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For the current version of this document, see:

- Depot Pack (see Depot Pack Instructions (DM# 9001578))
- the Western Power intranet site, busbar http://busbar/work-practices.html
- Enterprise Connect (DM# 6999451)

**Note:**

Any updates to this manual will be communicated to the Network Total Workforce (NTW) and the electronic version updated on Depot Pack, the Western Power website and busbar.

This document has been prepared by Work Practice Development & Training.

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Safety LifeSavers

Safety LifeSavers are essential safe work practices designed to protect you and others from serious injury or death.

QUALIFICATION AND AUTHORIZATION
To safely perform the work including operating equipment, you must have the necessary qualifications, certificates, competencies and training.

JOB BRIEFING
Before you start, make sure you plan the job and all members of the work team understand their roles and responsibilities. A Job Risk Assessment must be completed for all operational jobs.

PERSONAL PROTECTIVE EQUIPMENT
Always wear the appropriate personal protective equipment and clothing at the work site and for the job.

WORKING AT HEIGHTS
Comply with all the requirements of working at heights when using equipment such as a ladder, harness, halyard or scaffold.

WORKSITE SAFETY
Provide adequate control to manage site hazards, excavations, traffic and public safety.

TEST AND CONFIRM
Test before you touch. Treat all conductors as live until YOU prove they are de-energised and made dead. Confirm your work and follow the correct work instructions.

ISOLATION, PERMITS AND TAGS
The relevant permits or programs must be issued before work starts. Make sure the correct isolations are made and the proper tags are used for the job.

EARTHING
Apply appropriate earthing where required. Use visible earths in the work area.

VEHICLE OPERATION
Always drive safely, obey traffic laws, secure loads and conduct regular safety checks.

Think Safe
Work Safe
Live Safe

Breach of Safety LifeSavers or concealing breaches can result in disciplinary action and may lead to termination of employment.
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Introduction

Work practices

Western Power is committed to meeting all legal obligations in relation to legislative, regulatory and environmental requirements.

The work practices contained in this manual have been developed to ensure standardisation of work practices and procedures for the Network Total Workforce (NTW). They ensure that the NTW is aware of their roles and responsibilities in creating and maintaining a safe working environment that meets state and national legislation, standards and work practices.

These work practices, which set the minimum requirements, must be issued to all relevant staff and must be followed at all times except when:

- in the opinion of the employee, a potential injury or life threatening situation dictates alternate action. In this situation, stop work and contact your formal leader.

or

- written authorisation for an alternative practice has been obtained, in advance, from Work Practice Development

The manual is constantly being reviewed, updated and developed to meet new legislation, newly developed techniques and technological advancements in equipment and network design for accessing and working on the Western Power Network.

Version control

- It is the user’s responsibility to update and maintain their own hard copy manual.
- It is the formal leader’s responsibility to ensure that employees are using the current version of the Work Practice Manual.

Note:

Use the electronic version wherever possible. It is available on Depot Pack, the Western Power website and busbar. This helps to ensure that the most up to date version of the manual is being used.
Depot Pack

Depot Pack is an electronic resource that was designed to be used by workers in the field where a data connection may not be available. It does not require a network or internet connection to be used (although one is required to update the Depot Pack files).

Figure 1: Depot Pack main menu

Depot Pack is available to the entire NTW and is in use by all Western Power staff and many of our contractors.

Depot Pack is:

- the one stop shop for all Western Power work practice information
- easier to use and more reliable than printed paper documents. It’s regularly updated, so you know the information is current, unlike a printed document that may have changed since your copy was printed.
- a controlled source of information, which is crucial when it comes to safe and efficient work practices

For information on installing and updating Depot Pack, see Depot Pack Instructions (DM# 9001578).
Western Power website

The Work Practice Manual is available on the Western Power website in the *Network contractors* section:


**Hierarchy of documentation**

Government legislation and regulations set the requirements for company-level policy. Within Western Power, documentation is governed by the hierarchy shown in Figure 2, below. If there is ever a difference between documentation, the higher level documentation always overrides documentation at a lower level.

- The Work Practice Manual overrides guidance notes, etc.

*Figure 2: Western Power’s Safety and Health Management System Document Framework*
Feedback

The Work Practice Development team strives for continual improvement of systems, procedures, processes and instructions. We value feedback, and encourage any suggestions or recommendations for changes, alterations or inclusions.

Feedback must be submitted to a formal leader for review, who may then forward it on to us at:

work.practice.development@westernpower.com.au

References

- Depot Pack Instructions (DM# 9001578)
Definitions

Aboriginal
A member of the Aboriginal race of Australia, including a descendant of the indigenous inhabitants of the Torres Strait Islands.

Above
Greater in height than a given level, at or to a higher point.

Active or phase conductor
Any conductor that is maintained at a difference of potential from the neutral or earthed conductor (also known as phase, line, red, white, blue, live).

Aerial bundle cable (ABC)
Conductors that are insulated and twisted together to form a single unit.

Anchor/anchorage point
A secure point of attachment on a structure to which a fall-arrest device, or lanyard assembly, or restraint line may be secured.

Apparatus
Any item of electrical machinery or equipment (including primary and secondary) in which conductors are used, or supported, or of which they form a part.

Approved
Having appropriate Western Power endorsement in writing for a specific function.

Approved high-load route
A Western Power and Main Roads-approved road over which any electricity mains are at a height, which allows a vehicle to move without an escort.

Approved work technique
A documented technique which meets the requirements of this manual and which has been approved by Western Power.

As constructed drawing
A design drawing that has been modified or altered due to changes to the construction. As constructed drawings should be prepared by a qualified surveyor where cable routes are shown and should be verified and signed by the person in charge of the work.
Asbestos
The name given to a group of naturally occurring fibrous, crystalline minerals. The three main types of asbestos minerals that have been used in products throughout WA are Crocidolite (blue asbestos), Amosite (brown asbestos) and Chrysotile (white asbestos). Contact with asbestos is strongly linked to fatal illnesses.

Atmospheric monitoring device
A device that can measure continually or at intervals, the composition of the air including:
- combustible gases
- oxygen level
- carbon monoxide
- hydrogen sulphide

Authorisation/Authorised
Shall be approved in writing or by means of an approved technique by western power. See 'Approved'.

Authorised person
Is a competent person with the delegated authority to perform the duty concerned on behalf of Western Power.

Barrier
A temporary visual device (fence/restraint/person) that restricts or prevents access to non-authorised personnel.

Brush contact
Momentary accidental or inadvertent contact.

Bush fire
A fire, or potential fire, however caused, including a fire in a building.

Bush Fire Service (previously the Bush Fire Board; before 1997)
Co-ordinates the volunteer bush fire brigades that fight fires in rural areas.

Cable
An insulated conductor or two or more such conductors laid together, whether with or without fillings, reinforcements or protective coverings.
Cable cover
A mechanical protective object that affords protection to cables from inadvertent contact (e.g. split conduit, planking, slabs, conduit, poly pipe and concrete) covered with earth placed over the cable in accordance with the design manual.

Cable locator
A device that can be used to detect the presence of buried apparatus either by sensing fields or signal injection.

CDD/EDD
Controlled descent device/Emergency descent device. A device or system that enables a person to descend from a height at a predetermined speed.

ChemAlert
A database providing chemical and product information and material safety data sheets (MSDS).

Circuit
A configuration of electrically connected components or devices that has a closed loop giving a return path for the current.

Clean down
The removal of all soil and vegetation from a vehicle and/or footwear by either washing or brushing down. Particular attention is to be given to wheel arches, mudflaps, tyres and vehicle under-body.

Collapsible area
The area surrounding an excavation that may be subject to collapse due to excavation work. A safety provision is using the natural angle of the lay of the soil to the horizontal in which the soil will not collapse (angle of repose up to 30°).

Collection tank
A grease trap, oil interceptor, or an impervious vessel, other than an apparatus for the treatment of sewage, for the collection, storage, transfer or treatment of controlled waste.

Combined earthing system
A combined earthing system as defined in AS 3000, in which high and low voltage electrical equipment is connected to a common earthing system.

Combustible material
Any material capable of catching fire and burning.
**Commissioning**
Activities carried out in order to ensure that new and existing equipment is safely and accurately connected to the network and, once in service, will operate as intended. Activities include inspections to verify installation, commissioning tests and post-energisation tests/checks.

**Commissioning Authority**
The Commissioning Authority is the group which conducts pre-commissioning and final commissioning activities. The Commissioning Authority controls access to plant and equipment which cannot be energised by normal switching during the commissioning stage.

**Commissioning Notice**
Issue of this notice signifies that all commissioning tests have been completed and that a site or items(s) of plant is accepted by the Operating Authority ready for service. The notice may contain a list of outstanding items.

**Competent/competent person**
A person having the skills, knowledge and attributes needed to complete a task.

**Completion Notice**
A Completion Notice is issued to advise that construction work has been completed. It may be used for a complete site, part of a site, or may only cover certain items of plant. It may also contain a list of outstanding items.

**Concentrated**
Oil, chemical, gas or fuel that has collected in one location.

**Conductive pole**
Concrete poles, steel poles and wooden poles with a down earth conductor.

**Conductor**
A wire, cable or form of metal designed for carrying electric current (includes neutral and earth).
Confined space
An enclosed or partially enclosed space that is not intended or designed primarily for human occupancy, within which there is a risk of one or more of the following:
- An oxygen concentration outside the safe oxygen range.
- A concentration of airborne contaminant that may cause impairment, loss of consciousness or asphyxiation.
- A concentration of flammable airborne contaminant that may cause injury from fire or explosion.
- Engulfment in a stored free-flowing solid or a rising level of liquid that may cause suffocation or drowning.

Connectable
Apparatus capable of being connected to the live system by switching.

Connected
Joined together by a conductor capable carrying electrical current for its required function or purpose by either physically clamping or bolting conductors together or closing a circuit breaker, switch or similar device.

Constant leakage monitoring
Monitoring continually or at intervals of leakage (in micro amps) of current across the insulated section of the boom during high voltage work – 1 uA/kV allowable.

Construction Authority
The Construction Authority is the group which is responsible for the construction and installation of the plant and equipment. The Construction Authority controls access to plant and equipment which cannot be energised by normal switching during the construction stage.

Construction Authority Work Permit (CAWP)
Construction Authority Work Permit (CAWP) – a non-operational permit issued by a Construction Authority that authorises the work on new or non-operational and not connected electrical apparatus and associated equipment.

Construction site
A workplace at which construction work (see definition below) is done and includes any adjoining area where plant or other materials used or to be used in connection with that work are located or kept and over which the Network Total Workforce has control for the purpose of doing the construction work.
Construction work

- The construction, erection, installation, alteration, repair, maintenance, cleaning, painting, renewal, removal, excavation, dismantling or demolition of, or addition to, any building or structure, or any work in connection with any of those things, that is done at or adjacent to the place where the building or structure is located.
- Work on which a hoisting appliance or any scaffold or shoring is used or intended to be used.
- Work in driving or extracting piles, sheet piles or trench sheet.
- Work in laying any pipe or work in lining pipe that is done at or adjacent to the place where the pipe is laid or to be laid.
- Work in sinking or lining or altering, repairing, maintaining, renewing, removing, or dismantling a well or borehole.
- Road works, earthworks or reclamation.
- Work in laying an underground cable or work related to laying an underground cable that is done at or adjacent to the place where the cable is laid or to be laid.

Consumer

A person, entity or thing to which electricity is supplied for the purpose of consumption.

Consumer mains

Those conductors between the point of supply and the main switchboard.

Consumer pole

A support pole providing ground clearance for overhead service mains that are connected to the point of supply (either on a building or another pole).

Contact area

The surface area of one object that makes contact with another.

Contact area (Glove and Barrier work)

The area within one (1) metre of the nearest energised high voltage line or component whilst carrying out glove and barrier work.

Continuity test

A test to determine whether electrical current flows continuously throughout the length of a single wire or individual wires in a cable.
Contractors
Any person(s) engaged to execute works under a contact.

Control Authority
This is the representative authority responsible for the control of apparatus. Typically this includes:
- Construction Authority
- Commissioning Authority
- Operating Authority: Transmission SOCC and Distribution NOCC

Controller
An authorised person who co-ordinates switching, performs switching by remote control and approves the issue of work permits.

Cover (Insulated)
A barrier of insulating material specifically designed, approved and tested for use as a line cover or as a cover for equipment or apparatus.

Customer standing agreement (CSA)
Is a document which represents a standing agreement between the high voltage customer and Western Power. The purpose of a CSA is to ensure that any customer switching of specified circuits is performed with the network operator’s prior permission and approval.

Danger
Is the presence of risk to health and/or risk of bodily injury.

Danger zone (As defined by the ESSP/ENA)
Lines – Distribution and Transmission
The area surrounding live electrical equipment (such as powerlines), that ordinary persons, equipment and materials must not enter. The size of the zone varies depending on the voltage.

Danger zone (AS 2067)
Substations
The area limited by the non-flashover distance (N) around live parts that are without complete protection against direct contact.
Note: Infringing the danger zone is considered the same as touching live parts.

Dangerous goods
Classified goods having, or potentially having, a dangerous or hazardous nature.
Dangerous goods in bulk
Dangerous goods of Class 2 (gases) in a container with a capacity greater than 500 litres or dangerous goods of another class in a container with a capacity greater than 450 litres; and a container with a net mass of more than 400 kilograms. Also see 'Packaged dangerous goods'.

De-energised
The electrical supply to electrical apparatus has been switched off. The electrical supply has been de-energised but not necessarily isolated, tested and earthed.

Dewatering
The action of removing groundwater or surface water via pumping from a construction site. Also known as 'construction dewatering'.

DFIS
Distribution Facilities Information System. A geographical information system (GIS) that allows users to view the electrical distribution network in relation to physical geographical location in Western Australia. Users can view and analyse network assets using spatial information.

Discharge
The release or dissipation of stored energy.

Discharged (Electrically)
Conductors which have been connected to earth so as to remove any stored electrical energy

Disconnected
Apparatus that has been separated from the system by the removal of jumpers or sections of conductor so that it cannot be re-energised through normal switching operations.

DNAR
Distribution Network Access Request. The formal request to Network Operation Control Centre to access the HV distribution network.

Do Not Operate Danger tag
An approved tag that reads 'DO NOT OPERATE DANGER' which is affixed to isolation and program earthing points established for the purpose of issuing a work permit to personnel.
Drop zone
The area below the immediate work where objects could fall or be directed into if they strike other structures or objects after the fall.

Earth
The conductive mass of the earth, the electric potential of which, at any point, is conventionally taken as zero.

Earthed
Electrically connected to earth in an approved manner by approved earthing conductors or switches.

ECL
Electrical Contractors Licence

EDD/CDD
Emergency descent device / controlled descent device. A device or system that enables a person to descend from a height at a predetermined speed.

Electrical Access Permit (EAP)
Western Power’s standard form that authorises access to, and work on, electrical apparatus which has been made safe by isolating and earthing.

Electrical apparatus
Any electrical equipment or machinery in which conductors are used, or supported, or of which they form a part.

Emergency
An event, actual or imminent, which endangers or threatens to endanger life, property or the environment, and requires co-ordination of a number of significant emergency management activities.

EMISWeb
A database for recording and tracking Western Power’s environmental activities and legal compliance.

ENMAC
Electricity Networks Management and Control (for distribution systems). An advanced DMS/TCS/SCADA product that completely computerises Electricity Distribution Control Room operations.
Equipotential mat
A conducting device at ground level, connected electrically to equipment, to avoid differences of step and touch potential through the body of a person.

ESA
Environmentally sensitive area

ESO
Environmental support officer

ESSP – Electrical System Safety Procedures
The intention of the ESSP is to provide Western Power with a standard set of procedures and rules that govern all access to the network issued and owned by NOCC and SOOC.

EWL
Electrical Workers Licence

Elevated work platform (EWP)
Mobile plant equipment used to gain access to and work on lines.

Elevated work platform operator
A person who holds a current Elevated Work Platform Licence, class (WP), High Risk Work Licence and is competent to operate the plant under their control including the retrieval of the basket in the event of an emergency.

Excavation
Any action that digs, displaces or penetrates the ground.

Extra low voltage
Not exceeding 50 volts ac or 120 volts ripple-free dc.

Extreme fire danger
The fire danger rating for the day in a district that exceeds specific values (as determined by the Bureau of Meteorology) and aspects of the Bush Fires Act 1954 which are in force for the day.

Ferro-resonance
A condition that may occur when an unloaded delta/star distribution transformer becomes energised or de-energised by single phase high voltage switching, causing sustained over-voltages.
Fire danger warning
An advice from the Bureau of Meteorology indicating adverse fire weather conditions.

Fire extinguisher (hand held)
The hand-held fire extinguisher is simply a pressure vessel from which is expelled a material or agent to put out a fire.

Fire fighting unit
A device that comprises a container filled with a minimum of 400 litres of water and a motor driven pressurised pump (spray unit) capable of discharging water.

Formal handover
A formal handover is either a verbal or written exchange of information between two or more people who have responsibility for the job. The formal handover information must be accurate and understood, thereby ensuring the continuity of safe work processes.

Formal workplace risk assessments
These risk assessments are required both for individuals and teams. For individuals it involves following clearly defined steps usually in the form of hazard checklist to be completed and signed off by an individual identifying the hazards and assessing the risks within their own or another workplace as part of a regular procedure.

Frangible
Impact-absorbent hexagonal column with a split seam feature where all sides are intermittently welded in the vehicle impact zone (10.5 metres and 12.5 metres columns only from ground level to 3 metres).

Fully insulated EWP
An approved, tested and insulated EWP that has constant leakage monitoring facilities to ensure continued insulation for higher voltage work, 66 kV and above.

Gantry
A structure built to prevent new aerial conductor being strung over existing distribution conductors from making inadvertent contact with the lower conductors.

Ground safety clearance
The minimum distance required between the earthed end of any exposed insulator carrying or containing live parts and ground or the floor of permanent walkways used for normal inspection and operation functions. This distance is equivalent to
the reach of a person at ground level (2,400 mm) which includes an allowance of 300 mm for tools.

**Ground approach distance**
The distance to be maintained by all ground personnel from the base of the mobile plant (stabilisers/outriggers) when deployed.

**Ground observer**
A person whose sole role is to advise the EWP operator of any hazards that could restrict the operation or cause damage to the EWP, and be able to perform an emergency operation by use of a manual recovery system, if required to do so. Note: This function could be performed by the safety observer if trained in emergency recovery by manual means.

**Handover Certificate**
Is used when responsibility for control of one or more items of plant, or an entire site, is transferred from one group to another.

**Hazard**
A source of potential harm or a situation with the potential to cause loss or damage.

**Hazardous workspace**
Any space that, during its occupancy is likely at any time to:

- Have an atmosphere which could contain unacceptable levels of harmful contaminants.
- Have a too high or too low level of oxygen.
- Cause engulfment of the space.
- Has a means of entry or exit that is restricted.

Restricted entry or exit requires the use of three limbs to enter or exit. Therefore it is impossible for a single person to remove an incapacitated person unaided.

Training is to be provided by a registered body and meet national requirements for Confined Space Entry.

**High voltage (HV)**
A voltage of 1,000 volts ac or 1,500 volts dc or greater.

**High voltage earth installation**
Any high voltage installation where high voltage earth electrodes are to be installed. This could be at ground-mounted substations, wooded poles with a down earth or conductive poles.
Horizontal work safety clearance
The minimum distance from the extremities of the work object, horizontally to the nearest live part.

Hot work
Any naked flame, any hot air blower or any gas operated handgun.

Independent earth
An effective earthed reference point used for testing purposes.

Independent scaffold
Scaffolds that consist of two or more longitudinal rows of standards connected longitudinally and transversely. Independent scaffolds typically, but not necessarily, are constructed prefabricated components, prefabricated frames, tubes and couplers or timber components with bolted connections

Information Caution tag
An approved general purpose information tag affixed to apparatus to provide information about changed or unusual network operating conditions. An Information Caution tag would be used for conditions that do not require a Do Not Operate Danger, Restricted Use Danger or Out of Service Warning tag and may not be apparent to the observer if the tag was not present.

Inspection
To view or examine to a set criteria as part of a job process.

Inspection tag
A tag which is used to indicate that the equipment to which it is attached has passed inspection. The tag should also show the date the equipment was inspected and the date the next inspection is due.

Instructed person
A person who, whilst operating mobile plant (crane) near energised overhead electrical apparatus, is adequately advised and supervised by an authorised person to ensure they avoid the dangers presented or created by energised equipment.

Insulated
Separated from adjoining conducting material by a non-conducting substance, which provides adequate resistance to the passage of current, or to disruptive discharges through or over the surface of the substance at the operating voltage and to mitigate the danger of shock or injurious leakage of current.
Insulated conductor
A conductor covered by a type of insulation that prevents the danger of electric shock.

Insulated EWP
An approved and tested insulated EWP fitted with an approved and a tested insulating liner to the inside of the basket – used with the glove and barrier method.
An approved and tested insulated EWP without a liner – used with the stick method.

Insulated tools and equipment
Tools and equipment specifically designed, approved and tested for use on or near live electrical apparatus.

Insulating barrier
A barrier of rigid or flexible insulating material specifically designed, approved and tested for use as an insulated cover.

Insulating equipment
Equipment of insulating material specifically designed, approved and tested for use on high voltage equipment.

Insulating gloves
Gloves that are especially designed, approved and tested to a rated voltage for working on or near live electrical apparatus.

Insulating pole platform
A platform of insulating material specially designed, approved and tested for use with the HV live work glove and barrier method.

Insulating sleeves
Insulating sleeves are specially designed, approved and tested to a rated voltage for working on or near live electrical apparatus.

Isolated
De-energised by an isolating device that prevents unintentional energisation of the electrical apparatus.

Isolating device
A device for rendering plant and apparatus isolated.
Isolation point
An isolating device that has been isolated and has a DANGER DO NOT OPERATE tag fitted.

Issuing officer (IO)
An authorised person who is responsible for issuing permits. Note: This task is generally handled by the switching officer.

Insulating pole platform
A platform of insulating material specially designed, approved and tested for use with the HV live work glove and barrier method.

Job briefing
A discussion (for example, during toolbox meetings), which must involve all members of the work team prior to the commencement of any work, and as required throughout the job. The key elements include but are not limited to:
- Scope of work involved.
- Work procedures/practices involved.
- Roles of each team member.
- Hazards associated with the job and the control measures required (JRA).
- Work zone setup.
- Contingency plans.

Job risk assessment (JRA)
A job risk assessment (JRA) is a critical part of work planning. It ensures the scope of work is understood, all foreseeable hazards have been identified, effective controls established and communicated through the job briefing process.

Karabiner
An oblong metal ring with a spring clip, used to attach a running rope.

Lanyard
A line used, usually as part of a lanyard assembly, to connect a fall-arrest harness to the anchorage point or static line in situations where there is risk of a free-fall.

Leaching
Action of a liquid filtering or gradually oozing through the wooden pole, typically indicated by a moist, gummy or sticky surface.
**Lead Combat Authority**
A title used to describe an organisation that is responsible for ensuring that all emergency management activities are undertaken for a specific emergency.

**Levelling or stabilising crossbar**
An insulated crossbar that is used to stabilise and level LV conductors prior to installing spreader rods.

**Linesman’s pole strap**
A work-positioning strap designed to be placed around a pole and attached to two points on each side of a lineworker’s body belt, or a fall-arrest, or fall harness, whilst the wearer is working on the pole.

**Live**
Energised or subject to hazardous induced or capacitive voltages.

**Live line equipment**
All approved live line tools, rope, insulating equipment and other gear used for live line work.

**Live line glove and barrier method**
A method of performing live line work on circuits up to and including 33,000 volts. The live line worker is fully insulated from earth and phases using approved insulating gloves and sleeves, insulating platform and/or insulated EWP and insulating barriers.

**Live line stick (also called Hot Stick)**
A stick of insulating material specifically designed, approved and tested for use in physically bridging the distance between the live line worker and energised apparatus, between the energised apparatus and earth, between adjacent phases, and to enable physical loads to be taken or tools to be applied to the stick.

**Live line stick method**
A method of performing live line work using tools and equipment attached to live line sticks with the live line worker maintaining the MAD from energised apparatus.

**Live line work**
All work performed on high voltage or low voltage apparatus capable of being energised without implementing the full protective practice of isolating, proving de-energised and earthing at the worksite.
**Live line worker**
A person who, by way of training and demonstration of competency, performs live high voltage work or low voltage work.

**Live work**
All work performed on components of electrical apparatus, not isolated, nor proved de-energised or short-circuited or earthed.

**Load box**
An electrical device used to apply a resistive load to the low voltage side of a transformer.

**Low voltage (LV)**
A voltage less than 1,000 volts ac or 1,500 volts dc.

**Manual recovery system**
A system that is capable of being operated by a person located on the ground to manually retrieve an EWP basket.

**Material safety data sheet (MSDS)**
A document providing detailed information on a hazardous substance.

**Mats**
A insulated material specifically designed, approved and tested for use as a mat to stand on insulating person from earth.

**MCB**
Mains connection box which is the customer’s point of connection from the energy supplier.

**Mechanical protective glove**
A glove that by its design affords the wearer protection against cuts, abrasion and penetrating hazards.

**Medical air cylinder**
A cylinder containing air of breathing quality. Used to oxygenate the atmosphere within a power transformer.

**MEN**
Multiple Earthed Neutral system of earthing, as defined in AS 3000.

**Midspan**
The centre of a span between two fixed points or poles.
Minimum approach distance (MAD)
The minimum separation distance that must be maintained by a person, mobile plant (including its load) or any object (other than insulated objects designed for contact with live conductors) from electrical apparatus for that apparatus nominal voltage and the person skill level (authorised person or ordinary person).

Minimum tool insulating distance
The distance that the insulating material (stick or rope) is subjected to whilst touching energised conductors. This distance shall be measured between the metal end fitting at the conductor end of the insulating material and the metal end fitting or handmark, where provided, at the opposite end of the insulating material. When live line sticks consist of sections joined with metal couplings, the insulating distance shall be the total of each of the lengths of insulating material which have not been bridged out by the metal couplings.

Minor spill or leak
Amounts between 20 and 100 litres.

Mobile plant
Cranes, elevated work platforms, tip trucks or similar plant; any equipment fitted with a jib or boom and any device capable of raising or lowering a load.

Mobile scaffold
An independent scaffold that is freestanding and mounted on castors.

Multi-task workplace risk assessments
These are sophisticated workplace risk assessments that form part of the planning process of the more complex jobs and projects. They follow a similar format to that of formal workplace risk assessments in as much as they require hazard identification and risk assessment, but involve a more highly structured, facilitated risk assessment.

Near
Outside the minimum approach distance (MAD) but where there is a reasonable possibility of a person, either directly or through any conducting medium, coming within the MAD.

Network
The transmission or distribution conductors or apparatus. The word ‘network’ can be used interchangeably with ‘system’. On working anywhere inside the MAD.
Network Authority Card (NAC)
A card issued by Western Power to an authorised person as evidence of their authority to work on Western Power’s Network. The card provides written and photographic identification of the authorised person. The Network Authority Card remains the property of Western Power and may be recalled by Western Power in the event of suspension or cancellation of the worker’s authority to carry out work on or near Western Power’s Network.

Network operator
The owner, controller operator of an electricity network (NOCC/SOCC).

Network Total Workforce (NTW)
Is the total workforce who work on Western Power’s Assets ‘the network’ and consists of Western Power employees, contractors, subcontractors, Alliance Participants and partners.

Neutral conductor
The conductor of a three-wire or multi-wire system that is maintained at an intermediate and approximately uniform potential in respect of the active or outer conductors, or the conductor of a two-wire system that is connected to earth at its origin.

NMS
Networks Mapping System.

No work zone
An area around a suspected object of Aboriginal origin in which no construction activities are to be conducted.

NOCC
Network Operations Control Centre. The NOCC is responsible for control of the Distribution Network.

Non-frangible column
Solid one section pieces of hexagonal column with a continuous weld on seams or a one piece pipe column.

Noxious weed
A non-native species, which is declared to be harmful and if found, must be controlled or eradicated by the property owner.
Object of Aboriginal origin
An object, including Aboriginal remains, used, made or adapted for a purpose consistent with Aboriginal traditional cultural life.

One Call
(Dial Before you Dig, phone number 1100) The service that issues information about the likely presence of buried apparatus installed by various service utilities. http://www.1100.com.au

On-site person in charge
A person who is responsible for the work being carried out by a work team.

Operational work
All construction, maintenance, trade based and switching activities undertaken in a field environment.

Operating Agreement (OA)
Is used to confirm between two parties that the state of apparatus will remain constant for the duration of the agreement.

Operating Authority
The division responsible for the operation and control of the network.

Ordinary person
Is a person without sufficient training or experience to enable them to avoid the dangers that electrical apparatus may create.

Organochlorine pesticide
A wide range of organic chemicals, which contain chlorine and sometimes several other elements.

Other cable systems
Telecommunications cables, pay television cable, control cables, aerial earthed cables, electrolysis drainage cables.

Out of Service Warning tag
An approved tag that reads "OUT OF SERVICE WARNING" which is affixed to apparatus and advises of the physical condition of apparatus or network controlled by the apparatus.

Out of use (electrical)
For HV the removal from each source of electrical supply, a length of conductor equal to or greater than the insulation distance for that voltage. For low voltage, a
gap in the conductor of not less than 150 mm. An isolator is not an acceptable alternative to the removal the length of a conductor.

Packaged dangerous goods
Dangerous goods Class 2 (gases) in a container with a capacity of not more than 500 litres or dangerous goods of another class in a container with a capacity of not more than 450 litres; and a container with a net mass of not more than 400 kilograms.

Packing groups
Packing groups are used for the purpose of determining the degree of protective packaging required for dangerous goods during transportation.

- **Group I**: great danger, and most protective packaging required. Some combinations of different classes of dangerous goods on the same vehicle or in the same container are forbidden if one of the goods is Group I.
- **Group II**: medium danger
- **Group III**: least danger among regulated goods, and least protective packaging within the transportation requirement

PCB
Polychlorinated Biphenyl – a hazardous substance found in capacitors and transformers manufactured before 1978.

PCB coffin/drum
A container acceptable for PCB contaminated chokes and capacitors is a steel drum of gauge 18 or heavier with a gasket made of PCB resistant material.

Person in charge
The person responsible for the work being carried out by a work party.

Personal protective equipment (PPE)
Approved personal protective equipment and clothing specified for the task or work area.

Phase position
Western Power connects the three phases in the order: Red – White – Blue, from left to right.

Phase rotation
The direction phases rotate relative to each other.
Phasing out
The identification of active conductors of the same phase (having no significant angular displacement i.e. red phase to red phase).

Physical clearance
No contact is made with the conductor.

Plant
Mechanical plant including all machinery and equipment not elsewhere defined as apparatus.

Polarity
The voltage of a conductor relative to another conductor or the general mass of earth.

Portable earthing equipment
Earthing equipment that can be transferred from one location to another and used for earthing and short-circuiting de-energised apparatus.

Potholing
The action of removing earth by hand or vacuum excavation to determine the existence of any known or unknown buried apparatus.

Powerline or line
Any aerial conductor with associated supports, insulators and other apparatus erected, or in the course of erection, to convey electrical energy.

Procedure
The documentation of a systematic series of actions (or activities) direct to achieve a desired result.

Proposed Outage Plan (POP)
A Proposed Outage Plan is the online mechanism by which outage requests are lodged with the Transmission Network Operating Authority. The request for access (POP) can be utilised for the purpose of maintenance, construction or testing. A Proposed Outage Plan outlines:

- Isolations which are required to complete the work.
- Operational impact.
- The date and time of the intended work.
- The types of permit(s) required.
- Any special precautions which need to be taken.
Contingency planning information.

Primary plant
Primary plant is all equipment which can be connected to HV levels, e.g., circuit breakers, isolators, and current transformers. Primary plant also includes any equipment directly associated with the major plant, e.g., Buchholz relays on transformers, SF₆ gas pressure switches on circuit breakers.

Process owner
The person who has been assigned with the authority and responsibility for managing the whole process from end-to-end. This authority may extend across more than one division and/or functions, in order to deliver agreed business results.

Programmed earth
Earthing equipment of an approved type applied as part of an electrical switching programme/schedule.

Prohibited burning time
The times of the year during which it is declared by the Minister under Part III, Division 2, Section 17 of the Bush Fires Act 1954, to be unlawful to set fire to the bush within a zone of the State and, in relation to any land in that zone.

PTS
Pole-top switch.

PTS cover
Insulated material that has been moulded and tested to fit over PTS insulators and fittings.

Pyrolysis
The chemical decomposition of a substance by the action of heat.

Query trouble (QT)
Forms used/created by personnel in the field who identify areas for improvement in the distribution network that could impact safety or reliability.

Rated voltage
The manufacturer’s recommended maximum voltage to be applied to their specified equipment.

Recipient
A person authorised by Western Power to sign on and sign off work permits under control of the recipient in charge.
**Recipient in charge (RIC)**
The authorised person who has the responsibility of accepting and relinquishing EAPS and VAs and managing the work group activities to ensure compliance with the conditions of the EAP or VA and the requirements of the ESSP.

**Registered Training Organisation (RTO)**
An education or training organisation that is registered under the appropriate state legislation.

**Remote control**
A module that is used to operate a base unit.

**Reconnected**
Apparatus that has been joined to the system by the reconnection of jumpers or sections of conductor so that it is re-energised.

**Remote end**
The opposite end of the cable from where work is being carried out.

**Restricted Use Danger tag**
An approved tag that reads 'RESTRICTED USE DANGER' which is affixed to apparatus and advises of the person who controls the operation and state of the apparatus. The tag allows the nominated person to change the status of the apparatus as required for their work.

**Risk**
The chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood.

**Risk control**
That part of risk management, which involves the implementation of policies, standards, procedures and physical changes to eliminate or minimise adverse risks.

**RMU – ring main unit**
One or a combination of ring main switches and/or switch fuses used to control and operate HV underground systems.

**Road safety barrier**
A physical barrier separating the work area and the travelled way, designed to resist penetration by an out of control vehicle and as far as practicable, to redirect colliding vehicles back into the travelled path.
RSU
Radio switching unit comprising a base unit and remote control.

Running Earth
Additional aerial earthed conductor run either above or below the active conductors.

Rural area
The countryside and pastoral areas outside the boundaries of a city or town.

Safe
Not posing an unacceptable risk to life, health or property.

Safe-cut
A method of exposing underground cables to establish their status.

Safety observer
A competent person assigned by the person-in-charge and whose sole function is to observe and warn against unsafe approach to live electrical apparatus or unsafe conditions.
The safety observer must remain outside the MINIMUM APPROACH DISTANCE.

Safe working load
The maximum load (in kilograms or kilonewtons) to be applied to the specified equipment, apparatus or hardware.

Sag
The vertical distance between the final conductor position midspan and the conductor fixing points.

Sanction to Test (STT)
Western Power’s standard form which authorises testing of electrical apparatus.

SCADA
Supervisory control and data acquisition.

Scaffold
A temporary structure, specifically erected to support access platforms or working platforms.

Screened Cable
Insulation covering conductor cores covered by a conducting or semi-conducting material that is connected to a neutral or earth.
SCT
Service connection testing. Testing of low voltage connections made onto Western Power’s low voltage network.

Secondary equipment
All equipment that is not directly connected to a HV system. Typically, anything that is installed on a protection panel. This includes (but is not limited to) protection relays, control relays, contactors, indication equipment, SCADA equipment, panel wiring, marshalling boxes and control kiosks. The demarcation point on CTs and VTs is the magnetic interface point. The secondary cores within CTs and VTs are part of the secondary system.

Secondary isolation schedule (SIS)
The Secondary Isolation Schedule is used to:
- Formalise the preparation of secondary isolations.
- Pass written information to the recipient.
- Provide information for isolation and restoration.

Secondary systems
Secondary systems include (but are not limited to) station LV supply, batteries and battery chargers, protection circuits, pilot cables, control and alarm circuits, SCADA and communication equipment.

Secondary work activities
All construction type work for the purposes of secondary equipment installation/replacement or modification, conducted under the conditions of an EAP permit. Whenever access to secondary equipment is required, a Secondary Isolation Schedule will be in accompaniment with either EAP for primary plant or an EAP for secondary plant.

Section safety clearance
The minimum distance between live parts and the foot position of a person, whether they are on the ground, a walkway, a platform or on top of equipment.

Serviceable apparatus
Parts of the network and consumer owned apparatus to which access is allowed by the Network Operator and Service Providers for the purposes of maintaining supply.
Short circuited low voltage
Earthing of LV circuits is performed by bonding all phase and neutral conductors using approved equipment and procedures. This is commonly referred to as short-circuiting.

Shall and should
Throughout this manual the word “shall” is to be interpreted as the minimum requirement and ‘should’ is to be interpreted as advisory or discretionary.

SOCC
System Operations Control Centre. The SOCC is responsible for control of the Transmission Network.

Specialised insulated mobile plant
An all-terrain tree trimmer

Spiking
The process of proving a cable has no hazardous voltage present, by creating a short circuit between the core(s) and neutral/earth screen, using a method that poses no risk to persons during the spiking of the cable.

Stabiliser
An approved, hydraulically deployed stabilising structure fixed to a crane borer sub-frame.

Substation
Any yard, terminal, zone substation or facility that transforms or switches high voltage.

Switching
The operation of circuit breakers, isolators, disconnectors, fuses or other methods of making or breaking an electrical circuit and/or the application and removal of programme earths.

Switching Authority
An authority that has been issued an approval to give approval to perform switching operations.

Switching device
Any item on the network capable of connecting and disconnecting apparatus.
Switching operator
A person authorised by the operating authority to carry out switching operations within the limits of their authorisation.

System
Refer to ‘Network’.

Test
The measurement of electrical apparatus, with an approved device, to establish the present condition.

Test voltage
The voltage which shall be applied to the specified equipment for the purpose of periodic electrical testing.

Tested
Apparatus which has been tested in accordance with the relevant standard.

Tester in charge (TIC)
The authorised person who has the responsibility of accepting and relinquishing an STT and managing the work group activities to ensure compliance with the conditions of the STT and the requirements of the ESSP.

TNO
Technical network officer.

Under direction
The authorised operator with the ‘D’ restriction may carry out switching on their own. However, each item of the program requires direction by telephone or radio from the authorised switching operator.

Vicinity Authority (VA)
Western Power’s standard form that authorises work in close proximity to live electrical apparatus or apparatus which may become live.

Vegetation
Any living or non-living plant, or part thereof.

Vertical work safety clearance
The minimum distance from the extremities of the work object, vertically to the nearest live part.

VIR
Vulcanised insulated rubber.
Voltage
A difference of electrical potential normally existing between conductors or between conductors and earth.

Western Power Authorised Representative
Is authorised to act on behalf of Western Power within their scope of authorisation.

Work area
The area within normal body reach of the working position.

Working earth
Additional to programmed earths installed by a working team to ensure a safe work site.

Workplace
A place, such as a substation, vehicle, building or other structure, where employees or self-employed persons work or are likely to be in the course of their work.

Worksire
Colloquial term used by Western Power that refers to a construction site. Refer to ‘Construction site’.

Work team
One or more authorised persons who have been authorised to carry out work on Western Power equipment/network.

Working load limit
Working load limit (WLL) is the maximum load (tension) that may be applied to slings or to any materials handling equipment.

Working voltage
The maximum voltage to be applied to the specified equipment while conducting actual fieldwork.
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2.1 Worksite evacuation plan

Purpose
This work practice outlines how and when to establish a worksite evacuation plan.

Scope
This work practice:

- applies to any worksite (in the field or at substation, radio or communications sites and associated buildings) where the risk assessment for a task has identified the need for an evacuation plan
- does not apply at sites that have a formal evacuation plan

Training
If it is identified during the risk assessment that an evacuation plan is required, and the plan requires a person with specific training, you must have a person onsite that has the relevant training.

Instructions
Identify if an evacuation plan is required
While doing the risk assessment, identify if an evacuation plan is required. Factors that may affect this decision include:

- the tasks to be done
- the environment of the worksite. This may change with seasons and weather conditions, and includes:
  - fire (e.g. bushfire)
  - flooding
  - lightning
  - venomous fauna (e.g. snakes, spiders, bees, ticks)
- any other incident that may endanger personnel or the public

Establishing an evacuation plan
If it is identified during the risk assessment that an evacuation plan is required, the following steps must be completed before work starts, and noted on the risk assessment.
1. Consider if any members of the public may be affected by the evacuation. If so, ensure that the evacuation plan takes them into account, including methods of communication.

2. Establish:
   - a means of raising the alarm
   - an evacuation route
   - an assembly point

3. Establish an effective means to communicate with emergency services in the event of an emergency (e.g. landline phone, mobile phone, two-way radio).

4. Obtain the direct phone numbers of local hospitals and doctors when working in country areas. For more on this, see Appendix 4 (Emergency contact information) in this manual.

   **Note:**

   If a non-phone communication device (e.g. two-way radio) is chosen in step 3:
   - obtain the contact details of local emergency services as appropriate to the device
   - ensure that all team members know how to use the device

5. Ensure that a first aid kit is onsite and contains equipment relevant to the potential injury risk.

6. Ensure that all team members understand their roles and responsibilities.

   For more on risk assessments, see work practices:
   - 2.27 (Construction site hazard management forms)
   - 2.28 (Job briefing process)

**In the event of an emergency**

1. Stop work and act according to the evacuation plan.

2. If safe to do so, attend to and assist with situations such as rescue, fire and injured personnel. Call emergency services or Network Operations if required (see *Emergency contact numbers*, below).

3. Move to the assembly point and:
   - confirm that all personnel are accounted for
   - await further instructions from the site coordinator, a team leader or other person as appropriate to the situation
4. Continually monitor the hazards and re-evaluate the evacuation plan if required.

5. Where practical, immediately document any additional actions on the risk assessment.

6. Report the incident, including details (e.g. fire, personal injury (including electric shock, even if it’s just a tingle), network asset damage), to both of the following within an hour of the incident happening:
   - your formal leader
   - the Incident Hotline on 1300 CALL WP (1300 2255 97)

**Emergency contact numbers**

**Emergency – Fire, Police, Ambulance** 000

**Emergency switching** *to stop injury or damage during the emergency*

Network Operations 9427 0626

**To report an incident** *after the emergency has passed*

Incident Hotline 1300 CALL WP (1300 2255 97)

**For assistance coping with natural or man-made emergencies**

SES 132 500

**Note:**

For more emergency contact information, see Appendix 4 (Emergency contact information) in this manual.

**References**

- Work Practice Manual:
  - work practice 2.27 (Construction site hazard management forms)
  - work practice 2.28 (Job briefing process)
  - Appendix 4 (Emergency contact information)
2.2 Safety observer role

Purpose

This work practice describes the role of the safety observer on any Western Power worksite. It also applies to onsite persons in charge and workers who are being observed performing tasks on Western Power worksites.

Training and authorisation

The role of the safety observer carries a high level of responsibility. The safety observer must have a high regard for safety, be familiar with the task and be fully aware of the potential risks associated with the work being performed. In addition, the safety observer:

- will require specific authorisation or qualification for certain high-risk work
- must be trained in any specific rescue process relevant to the task
- must be trained and authorised in the operation of any machinery or plant that is required for the rescue process
- must be competent in the use of any onsite communication system

Instructions

Risk assessment

- A risk assessment must be performed before commencing work. This may determine the need for a safety observer or multiple safety observers to be appointed. A safety observer is always required when the following work is being undertaken:
  - installing, maintaining or working on live low voltage (LV) or high voltage (HV) electrical equipment
  - work on or near live overhead conductors
  - work on live underground cables
  - mechanical excavation near underground or overhead utilities
  - pruning vegetation near live conductors
  - any elevated work platform (EWP) work
  - crane operations near live overhead conductors
  - any excavation work deeper than 1.5 metres
  - lead vehicle when escorting restricted access vehicles (high loads)
• The following are examples of operational tasks which may not require a safety observer unless the risk assessment deems it necessary:
  o switching operations
  o maintenance of control circuits
  o testing, removal and installation of test meters and load loggers
  o inspection and replacement of fuses or links
  o working at height on a communication tower when:
    — working in pairs at height
    or
    — in direct communication with a person who is trained in tower rescue and is onsite
  o testing for faults at mini pillars, universal pillars and LV panels

• The risk assessment must be used to record:
  o the name of the safety observer and the time that the role commences
  o an update each time the safety observer changes
  o the method of communication that will be used between the safety observer and the personnel working above, e.g. voice, two-way radio
  o the approved at-risk whistle warning system
  o if a safety observer is not required

Important

• The safety observer must use one sharp blast of the whistle to:
  o stop work
  o warn personnel of any imminent risk, hazard or non-compliance

• All personnel, on hearing the whistle, must immediately stop work and communicate with the safety observer.

• The decision to stop work must be made immediately and lies with the person who identifies the risk.

• Every member of the team is required to stop work in the event of imminent risk or non-compliance with safe work procedures.

• The situation must be reassessed and appropriate control measures must be implemented and recorded on the risk assessment before continuing.
Personal protective equipment

The safety observer’s personal protective equipment, including clothing, must be suitable for the work, in good condition and compliant with relevant requirements. For more on this, see section 3 (Personal protective equipment) in this manual.

The safety observer will be required to have additional safety clothing and equipment if required to perform a rescue.

Onsite person in charge

The onsite person in charge must:

- confirm that the safety observer is competent
- appoint and instruct the safety observer in their duties
- clearly define the work activity that is to be observed
- ensure that there are sufficient ground personnel so that the safety observer is not distracted, especially while observing live work. For more on this, see the Safety observer for live work section in this work practice.
- establish and ensure sufficient barriers or personnel to control the drop zone
- provide sufficient safety observers for rotation during tasks that take place over extended periods

provide any tools and equipment required by a safety observer, e.g. whistle, two-way radio, pole top rescue kit

Safety observer

- The safety observer’s primary role is to:
  - monitor the movement of people, plant and equipment and warn against unseen hazards
  - immediately stop the work when there is any imminent risk that could result in an incident
  - give timely warnings of any risk or non-compliance with safe work procedures
  - ensure that a two-way dialogue is maintained between the safety observer and all personnel being observed

- The safety observer must:
  - monitor the work activity being carried out and have the authority to suspend the work at any time
Operational work practice standards

- wear the approved whistle and green safety observer lanyard (with safety clasp) around the neck at all times while performing the safety observer role
- wear a green ‘Safety Observer’ armband
- be appointed prior to any member of the team commencing work
- fully understand and be comfortable with the role that they are performing
- not have any known temporary or permanent disabilities that would prevent them from properly performing the role
- rotate if fatigue becomes a risk factor. If there is no other safety observer to rotate with, work must be suspended in accordance with the Fatigue Management Standard.
- conduct a formal handover between the new safety observer and those being observed when replaced
- instruct the workers being observed to pause work whenever the safety observer becomes distracted or identifies an imminent distraction, e.g. during a changeover, changing position, third party distraction
- be positioned at a suitable location to effectively observe both the work being performed and plant being used
- be positively identified to each member of the work team
- remain outside of the minimum approach distance (MAD). For more on this, see work practice 2.8 (Minimum approach distances (MADs)) in this manual.
- immediately stop the work for any imminent risk situation that could result in an incident, and instruct when it is safe to proceed
- be prepared and ready to perform a rescue if required
- notify the person in charge of fatigue before focus is lost
- provide an eyewitness account of a worksite incident (if required)

Note:

When a worker is acting as a Recipient in Charge (RIC) or Tester in Charge (TIC), they must not take on the safety observer role at the same time.

Safety observer for live work

When acting as a safety observer for work on or near HV or LV live conductors, the following additional requirements must be met:
• Give undivided attention to those performing the work.
• Only focus on one work activity at a time.
• Do not undertake any other tasks that may distract their focus on the work that is being performed.

Extra ground personnel may be required while live work is being performed so that the safety observer is not distracted by external influences such as:
• controlling the public
• ensuring that the ground approach distance (GAD) is maintained
• controlling the drop zone
• restricting access to the worksite
• inducting visitors to the work site

**Note:**
Safety observers for HV live line work (e.g. when the glove and barrier method or insulated stick method is being used) have their own specific requirements as detailed in the *High Voltage Live Work Manual*.

**Workers being observed**
The workers being observed must:
• verbally respond to the safety observer to confirm their understanding of any instructions or warnings
• inform the safety observer if there is a change to the previously agreed scope of work
• stop work immediately when they hear the safety observer’s whistle
• during live work only - pause work and stay outside of the MAD when the safety observer has to change position or is being replaced
References

- Work Practice Manual:
  - work practice 2.8 (Minimum approach distances (MADs))
  - section 3 (Personal protective equipment)
- Fatigue Management Standard (DM# 10232185)
- High Voltage Live Work Manual
2.3 Height safety

Purpose

This work practice outlines the safety systems required when performing any elevated work.

Note:

This work practice provides the key safety requirements relevant to working at heights and does not attempt to replicate any detailed work practices contained in Worksafe WA’s Code of Practice, specific workplace instructions or training documents.

Training

- Personnel who perform work at heights on behalf of Western Power must:
  - meet the requirements of the unit of competence RIIOHS204D – Work safely at heights or equivalent
  - have a current Network Authority Card (NAC)
  - have current rescue training appropriate to the work at height risk potential
- Personnel who issue fall protection equipment must provide the user with instructions relating to the correct fitting, use, selection, testing, maintenance and storage of equipment. They must also explain the limitations of the equipment (see work practice 2.7 (Fall prevention equipment) in this manual).

Instructions

- Before commencing work where a person or equipment could fall, conduct a risk assessment (see work practice 2.28 (Job briefing process) in this manual).
- Where the risk assessment identifies that a person could fall from one level to another, suitable fall prevention means must be implemented. Engineering controls include:
  - use of a fall arrest/prevention system
  - installing edge protection
- Other hazards considered during the risk assessment include but are not limited to:
  - slippery surfaces
- uneven surfaces
- narrow ledges
- uncomfortable work position
- poor weather conditions (e.g. hot, cold, wet, windy, low light)
- unsuitable equipment
- loose objects
- positioning and movement of mobile plant
- positioning and movement of mobile elevated work platforms (EWPs)
- use and positioning of ladders
- use and positioning of cranes
- third parties not associated with the work
- location and environment
- loose tools

- The work must be planned to minimise the amount of work that will take place in an elevated area.
- Certain high risk tasks will have a Safe Work Method Statement (SWMS) to guide the risk assessment process (see work practice 2.27 (Construction site hazard management forms) in this manual).
- Ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual).
- Before use, a fall protection system must be visually inspected for serviceability and to ensure the tag is within date. For more on inspection and maintenance, see 2.7 (Fall prevention equipment) in this manual.

Note:
Personnel using fall arrest systems must not work alone.

**Risk controls**

**Fall injury prevention**

A fall injury prevention system must be used where a person could fall three (3) meters or more (*WA Code of Practice: Prevention of Falls at Workplaces (2004)*).
In addition to other controls, employer approved fall prevention, fall restraint or fall arrest systems must be used to reduce the risk where there is a likelihood of a fall from height:

- **Fall prevention systems** – includes railings, barriers, guardrails or any other control attached to walkways or scaffolding which will prevent a fall
- **Fall arrest systems** – any form of harness worn by workers and using a lanyard (including a shock absorber system) attached to a fixed point to limit a fall to the extent of the lanyard
- **Fall restraint technique** – a combination of anchorage placement and correct lanyard or rope-grab length with harness which will prevent the wearer from reaching a fall risk position
- Harnesses, lanyards, shock absorbers, pole straps and karabiners must comply with the following standards:
  - AS 1891.1-2007 *Industrial fall-arrest systems and devices - Harnesses and ancillary equipment*
  - AS 1891.3-1997 *Industrial fall-arrest systems and devices - Fall arrest devices*
  - AS 1891.4-2009 *Industrial fall-arrest systems and devices - Selection, use and maintenance*
- Before attaching a fall arrest system, visually inspect the integrity of the attachment point. The attachment point must be capable of withstanding the loading that is likely to be placed on it in the event of a fall.
- Adjust (if possible) the lanyard length to ensure that:
  - the shortest possible distance is travelled in the event of a fall
  - the fall will be arrested before the level below is reached
- A lanyard must not allow a person to fall more than two metres.
- Use the fall arrest equipment as directed and ensure that lanyards are properly connected.

**Equipment and materials**

The following controls must be used to reduce the risk of an object falling:

- Lifting large or heavy loads – consider the safest method of lifting these into the elevated work area; do not exceed the safe working load (SWL) of the lifting device.
• Secure loads – if using the EWP to lift large items, use slings or ropes that are suitably rated to hold the load.
• Organise the EWP – limit the amount of equipment and tools that are taken into the EWP to only those items that are necessary to complete the task.
• Tools – tool-bags and other equipment must be hung on the inside of the EWP. Where possible, attach heavy hand tools to prevent them from dropping.

Note:
Always consider alternative methods of raising equipment and materials into the elevated work area.

Drop zone

• The drop zone is an exclusion zone that must be established below any elevated work or suspended load.
• Establish the drop zone before commencing work. The area of the drop zone will depend on the following:
  o type of work
  o size and weight of equipment and materials being used in the elevated work area
  o height of the work
• The boundary of the drop zone must be agreed on by all members of the crew during the job briefing process and must be noted on the risk assessment.
• Access to the drop zone must be controlled and the method of control is to be decided during the risk assessment.
• The drop zone will affect the positioning and movement of the following (if applicable):
  o all personnel onsite
  o safety observers
  o vehicles and moving EWPs
  o ladders and work platforms
  o barriers and/or signs to mark the perimeter of the drop zone
  o traffic management
• Effective communication must be maintained between crew working aloft and ground staff.

**Note:**
If site conditions change, the drop zone must be reviewed and altered if required. Changes must be recorded on the risk assessment.

**Transformers**

• The top of a transformer may be used as a working platform if the risk controls are satisfactory. The risk controls must be in place before stepping onto the transformer.

• Before stepping onto the transformer, attach the fall arrest equipment to an attachment point.

**Note:**
Fall arrest equipment must be attached at all times during work.

• Use a ladder, elevated work platform or an approved means to ascend or descend the transformer.

• Depending on the risk of a fall, consider the use of a restraint line, maypoles or redirect anchors.

**Mobile elevated work platforms**

• Fall arrest systems must be worn and attached to the designated anchor point before ascending in an EWP.

• An EWP bucket should not cross beneath / above another unless the occupants of the higher bucket stop work while this movement is in progress.

• For additional information, see work practice 2.6 (Mobile elevated work platform (EWP) safety) in this manual.

**Towers**

• When ascending or descending a tower, use a double lanyard fall-arrest system.

**Ladders**

• When working on a pole structure, a pole strap and harness may be used instead of a fall arrest lanyard and harness.
• For additional information on ladders, see work practice 2.4 (Portable ladders) in this manual.

Scaffolding
• Whenever a person can fall two metres or more, install edge protection and a guardrail system.
• Never overload scaffolding.
• For additional information on scaffolding, see work practice 2.5 (Scaffolding) in this manual.

Trees
• Use climbing ropes and safety harnesses that are designed for tree climbing.
• Establish and consider the size of the drop zone to account for the debris from vegetation cutting, which will fall in an uncontrolled manner.
• For additional information on vegetation management, see section 10 in this manual.

Note:
If it is required to climb to the work position:
• small hand tools may be carried in a tool-belt
• large tools, power tools and equipment should be elevated by a handline
When working above a drop zone:
• where possible, hand tools should be attached to prevent them dropping
• large tools, power tools and equipment should be attached by means of a suitable lanyard
References

- Work Practice Manual:
  - work practice 2.2 (Safety observer role)
  - work practice 2.4 (Portable ladders)
  - work practice 2.6 (Mobile elevated work platform (EWP) safety)
  - work practice 2.7 (Fall prevention equipment)
  - work practice 2.27 (Construction site hazard management forms)
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)

- **AS 1891.3-1997 Industrial fall-arrest systems and devices - Fall arrest devices**
- **AS 1891.1-2007 Industrial fall-arrest systems and devices - Harnesses and ancillary equipment**
- **AS 1891.4-2009 Industrial fall-arrest systems and devices - Selection, use and maintenance**
- **WA Code of Practice: Prevention of Falls at Workplaces (2004)**
2.4 Portable ladders

Purpose

This instruction outlines maintenance and use of portable ladders.

Instructions

<table>
<thead>
<tr>
<th>DANGER</th>
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</table>
| • Never use metal ladders.  
• Use only non-conductive ladders. |

• Conduct a worksite risk assessment before commencing any ladder work.
• If required, install barriers or barricades.
• Ensure that all locking devices on the ladder are secure.
• If using a step and trestle ladder as a working platform, they must be in the fully open position.
• Stabilise and secure the ladder/s before ascending to the work platform or pole top.
• The ladder must be footed until it is secured via the head rope. If it is not possible to secure the ladder via a head rope then the ladder must be footed at all times.
• When positioning the ladder use the 4:1 rule (e.g. if the distance between the ladder base and the supporting structure is 1 metre, the ladder should be supported approximately 4 metres from the ground).
• Do not use the rungs of the ladder to support scaffold planks.
• When the ladder is being used for access or egress, the ladder must extend at least 900 mm above the stepping-off point of the working platform.
• Do not move the ladder while a person is standing on the rungs.
• Only one person is allowed on the ladder at any time and they must be within the load rating of the ladder (unless in the event of a pole top rescue).
• There is no requirement for a fall arrest system when ascending or descending a portable ladder. However, fall protection must be in place when in position to perform work.
• Make sure that the full body harness and pole strap are in good condition and are attached correctly before starting work.
• During ascent and descent, face the ladder and maintain three (3) points of contact with the ladder at all times.
• Do not carry tools or equipment while climbing up or down a ladder. Use tool belts, pouches or rope pulleys to carry equipment without compromising the three points of contact.
• When climbing up or down a ladder it is safer to grasp the ladder rungs rather than the sides of the ladder.
• Trestle ladders should be used for light duty work only. The minimum width of the working platform must not be less than 450 mm. Work performed on a trestle platform that is over two metres above ground level must have edge protection.

Restrictions when using ladders on porcelain insulators
• Do not place ladders against post insulators.
• Do not place ladders against surge diverters or lightning arresters.
• Do not use ladders with metallic reinforcement that may contact the porcelain unless protected from that contact.
• Do not use ladders against insulators not in a vertical aspect (i.e. horizontal).
• Do not use metallic or rigid ladder straps, unless specifically designed for a particular insulator.

Maintenance
• Inspect all new ladders before use and fill out an inspection label before attaching it to the ladder. The inspection label must record the following:
  o the worker’s name
  o the current date
  o the date that the ladder is next due to be inspected (see Appendix 1 – Tags and signs, p1)
• Inspect every ladder before climbing to check that it is safe to use. If it is unsafe, tag it out using the “Out of Service” warning tag (see Appendix 1 – Tags and signs, p1).
• Carry out a detailed inspection at least every six (6) months, using the Ladder inspection checklist (see Appendix 2 – Standard forms, p11).

• When defects are discovered during an inspection, tag the ladder out and return it to the supplier for repair, along with the completed Ladder inspection checklist (see Appendix 2 – Standard forms, p11). When the ladder is not to be repaired, it must be destroyed (rendering it unusable) and removed from the asset register.

• When sending the ladder for repair, insert the Ladder inspection checklist into an adhesive document pouch and attach it to the bottom rung of the ladder (see Appendix 2 – Standard forms, p11).

Note:
If a ladder falls from a vehicle or structure, inspect it thoroughly before using it again. If you find or suspect any defects, follow the same procedure as above.

References
• Work Practice Manual:
  o Appendix 1 – Tags and signs, p1
  o Appendix 2 – Standard forms, p11 – Ladder inspection checklist (DM# 4778786)
• Business Process – Management of Defective Plant or Equipment Non-Network Related (DM# 404243)
• Ladders on Insulators (DM# 4949077)
2.5 Scaffolding

Purpose

This work practice outlines the minimum requirements for erecting, dismantling and maintaining scaffolding.

Instructions

General

• When carrying scaffolding (or any long items) beneath overhead electrical apparatus:
  o carry it at, or below, shoulder height and parallel to the ground
  o scaffolding sections should be carried using a person at each end

• Before any scaffolding is erected:
  o conduct a risk assessment and job briefing (see 2.28 (Job briefing process) in this manual). The risk assessment must include the following, if relevant:
    – serviceability of the scaffolding
    – safe working load (SWL) of the scaffolding
    – height safety (see work practice 2.3 (Height safety) in this manual)
    – maintaining minimum approach distances (MADs) from live electrical apparatus (see work practice 2.8 (Minimum approach distances (MADs) in this manual)

  Note:

  If working close to the MADs of live electrical apparatus, a safety observer is required (see work practice 2.2 (Safety observer role) in this manual.

  o ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

• Inspect all scaffolding to ensure that it is safe:
  o Scaffolding up to four metres must be inspected before climbing using the Scaffold inspection checklist (DM# 5236891)
Scaffolding over four metres must be inspected as outlined in the *Scaffolding taller than four metres* section below.

- If any scaffolding components are found to be damaged or defective, remove them from service and tag them out using an “Out of Service” warning tag (see Appendix 1 (Tags and signs)).
- Erect, dismantle and maintain all scaffolding according to the manufacturer’s specifications.
- Stabilise scaffolding by:
  - tying the scaffold to the structure that is being worked on
  - adding backup bays to increase the base dimension
  - installing stabilisers or outriggers at a 3:1 ratio, providing a base with dimensions at the narrowest point of at least one-third the maximum work platform height
    - If the scaffold is set up on a surface that may move under the feet/castors when loaded (e.g. soft sand) – use stabiliser leg pads to provide a solid, sound surface
- If scaffolding is left partially erected or unattended, warning signs must be placed on the scaffolding to discourage unauthorised access.
- Only use mobile scaffolding which has adequate strength and is set up on a level surface. It must be able to safely support the total load imposed by the weight of the scaffold, the people working on it and the materials used. For more on this, see the *Mobile scaffolding* section, below.
- Be aware that, on some designs, the feet can fall out of the scaffold tube if the assembly is lifted off the surface.

**Edge protection**

- If there is a possibility of someone falling more than two metres, install edge protection to the open sides of the working platform, such as:
  - guardrails:
    - securely fixed guardrails parallel to the working platform, 900–1100 mm above the platform
    - no more than 100 mm outside the edge of the working platform
    - position midrails halfway between the guardrail and the toe board
o toe boards:
  ─ on the exposed edges of the working platform (or any other place) where tools or materials could fall more than two metres
  ─ securely fixed to the floor (or posts) and at least 150 mm high. The gap between the toe board and the working platform must be no more than 10 mm.

• If edge protection cannot be installed, use a fall restraint or arrest system instead (see work practice 2.3 (Height safety) in this manual).

• Ensure that ground-based personnel are aware of the drop zone. If required, erect barriers or barricades around the base of the scaffolding (see work practice 2.3 (Height safety) in this manual).

Working platform

• Working platforms must:
  o have a slip-resistant surface
  o be carefully and routinely checked for faults
  o not be capable of uplift under working conditions
  o be level and free of tripping hazards

• Ensure that the slope of the working platform does not exceed seven degrees from the horizontal.

• Use only full-width working platforms.

• Do not erect working platforms between adjacent mobile scaffolds.

• Do not use split-level working platforms.

Climbing to and from working platforms

• Use the ladder at a ratio of 4:1 and extend the top at least 900 mm above the height of the working platform.

• Ensure that the ladder is footed or mechanically stabilised until it is secured.

• Before commencing work from the platform, secure the ladder to the scaffolding structure.

• Close the swivel gate guardrail after transferring from the ladder to the working platform.

• For tower scaffolds:
  o up to six metres – internal or external ladders may be used
over six metres – only internal ladders may be used

- For mobile scaffolds – only internal ladders may be used that ascend through an approved landing with a hinged hatch.

**Mobile scaffolding**

- The height of a mobile scaffold must not exceed three times the length of its smallest base dimension.
- Do not exceed the manufacturer’s specified safe working load (SWL)
- Do not modify components or use components that are not part of the original scaffold unless supplied by the manufacturer for that scaffold
- Mobile scaffolding (fitted with castors) may only be used on a solid level surface and not within one metre of any slab edge or stepdown.
- Ensure that castors are locked, and cannot be accidentally released when working from the scaffold.
- Do not release the wheel locks or relocate the scaffold, unless the scaffold is unoccupied and all items on the scaffold have been secured against falling.
- Ensure that the castors cannot accidentally fall out of the scaffold tube if the assembly is lifted off the surface.

**Important**

*Do not* move the mobile scaffold while someone is on it.

**Tower or independent scaffolding**

- The height of the tower or independent scaffold must not exceed three times its smallest base width (unless specifically designed and built per the manufacturer’s specifications).
- The minimum size of the base plates for independent scaffolding is:
  - square – 150 mm x 150 mm
  - circular – 170 mm in diameter
Insulated scaffolding

Note:

Scaffolding made from an insulating material that has not been electrically tested or is not within the test period must be treated as non-insulated, but may still be used in an isolated and earthed environment.

Insulated scaffolding used for live working procedures must meet the following requirements.

- Must be approved fit for purpose and conform to AS 5804.1-5804.3 (referred to as platforms or towers in AS 5804).

- Before erecting the scaffolding:
  - check that all scaffolding displays a test expiry date (month and year) and is within the expiry date
  - clean and dry then wipe it with a silicone-impregnated cloth

- Store insured scaffolding:
  - in a cool, dry area that is free of chemicals, oils, solvents, damaging vapours, and fumes
  - ensuring there are no distortions and/or mechanical stress
  - out of direct sunlight

- Test all insulated scaffolding as outlined in work practice 2.11 (High voltage tools and equipment – testing and use) in this manual.

Scaffolding taller than four metres

- To erect or dismantle scaffolding that is more than four metres in height:
  - at least two personnel must be engaged in the process
  - at least one of the personnel must have the following endorsements on their Network Authority Card (NAC):
    - trained and certified in scaffolding
    - a High Risk Work Licence (Scaffolding), classes (SB),(SI) or (SA).

Scaffolding may only be tagged as safe for use by a person who is:
- trained and certified in scaffolding
- a holder of a High Risk Work Licence (Scaffolding) classes (SB),(SI) or (SA), whichever is appropriate for the structure

Before assembly, determine the purpose and intended load of the scaffolding. This information must be included on a tag attached to the scaffolding and must be updated:
- at least every 30 days
- following any incident where the stability or adequacy of the scaffold is affected
- following repairs
- if a person or object could fall more than four meters off the scaffolding

Scaffolding tags must be attached at each access point, and include the following details:
- the date the scaffold was erected, altered or repaired
- the name and signature of the person inspecting the scaffold
- whether the scaffold is for light, medium or heavy duty use

Edge protection must be applied for scaffolds above four metres.

Periodic inspections

Carry out a detailed inspection of all scaffolding components at least every six months using the Scaffold inspection checklist (DM# 5236891).
References

- Work Practice Manual:
  - work practice 2.2 (Safety observer role)
  - work practice 2.3 (Height safety)
  - work practice 2.8 (Minimum approach distances (MADs))
  - work practice 2.11 (HV insulated tools and equipment – testing and use)
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - Appendix 1 (Tags and signs)

- Electrical System Safety Rules (ESSR)
- Scaffold inspection checklist (DM# 5236891)
- AS 5804.1-2010 -High-voltage live working – General
- AS 5804.2-2010 - High-voltage live working – Glove and barrier work
- AS 5804.3-2010 - High-voltage live working – Stick work

Related reading

- AS/NZS 1576.1:2010 – Scaffolding - General Requirements
- AS/NZS 4576:1995 - Guidelines for Scaffolding
- WA Occupational Safety and Health Regulations 1996, Part 3 (Workplace safety requirements), Division 7 - Scaffolds, gantries, hoardings and barricades and formwork
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2.6 Mobile elevated work platform (EWP) safety

Purpose

This work practice outlines the safety requirements when working from and around an EWP.

Instructions

EWP operators, occupants and safety observers

- All EWP operators must possess a licence to perform high risk work.
- All EWP operators and safety observers must be trained and competent in the use of emergency retrieval systems relevant to the EWP they are using (e.g. Leguan 110 has a manual recovery system).

Note:

Refresher training must be undertaken every 12 months – a grace period of six weeks applies at the end of the 12 month period.

- The EWP basket operator must be competent in emergency descent rescue.
- In addition to operational personal protective equipment, all occupants of the EWP basket must wear an approved fall protection harness.
- The EWP ground-based operator:
  - must be competent in the operation of the EWP
  - must be qualified to perform the role of safety observer if a separate observer is not present
- The safety observer must be competent in the recognition of workplace hazards relevant to EWPs.

Using the EWP

- Perform the log book pre-start EWP operations check.
- The EWP must have an insulation rating equal to, or greater than, the voltage of any energised apparatus within the maximum reach of the boom and basket.
  - Insulated EWP’s must be electrically tested every six months (three week grace period) and the electrical test sticker in the cab of the vehicle must be replaced after the test is passed.
An insulated EWP that does not display a current electrical test sticker or carry an electrical test certificate is classified as non-insulating and must not be used on the network.

**Note:**

- A minimum 132 kV insulated EWP must be used for 220kV and 330 kV transmission line and associated works; however, it must be considered as an uninsulated EWP.
- Follow the uninsulated clearances in Table 1 of work practice 2.8 (Minimum approach distances (MADs)) in this manual.
- For vegetation works, see section 10 (Vegetation management work) in this manual.

- An EWP working within the high voltage (HV) MADs or close to low voltage (LV) must be fitted with an emergency descent device (EDD) that complies with Western Power specifications.
- Only operate an EWP when the wind velocity is less than 45 km/h (40 km/h when using an approved lifting device to lift conductors for HV live line work).
- Do not exceed the EWP basket safe working load. For distribution aerial conductor weights, see Appendix 8 (Conductor weights) in this manual.
- Attach the fall protection harness to the EWP basket anchor point before operating the boom.
- Before operating an EWP, always ensure that:
  - the EWP vehicle is level
  - basket-bonding links have been removed
- When performing any work, stay inside the basket and have at least one foot on the basket floor.
- If transferring between an EWP basket and a tower structure or an approved working platform, always remain attached while transferring. All work processes are prohibited during the transfer movement.
- When working near energised apparatus:
  - **do not** compromise the insulated fibreglass section of an EWP boom
  - maintain MADs from live apparatus (see work practice 2.8 (Minimum approach distances (MADs)) in this manual).
ensure that portable earths are clear from the boom
ensure that extension leads for portable power tools are clear from the boom
cover any exposed live conductors

Note:
When the EWP is not being used for spray washing - ensure that the spray washing hose is disconnected to create a minimum 800 mm gap across the insulated section of the boom.

Ground approach distance (GAD)

- Everyone involved in EWP operations must maintain a GAD around the base of the EWP (stabilisers/outriggers included) when used near live apparatus. See Table 1 and Figure 1, below.
- Where a GAD must be maintained, a barrier must be placed around an EWP prior to the boom operation where inadvertent electrical contact may occur. This is for the protection of personnel and members of the public, and may require measures such as traffic control.
- If personnel must enter the GAD for any reason, they must wear insulating gloves rated to the highest voltage within the boom reach on the structure.

Table 1: EWP ground approach distance (GAD)*

<table>
<thead>
<tr>
<th>Voltage of conductor</th>
<th>Ground approach distances (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low voltage</td>
<td>1,000</td>
</tr>
<tr>
<td>High voltage 1 kV up to 33 kV</td>
<td>1,200</td>
</tr>
<tr>
<td>66 kV</td>
<td>1,500</td>
</tr>
<tr>
<td>132 kV</td>
<td>1,800</td>
</tr>
<tr>
<td>Over 132 kV</td>
<td>3,000</td>
</tr>
</tbody>
</table>

*If the above clearances cannot be maintained, for voltages up to 33 kV insulating gloves rated to the highest voltage within the boom reach on the structure must be used. For voltages of 66 kV and above the GAD must be maintained.
Earthing the EWP

- The insulated EWP must be earthed to ground or a known earth when working on or near any above ground HV electricity conductors (whether energised or de-energised).
- Before use, inspect the earth lead and confirm:
  - that the test date is not expired
  - the tightness of bolted connections
  - the general condition of earthing leads
- Earth leads must be:
  - a minimum of 150 mm² aluminium when working on 66 kV and 132 kV lines
  - a minimum of 95 mm² aluminium when working on 1 kV to 33 kV lines
- Where a permanently installed earth point is not available, pole reinforcing steel columns are the next preferred earth point. The last preference for the earthing point is the temporary earth electrode.
- Temporary earth electrodes:
  - should be placed close to vehicles to reduce touch potentials
  - must be barriered to a minimum radius of two metres to guard against step and touch potentials
must be inserted into the ground to a minimum depth of 300 mm and up to a maximum depth of 600 mm. Although calling ‘Dial Before You Dig’ is not mandatory, care must be taken to avoid driving earth electrodes into an underground service.

- If more than one mobile plant is involved:
  - if they are within a distance of two metres of any part of each other – they must be connected (bonded) to a common earthing point
  - if they are separated by more than two metres – each mobile plant must have its own direct earth connection applied and there must be a minimum of five metres between the earth points.

- The earth lead must be bolted to the vehicle or plant chassis or connected with a screw-on clamp. See Figures 2 and 3 for examples.

Figures 2 and 3: Examples of EWP earth connections

- A G-clamp must be used to securely connect the earth lead to the permanently installed earth point or temporary earth electrode.

Note:
Spring loaded clamps must not be used to secure the earth lead to either the vehicle, temporary earth electrode or permanently installed earth point.
Personnel must stand on an equipotential mat while operating base controls on a stationary vehicle or plant which is on or near live HV overhead electrical apparatus. Attach the earthing lead of the equipotential mat (either bolted or clamped) to the approved bonding point or a clean metal surface on the vehicle.

**Do not** connect the vehicle earth lead to any of the following LV neutral, SWER wire or down earth. A separate temporary earth electrode must be used.

**Note:**
EWPs with insulated booms do not have to be earthed when working on or near conductors that are earthed or shorted. However, the vehicle must be earthed when being used for the application of portable earths.

**In an emergency**

- If an EWP has mechanical failure and cannot be lowered, and the personnel are safe, they must remain in the bucket until a second EWP arrives onsite to effect a rescue.
- The EDD rope-style device is only to be used in time-critical, life threatening situations.
- Never tamper with the ‘deadman’ basket control to bypass its manual function.

**Uninsulated EWPs used in a substation**

- Clearly define the worksite with barriers and signs. All assets within the worksite must be de-energised and earthed. MADs must be maintained between the worksite boundary and any live conductors to ensure the safety of personnel at all locations within the defined worksite.
- Observe the MAD of all live and de-energised apparatus.
- Uninsulated EWPs working within substation sites must have the basket bonded to the hardware and the chassis connected to a known earth point using the approved earthing leads (either bolted or clamped).
- Uninsulated EWPs are not permitted to enter the MAD.
- Uninsulated EWPs can only be used on equipment that is earthed. Equipment under construction that is at risk of induced voltages must also be made safe by applying earths to ensure that no rise in potential difference is possible.
Travelling in EWP baskets

- A risk assessment must first be done to identify all foreseeable hazards and to ensure that risk controls are implemented.
- Comply with the conditions of Department of Transport exemption 46V11CP3TM (DM# 7438793). A copy of the exemption must be carried in the vehicle when undertaking the conditions within it, and must be produced on demand.
- EWP booms must be kept in the stowed position.
- The vehicle must not exceed the speed of six km/h or the posted road speed limit (whichever is lower).
- People travelling in the EWP basket must wear a suitable safety harness and lifeline arrangement at all times.

Escorting a person in an EWP basket

- An escorted person is defined as someone who is authorised to ascend in an EWP basket but is prohibited from performing any operational work. The escorted person:
  - may observe, take photographs or make a movie on behalf of Western Power
  - must not operate any EWP controls
- An accredited EWP basket operator must accompany the escorted person.
- The EWP basket operator must:
  - provide the escorted person with an induction that includes the operation of the EWP and the correct use of the fall arrest harness
  - not allow the basket to encroach any MADs

Cleaning and maintenance of EWPs

- Wash and clean the inside and outside of insulated EWP boom sections every six weeks or more regularly if used in harsh conditions.
- Use recommended methods and substances to polish the fibreglass. (Contact Western Power Fleet Services for advice on cleaning products.)
- After cleaning, rinse well with water to remove any residue.
- Ensure the insulated EWP boom sections are completely dry before using for work on live equipment.
• Report cracks or damage found in the fibreglass section of an EWP boom to the formal leader. The EWP must be tagged with an “Out of service” warning tag and must not be used until after it has been repaired, tested and approved for use.

**Contract EWP**

A hired EWP operating on Western Power assets must be inspected prior to use in accordance with the *Plant hire sheet for contractor use* (DM# 6617609).

**References**

- Work Practice Manual:
  - work practice 2.8 (Minimum approach distances (MADs))
  - work practice 2.10 (Use and management of overhead portable earthing / short circuiting equipment)
  - section 10 (Vegetation management work)
  - Appendix 8 (Conductor weights)
- Department of Transport exemption from 46V11CP3TM (DM# 7438793)
- Plant hire sheet for contractor use (DM# 6617609)
- AS 2550.10—2006 – Cranes, hoists and winches—Safe use Part 10: Mobile elevating work platforms
2.7 Fall arrest systems and pole top rescue kits

Purpose

This work practice outlines the requirements for inspecting and maintaining fall arrest systems and pole top rescue kits.

A fall arrest system is required to avert a fall from height or to mitigate any related risks identified during the risk assessment. As with personal protective equipment (PPE), fall arrest systems must not be used in isolation of other risk controls. For more on:

- height safety, see work practice 2.3 (Height safety)
- PPE, see section 3 (Personal protective equipment)
- pole top rescue, see work practice 6.19 (Pole top rescue)

Training

Before inspecting a fall arrest system, personnel must be deemed competent after completing the nationally recognised course: RIIOHS204D – Work Safely at Heights, or similar. This training may be embedded in other courses, e.g. Emergency descent device (EDD), Pole top rescue.

Instructions

Before commencing work

Inspect fall arrest systems and pole top rescue kits before each use. Check the expiry date; if the label is illegible or the date cannot be determined, the item must be removed from service, tagged out and reported to your formal leader.

Important

- Fall arrest systems (including pole top rescue) must be removed from service and destroyed 10 years from the date of manufacture.
- In the following situations, the item must be removed from service, tagged unserviceable and reported to your formal leader:
  - If a fall has occurred while wearing a fall arrest system or its shock absorber fall indicator has activated.
  - An item fails an inspection or is found defective.
Six-monthly inspections

- Inspections must be performed every six months using the following checklists.
  - Fall arrest systems – inspect while using *Fall arrest system inspection checklist* (DM# 6783836).
  - Pole top rescue kits – inspect while using *Pole top rescue kit inspection checklist* (DM# 6783459).
  
  See Appendix 2 (Standard forms) in this manual.

- When performing a six-monthly inspection, the checklist must be saved for future reference. If the item meets the inspection criteria, attach a general inspection tag (see Appendix 1 (Tags and signs) in this manual).

Care and maintenance

Cleaning

If soiled by dirt or grit:

1. Sponge down or hand wash with lukewarm tap water using pure soap or soap flakes. Harnesses can be machine washed on gentle cycle (D rings may damage machine).
2. Thoroughly rinse and hang harness to dry at room temperature out of direct sunlight and not exposed to direct heat.

If any other condition exists, consult manufacturer’s inspection guide or contact the manufacturer.

References

- Work Practice Manual:
  - work practice 2.3 (Height safety)
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 6.19 (Pole top rescue)
  - Appendix 1 (Tags and signs)
  - Appendix 2 (Standard forms)

- Fall arrest system checklist (DM# 6783836)
- Pole top rescue kit inspection checklist (DM# 6783459)
2.8 Minimum approach distances (MADs)

Purpose

This work practice outlines the minimum approach distances (MADs) for authorised personnel, mobile plant and vehicles working near live electrical apparatus.

The MADs in this work practice are based on an exclusion zone principle. This principle defines an area around the electrical apparatus into which no part of a person, mobile plant or object (other than approved insulated objects) may encroach.

Note:
The MADs in this work practice are taken from ENA NENS 04–2006 National Guidelines for Safe Approach Distances to Electrical Apparatus.

Scope

• This work practice applies to any Western Power authorised person who performs work near live electrical apparatus.
• The MADs apply to any competent person performing work on behalf of Western Power.
• The MAD must not be confused with the ‘Danger Zone’ as defined in WA Occupational Safety and Health Regulations 1996, regulation 3.64 (Overhead power lines, duties of employer etc. as to).

Note:
This instruction does not apply to:
• apparatus covered by an Electrical Access Permit (EAP)
• high voltage (HV) live line work
  For authorised live line work clearances, see work practice 8.0 (Glove and barrier method), 9.0 (Distribution stick method) and 10.0 (Transmission stick method) in the High Voltage Live Work Manual.
Authorisation

Authorised personnel must have sufficient knowledge and experience to ensure control of body and plant movement to maintain MADs. Authorised personnel must be trained and assessed for competency.

Instructions

Before commencing work:

- conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual).

**Note:**

To comply with ENA NENS 04–2006 National Guidelines for Safe Approach Distances to Electrical Apparatus, a risk assessment must be completed prior to arriving onsite (e.g. Safe Work Method Statement (SWMS)), as well as carrying out the local risk assessment.

- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- designate a competent safety observer who has been specifically instructed to recognise relevant workplace hazards (see work practice 2.2 (Safety observer role) in this manual).
Minimum approach distances

The MADs for an authorised person, mobile plant and vehicles working near live electrical apparatus are outlined in Table 1 (Minimum approach distances).

Table 1: Minimum approach distances

<table>
<thead>
<tr>
<th>Nominal phase-to-phase voltage (kV)</th>
<th>Authorised personnel* (mm)</th>
<th>Mobile plant (mm)</th>
<th>Vehicles (mm) (All directions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Insulated sections</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Uninsulated sections</td>
<td>Contact allowable</td>
</tr>
<tr>
<td>Up to 1</td>
<td>No uninsulated contact</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Up to 33</td>
<td>700</td>
<td>1,200</td>
<td>700</td>
</tr>
<tr>
<td>Up to 66</td>
<td>1,000</td>
<td>1,400</td>
<td>1,000</td>
</tr>
<tr>
<td>Up to 132</td>
<td>1,200</td>
<td>1,800</td>
<td>1,800</td>
</tr>
<tr>
<td>Up to 220</td>
<td>1,800</td>
<td>2,400</td>
<td>1,800</td>
</tr>
<tr>
<td>Up to 330</td>
<td>3,000</td>
<td>3,700</td>
<td>3,000</td>
</tr>
</tbody>
</table>

* These represent nominal minimum personal clearances and are for an ‘Authorised Person’ (as defined in ENA NENS 04-2006 National Guidelines for Safe Approach Distances to Electrical Apparatus).

- The MADs in Table 1 (Minimum approach distances) are to be maintained from:
  - any part of a person (body)
  - any conducting object, tool or equipment being held or carried
  - mobile plant and/or its load
  - a vehicle and/or its load
- The MAD for a person is based on the maximum flashover distance plus an allowance of 600 mm for inadvertent movement.
- The MAD for uninsulated sections of mobile plant is based on the maximum flashover distance plus an allowance of 1,000 mm for inadvertent movement.
All mobile plant, such as elevated work platforms, vehicles, plant and cranes that operate near live overhead HV electrical apparatus must be earthed. For more on this, see work practice 2.10 (Use and management of portable earthing/shorting equipment) in this manual.

Work in substations

For work in substations, the MADs that are outlined in AS 2067-2008 AS 2067–2008 Substations and high voltage installations exceeding 1 kV a.c. must be used.

Alternatively, the MADs are outlined in work practice 5.3 (Substation clearances) in the Transmission Substation Work Practice Manual.

Reducing MADs

For voltages between 6.6 kV to 33 kV, the MADs listed in Table 1 (Minimum approach distances) may be reduced by half if approved insulating covers are placed between the person, mobile plant, vehicles and the live electrical apparatus.

References

- Work Practice Manual:
  - work practice 2.2 (Safety observer role)
  - work practice 2.10 (Use and management of portable earthing/shorting equipment)
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
- High Voltage Live Work Manual, work practices:
  - 8.0 (Glove and barrier method)
  - 9.0 (Distribution stick method)
  - 10.0 (Transmission stick method)
- Transmission Substation Work Practice Manual, work practice 5.3 (Substation clearances)
- AS 2067–2008 Substations and high voltage installations exceeding 1 kV a.c.
- ENA NENS 04–2006 National Guidelines for Safe Approach Distances to Electrical Apparatus
- WA Occupational Safety and Health Regulations 1996, regulation 3.64 (Overhead power lines, duties of employer etc. as to)
2.9 Induced voltages in isolated conductors/apparatus

Purpose

This work practice outlines the minimum requirements for working on isolated overhead conductors/apparatus that could have voltages induced into them by nearby energised overhead conductors/apparatus.

Important

- Induced voltages may be as little as a few volts and as high as many kV and could be hazardous or life threatening if the correct procedures are not followed.
- Induced voltages can arise at any time while working on isolated overhead conductors/apparatus.

Note:

An induced voltage is often referred to as induction.

Instructions

- Before commencing work:
  - conduct an inspection of the line route or examination of a map indicating all other powerlines adjacent to the line to be isolated. This is to determine the likelihood of the existence of any induced voltages. Hazardous induced voltages may be present on apparatus due to it running in close proximity to a live conductor or adjacent apparatus at any point along its length. The danger may not be visible from the worksite.
  - conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual). The risk assessment must include the risk of induced voltages.
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- Obtain the relevant permits for the apparatus to be worked on from the controlling authority (Network Operations Control (NOC)).
Operational work practice standards

- Apply program earths according to the switching program.

**Working earths**

The number of working earths required will be influenced by the value within the electric field, the main earth resistance, the resistivity of the ground and the proximity of the working earths to a person’s working position. In severe cases where induction cannot be totally eliminated, suitably rated insulated gloves with approved outer must be worn (the rating of the gloves will be determined by the voltage indicated by the proximity tester). The minimum rating of gloves must be 500 V.

**Applying working earths**

- Use a proximity tester (e.g. Modiewark) to determine the presence of induced voltages on isolated and earthed apparatus. Start on the highest setting and gradually reduce to the lowest to identify induced voltages.
- Apply the working earth using an approved and rated insulated stick.
- Working earths must be applied as close as possible to each side of the point of work. Ensure that the earth grounding leads are bonded at the same earth point to create an equipotential work zone.
  - For more on this, see work practice 2.10 (Use and management of overhead portable earthing / short circuiting equipment) in this manual.
  - When applying the working earths, there may be an electrical discharge when the earth is applied to the overhead conductor/apparatus.

**Removing working earths**

- The working earths must be removed using insulating sticks, and all sets of phase clamps must be removed before disconnecting the grounding leads from the same earth point.

  When removing the working earths, there is still a possibility of drawing an arc when removing the phase clamp from the conductor.

**Broken, repaired, separated and joining conductors**

- If any part of the conductor being worked on is disconnected in any way, a temporary jumper must be installed to bridge the break in the conductor. If this is not done, the worker touching both ends of the disconnected conductor will act as a bridge and may receive a shock if an induced voltage is present in the isolated conductor.
• If any part of the earthing is broken, dangerous voltages may occur when it is necessary to break a part of the earthing system. Connect a temporary jumper across this part of the earthing system before it is broken.

**Conductors on the ground**

• There are additional requirements to the normal earthing requirements for electrical access if workers are handling conductors at ground level for any of the following reasons:
  o repairing the end of a broken conductor
  o moving or securing a conductor

• People working on any conductor on the ground that may have induced voltages must:
  o wear suitably rated insulated gloves with approved outers (the rating of the gloves will be determined by the voltage indicated by the proximity tester). The minimum rating of gloves must be 500 V.
  o apply working earths to the conductor For more on this, see work practice 2.10 (Use and management of portable earthing / shorting equipment) in this manual.

• To ensure that no personnel bridge the gap between conductors the following instructions must be followed:
  o If the conductor is to be disconnected - connect a temporary jumper to the conductor on both sides of where the conductor is going to be disconnected. This will bridge the gap until the conductor can be pulled together and reconnected. The temporary jumper can then be removed.
  
  or
  o When repairing broken or connecting lengths of conductor - the two ends that are to be joined together must be either bridged using a temporary jumper or earthed to a common earth electrode when they come within two metres of each other.

**Conductors working aloft**

When carrying out conductor jointing, splicing or disconnecting for any other reason:

• both conductors must be earthed as close as possible to the apparatus
• a temporary jumper must be placed across the disconnected conductor to maintain electrical continuity
• the lead must comply with the portable earthing equipment requirements outlined in work practice 2.10 (Use and management of portable overhead earthing / short circuiting equipment) in this manual

**Mobile plant**

• When operating on or near the structure, connect mobile plant (e.g. cranes) to the portable earthing point on the structure to create an equipotential zone. For more information, see work practice 2.10 (Use and management of portable overhead earthing / short circuiting equipment) in this manual.

• Wear a minimum of 500 V rated gloves with approved wrist length mechanical protective gloves to avoid touch potential, which may occur when working around mobile plant and other conductive apparatus.

**Substations**

• Uninsulated elevated work platforms working within a substation must have:
  - the basket bonded to the electrical apparatus that is being worked on
  - the vehicle earthed to an identified earthing point using approved earthing leads (either bolted or clamped). For more information, see work practice 2.6 (Mobile elevated work platform (EWP) safety) in this manual.

• Where possible, leave all earth switches **ON** at substation sites unless they need to be opened for testing.
  - If earth switches need to be opened for testing:
    - ensure that all personnel onsite are aware of the changes to the yard configuration and earthing arrangements within their relevant work area
    - attach a “Restricted Use” danger tag to the earthing switch (see Appendix 1 – Tags and signs)
  - Once the testing is completed:
    - set the earth switches to **ON**
    - notify all relevant personnel
General information

- People are also affected by induction and may feel this when brushing against earthed structures and apparatus. To avoid discomfort, maintain firm contact with earthed items when working in areas of high induction.
- Test instruments may give false readings when not connected due to induction in the leads.
- Testers in charge must remember that a transfer of earth potential is possible. Transfer of earth potential is controlled by effective earthing. Accordingly, any contact with a conductor that has the potential to carry a transfer voltage must only occur while that conductor is earthed effectively.
- Transmission lines are considered one of the major sources of induction. The current in the energised high voltage conductor causes a magnetic or electric field that may cut through de-energised conductors. This induces a current in the isolated, lower voltage line.
- The induced voltage in the de-energised circuit is a function of:
  - the current in the higher voltage line
  - the distance separating the two lines
  - the nature of the dielectric, ambient conditions, moisture, heat, wind, etc.

See Table 1, below for guidance on the percentage of the phase voltage that may be induced into a conductor at designated distances.

<table>
<thead>
<tr>
<th>Distance from energised line (metres)</th>
<th>1.0</th>
<th>2.0</th>
<th>3.0</th>
<th>4.0</th>
<th>5.0</th>
<th>6.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of the phase value of the energised line</td>
<td>60%</td>
<td>50%</td>
<td>40%</td>
<td>30%</td>
<td>20%</td>
<td>10%</td>
</tr>
</tbody>
</table>

- The distance between the overhead transmission lines and any object in the field may change from time to time according to the electricity loading of the lines as well as the swinging angle of the overhead transmission lines. Induction can be increased or transferred when a conductive object approaches an energised conductor, i.e. pulling or tensioning equipment, busbars, switchgear and mobile plant.
References

- Work Practice Manual:
  - work practice 2.10 (Use and management of overhead portable earthing / short circuiting equipment)
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - Appendix 1 (Tags and signs)
2.10 Use and management of portable overhead earthing / short circuiting equipment

Purpose

This work practice outlines the minimum requirements for the use, care and maintenance of portable earthing and shorting equipment, including the high voltage (HV) earthing requirements contained in the Electrical System Safety Rules (ESSR).

Scope

This work practice covers the following:

- works conducted on HV and low voltage (LV) overhead powerlines
- vehicle earthing requirements

It is applicable to:

- switching operators (SOs)
- Recipients in Charge (RICs)
- all personnel working under an Electrical Access Permit (EAP) or Sanction to Test (STT)
- personnel responsible for the inspection and maintenance of portable earthing and shorting equipment

Safety

- The application of:
  - program earths is the responsibility of the SO, is a step in the switching program and any identified risks must be covered in the switching risk assessment
  - working earths is the responsibility of the RIC and any identified risks must be covered in the risk assessment
- Ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual).
- Establish worksite safety barriers to prevent access to areas of step and touch potential risks, earth lead damage or trip hazards.
• The earthing and shorting leads:
  o must be applied using an approved and rated insulated stick
  o must not be handled during attachment and removal
  o must not be handled or tampered with while in service
• Avoid unnecessary touching or leaning against elevated work platform (EWP) vehicles and cranes while they are in use to avoid possible touch potential. Observe ground approach distances (GAD) as specified in work practice 2.6 (Mobile elevated work platform (EWP) safety) in this manual.

**Inspection and maintenance**

Earths are the primary method of ensuring that apparatus remain safe after being de-energised. They are an essential part of safe work practice and must be well maintained.

Portable earths used on the Western Power network must be regularly inspected to ensure that they remain compliant with the manufacturer’s specifications. Every six months they must be given a detailed inspection. If the inspection is passed, a new inspection tag must be attached to the earth. For more on this, see:

- Appendix 1 (Tags and signs)
- Appendix 10 (Portable earth inspection sheet)

Inspections and repairs must be performed and recorded by personnel deemed competent to do so.

**Note:**

- If an earth set or component of an earthing or shorting set has been subjected to fault current or energisation it must be removed from service and retained as possible evidence for investigation by Western Power’s Safety Health and Environment function. It must be tagged out of service and not used again.
- Portable earths are not designed to protect personnel from the effects of lightning. For more on this, see work practice 2.12 (Electrical storms) in this manual.
Instructions

HV earthing

Note:

- In this document information common to both program and working earths is presented first, followed by sections specific to program earths and working earths.
- If induced voltages are present, or suspected of being present, follow the additional steps in the *Earthing requirements for induced voltages* section, below.

- Only use approved portable earthing equipment that is rated for the application.
- All portable earths must be applied and removed using the approved stick, with leads kept clear of personnel.
- Before use, check the earth set and confirm:
  - that the inspection date has not expired
  - tightness of bolted connections
  - condition and serviceability of earthing leads
  - condition and serviceability of ground and aerial clamps
- When applying portable earths to HV, the earth lead from the HV earths must be separately grounded to an earthing point (earth electrode). The HV earth lead must not be attached to, or use any of, the following: LV neutral, SWER wire or down earth. This will minimise fault currents and voltages being fed back onto the LV system.

Earthing points

- Always use permanently installed earth points where available.
- Where a permanently installed earth point is not available, the pole-reinforcing steel column is the next preferred earth connection.
- The last preference is a temporary earth electrode:
  - Temporary earth electrodes should be located away from footpaths and work areas to minimise the risk from step potentials in the event of a fault.
Drive a temporary earth electrode into the ground to a minimum depth of 300 mm and up to a maximum depth of 600 mm. Although calling ‘Dial Before You Dig’ is not mandatory, care must be taken to avoid driving earth electrodes into an underground service.

Repeat the process at all points that are to be earthed.

**Note:**

‘Bentonite’ powder may be used to improve earthing electrode connectivity to soil. The temporary earth electrode is driven to half the depth and then removed. The powder is poured into the electrode hole and water is added to flood the hole. The earth electrode is then driven into the hole to the required depth and the down lead earth clamp is connected to it.

### Applying and removing earths

#### Applying earths

- Before applying portable earths, confirm that the apparatus to be earthed has been de-energised by using an approved proximity sensing device set (e.g. Modiewark) at the voltage of the apparatus to be tested. Perform safety tests as follows.
  - Test the proximity sensing device serviceability on energised apparatus or on a tester.
  - Confirm isolated apparatus is de-energised.
  - Test that the proximity sensing device again on energised apparatus or on a tester.

- Apply portable earths:
  - immediately after a test has proven that the electrical apparatus is de-energised
  - using an approved and rated insulated stick

**Note:**

Maintain a clearance of 700 mm from the earthing leads to the body during attachment and removal.

- The earth connection clamp:
• must be attached to the earth point first, before the phase clamps are installed onto the aerial conductors
• must be properly attached so that it will not become detached in event of a massive current discharge
• should be attached as close to the ground as possible when using a temporary earth electrode. This will reduce the amount of movement in the event of high current discharge.

• The aerial/phase clamps must be:
  o connected quickly and positively to minimise possible arcing, conductor damage and personal injury
  o aligned with the conductor and tightened sufficiently to allow the teeth to penetrate any surface corrosion. Do not over tighten.

• Earth leads must be arranged so that:
  o they are not hung up, crossed over or coiled on the ground
  o the excess lead is away from the worksite
  o unused earth leads remain attached to the parking bar
  o they are not tied together

• Earth leads may be wrapped around poles provided that the lead does not cross over any other conductive apparatus on the pole.

• Earthing sticks should be removed from aerial clamps:
  o to minimise mechanical damage to conductors due to additional weight and applied leverage torque due to wind
  o to prevent tampering and theft

Removing earths

• When removing portable earthing equipment:
  o use an approved and rated insulated stick
  o disconnect all aerial phase clamps from the conductor first and lower the earths to the ground

Note:
Maintain a clearance of 700 mm from the earthing leads to the body during attachment and removal.
disconnect the earth clamp from the permanently installed earth point or remove the temporary earth electrode

**Program earths**

- Program earths are applied to, and removed from, apparatus as part of the switching program. It is essential that they are applied before access to apparatus is granted through an EAP.
  - Program earth details must be recorded on the EAP.
  - Program earths may only be removed after the EAP has been cancelled.
- Program earths must be applied by, or under the direct supervision of, the SO in accordance with the switching schedule.
- A “Do Not Operate” danger tag must be attached by the SO to the earth lead ‘G’ clamp on program earths. In some cases a “Restricted Use” danger tag may be applied if a Sanction to Test (STT) permit is to be issued.
- The SO responsible for the placement of the program earths must enter their name in the ‘Placed By’ column of the EAP, and in the ‘Removed by’ column when the program earths are removed.
- Where possible, program earths should be installed no closer than one bay away from the work area. Where this is not possible, portable program earthing equipment may be installed closer to the work area. However, an assessment of the potential dynamic movement (whip) of the earthing leads must be assessed using a risk assessment.

**Working earths**

- Working earths:
  - are secondary to program earths, but are no less important
  - are applied at, or as close to, the workplace as possible on either side of the point of work (preferably to a common earth point)
  - are to be applied at the discretion of the RIC
  - provide additional protection at the worksite against static, induced and re-energisation voltages (see work practice 2.9 (Induced voltage) in this manual)
  - may only be placed after the acceptance of the EAP by the RIC
  - must be removed before the EAP is relinquished
The RIC responsible for the placement of the working earths must place their name in the ‘Placed by’ column of the EAP, and in the ‘Removed by’ column when the working earths are removed.

Working earths must be installed as close as possible to the worksite; an assessment of the potential dynamic movement (whip) of the earthing leads must be assessed using a risk assessment.

If program earths are used as ‘working’ earths, they may not be removed by the RIC.

Working earths must be clearly visible from the worksite. If the worksite is moved under the same EAP, the working earths must also be moved.

**Earthing (SWER return wire)**

The method for applying portable earthing to a SWER return wire system is outlined in the *Applying earths* section above. The only additional requirement is that the phase conductor/s must be bonded to the SWER return wire.

Where a SWER return wire is supported on a steel or concrete structure, ensure that the SWER return wire is bonded to one of the following:

- the structure’s earth terminal
- the metalwork of the structure
- the system down earth

**Earthing apparatus (SWER return wire)**

When working on any HV connected pole apparatus:

- isolate from all sources of supply
- always apply earths on either side and as close as possible to the point of work using one of the following methods:
  - park HV taps on the SWER return wire and connect to a common earth point using approved portable earthing equipment
  - bond de-energised HV conductors to the SWER return wire and connect to a common earth point using approved portable earthing equipment
Note:
The system down earth must not be used as an earthing lead as it is not rated.

Earthing requirements for induced voltages

Overhead conductors and apparatus could have voltages induced into them via nearby energised conductors that are in close proximity to the line that is being worked on. For more on this, see work practice 2.9 (Induced voltages) in this manual.

When induced voltages are, or are suspected of being, present, the following requirements must be met.

- **Applying earths**
  - A proximity tester must be used to indicate the level of induced voltage that is present.
  - Working earths must be applied, with insulated sticks and as close as possible, to each side of the point of work, ensuring that the grounding leads are bonded at the same earth point to create an equipotential work zone.
    - When applying the working earths, there may be an electrical discharge when the earth is applied to the overhead conductor/apparatus.

- **Removing earths**
  - The working earths must be removed using insulating sticks, and all sets of phase clamps must be removed before disconnecting the grounding leads from the same earth point.
    - When removing the working earths, there is still a possibility of drawing an arc when removing the phase clamp from the conductor.

Note:
If any part of the conductor being worked on is disconnected in any way, a temporary jumper must be installed to bridge the gap and maintain an equipotential bond.
Earthing mobile plant

- Mobile plant must be earthed to ground or a known earth when working on or near any HV overhead electricity conductors (whether energised or de-energised).

- Before use, inspect the earth lead and confirm:
  - that the test date is not expired
  - the tightness of bolted connections
  - the general condition of earthing leads

- Earth leads must be:
  - a minimum of 150 mm² aluminium when working on 66 kV and 132 kV lines
  - a minimum of 95 mm² aluminium when working on voltages from 1kV to 33 kV lines

- Where a permanently installed earth point is not available, pole reinforcing steel columns are the next preferred earth point. The last preference for the earthing point is the temporary earth electrode.

- Temporary earth electrodes:
  - should be placed close to vehicles to reduce touch potentials
  - must be barriered to a minimum radius of two metres to guard against step and touch potentials
  - must be inserted into the ground to a minimum depth of 300 mm and up to a maximum depth of 600 mm. Although calling 'Dial Before You Dig' is not mandatory, care must be taken to avoid driving earth electrodes into an underground service.

- If more than one mobile plant is involved:
  - if they are within a distance of two metres of any part of each other – they must be connected (bonded) to a common earthing point
  - if they are separated by more than two metres – each mobile plant must have its own direct earth connection applied and there must be a minimum of five metres between the earth points

- The earth lead must be bolted to the vehicle or plant chassis or connected with a screw-on clamp. See Figures 1 and 2 for examples.
• A G-clamp must be used to securely connect the earth lead to the permanently installed earth point or temporary earth electrode.

**Note:**

Spring loaded clamps must not be used to secure the earth lead to either the vehicle, temporary earth electrode or permanently installed earth point.

• Personnel must stand on an equipotential mat while operating base controls on a stationary vehicle or plant which is on or near live HV overhead electrical apparatus. Attach the earthing lead of the equipotential mat (either bolted or clamped) to the approved bonding point or a clean metal surface on the vehicle.

• **Do not** connect the vehicle earth lead to any of the following LV neutral, SWER wire or down earth. A separate temporary earth electrode must be used.

**Figures 1 and 2: Examples of earth connections**

**LV short circuiting**

**General**

For an EAP to be issued, the isolated LV phase conductors must be short circuited (bonded) to the neutral conductor to ensure that there is no rise in potential difference between them.
Isolation of LV network circuits must be performed according to a switching program. At the ‘Prove de-energised and fit LV shorts’ section of the program, the following actions must be performed at each point of isolation:

- The apparatus must be proved de-energised using an approved tester before bonding/shorting. For more on this, see work practice 5.4 (Instruments – testing and calibration) in this manual.
- Approved shorting leads must be used.
- Prior to attachment, inspect the shorting leads and clamps to confirm serviceability using similar criteria to HV earths.
- Attach a “Do Not Operate” danger tag to the shorting leads after application.

LV must be treated as live if the required bonding/shorting conditions cannot be fully complied with.

**Bare conductors**

- Attach short-circuiting leads to LV conductors in any sequence.
- Attach a “Do Not Operate” danger tag.
- Perform all de-energised LV work between short-circuiting points.

**Insulated aerial conductors**

- Install four insulation piercing connectors (IPCs) with 125 mm x 12 mm stainless steel bolts on the horizontal plane.
- Stagger the IPCs on the conductors so that they are not opposite each other.
- Install the IPCs near to fuse switches or at poles.
- Retain the nylon screw caps for use later.
- Apply shorting leads in any sequence to all IPC bolts.
- Attach a “Do Not Operate” danger tag.
- Perform all de-energised LV work between short-circuiting lead locations.
- On completion of work, remove the shorting leads and stainless steel bolts and insert the retained nylon screw caps prior to the conductors being re-energised.
References

- Work Practice Manual:
  - work practice 2.6 (Mobile elevated work platform (EWP) safety)
  - work practice 2.9 (Induced voltage)
  - work practice 2.12 (Electrical storms)
  - section 3 (Personal protective equipment)
  - work practice 5.4 (Instruments – testing and calibration)
  - Appendix 1 (Tags and signs)
  - Appendix 10 (Portable earths inspection sheet)
- Electrical System Safety Rules (ESSR)

Related documents

- ASTM F2249 – 03(2009) – Standard specification for in-service test methods for temporary grounding jumper assemblies used on de-energised electric power lines and equipment
- ENA Doc 024-2009 – National guideline for management of tools and equipment used in the electricity supply industry
- IEC 61230 International Standard – Live working – Portable equipment for earthing or earthing and short-circuiting
2.11 HV insulated tools and equipment – testing and use

Purpose

This instruction outlines the requirements for the testing and use of high voltage (HV) insulated tools and associated equipment.

Scope

This instruction covers all HV insulated tools and associated equipment used by Western Power personnel and contractors.

Instructions

General

All HV insulated tools and associated equipment must:

• be rated and certified for use on the relevant voltage
• be kept clean and dry
• be stored and transported so it is not exposed to excess moisture, dust, abrasion and other deteriorating effects
• be checked and cleaned before use
• be tagged out and removed from service if it is defective
• be kept clear of deteriorating contaminants such as hand creams, sunscreens, paint solvents, hydraulic oil, which may affect or degrade insulating qualities of the equipment

Testing

• Prior to use, ensure all HV insulated tools or associated equipment that has not previously been used is tested.
• Western Power’s electrical testing section or any other similar HV testing facility must test all insulated tools and associated equipment covers to the relevant standard.
Table 1: Testing intervals for HV insulating sticks

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Testing intervals</th>
<th>Reference Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulating sticks</td>
<td>dry</td>
<td>12 monthly</td>
</tr>
<tr>
<td></td>
<td>wet</td>
<td>24 monthly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AS 5804.3-2010</td>
</tr>
</tbody>
</table>

Note:
Visual inspections of the insulated stick should be carried out prior to use. If any physical damage to the surface is reported it should undergo a stick leakage test. The Chance-type stick tester is suitable for ‘pre-use’ testing but must not be a substitute for periodic testing by a test facility.

- All HV insulated tools and associated equipment must display an expiry test date twelve (12) months forward from the date tested.
- The expiry date (month and year) must be clearly visible.
- Attach the expiry date within 200 mm of the end of any tool or stick and as close to the shotgun adapter for covers.
- Place the expiry date at the top of the black hot stick locator tube on pole top switch covers.
- Put the expiry date in the same position on the HV insulated tool or associated equipment each time it is tested.
- Do not use HV insulated tools or associated equipment after the expiry date. Equipment must be retested and correctly dated prior to use.

References
- AS5804.3-2010 High voltage live working
2.12 Electrical storms

Purpose

This work practice outlines how to manage the risks associated with lightning strike and what to do if it occurs.

Instructions

Risk management

- There is an increased risk of lightning strike during stormy weather. If stormy weather is experienced during the work day, or if a storm warning has been issued:
  - include relevant controls in the risk assessment, including a worksite evacuation plan
  - ensure that personnel are aware that the hazards associated with working during lightning activity can be extremely dangerous

Note:

- Storm warnings are issued by:
  - Bureau of Meteorology
  - Network Operations

- For more on:
  - risk assessments, see work practices:
    - 2.27 (Construction site hazard management forms)
    - 2.28 (Job briefing process)
  - worksite evacuation plans, see work practice 2.1 (Worksite evacuation plans)

- If you can see lightning or hear thunder:
  1. stop work and seek shelter in a building or enclosed vehicle that is in a safe location and is away from powerlines as lightning strike can induce very high voltages
  2. wait until 30 minutes after the last time you see lightning or hear thunder before recommencing work
Important

During a storm, if you cannot seek shelter in a building or enclosed vehicle, avoid using fixed line phones and avoid the following locations as they have a higher risk of lightning strike.

- Tall objects, e.g. poles, trees. The lightning could jump to you (i.e. side flash) or result in a voltage gradient in the ground, creating a step potential.
- High elevation compared to the surroundings, e.g. on top of a hill or building.
- Electrical apparatus connected to the network. Lightning strike to or near the network can result in explosive damage to plant.

Note:

If working in a zone and terminal substation, see work practice 2.3 (Electrical storms) in the Transmission Substation Work Practice Manual.

Notification requirements

If an incident occurs (e.g. fire, electric shock (even if it's just a tingle), network asset damage), report it to both of the following within an hour of the incident happening, whether caused by lightning or otherwise:

- your formal leader
- the Incident Hotline on 1300 CALL WP (1300 2255 97)

References

- Work Practice Manual, work practices:
  - 2.1 (Worksite evacuation plan)
  - 2.27 (Construction site hazard management forms)
  - 2.28 (Job briefing process)
2.13 Hazardous workspace safety

Purpose

This instruction outlines the safe system of work associated with the entry and activities performed by any person working on behalf of Western Power who enters a hazardous workspace.

The instruction only provides the key points relevant to hazardous workspaces identified on Western Power worksites and does not attempt to replicate the OSH Regulation Division 8 – Work in confined spaces, or any confined space training provisions.

Instructions

Basic requirements

- The person in control of the worksite must carry out a suitable and sufficient job risk assessment (JRA) for all work activities to be undertaken in the hazardous workspace.

  Foreseeable risks includes:
  - changing task conditions
  - the working environment
  - an individual's physical size and shape
  - work materials and tools
  - task competency
  - the rescue of an incapacitated person.

- Determine whether the work environment is a hazardous workspace or confined space.

Note:

Avoid entry if the work environment is determined to be a confined space and designate a competent person who is trained in confined space entry to implement safe systems of work in accordance with WorkSafe WA requirements.
• Confirm that all team members are conversant with all risk controls and if required designate a competent safety observer and/or a rescue team.

• Establish a communication system.

• Consider methods of completing the work without entering the hazardous workspace.

• Identify a method to isolate any power supply in the event of an emergency.

• Determine any work permit requirements.
2.14 Confined space safety

Purpose

This instruction provides an understanding and knowledge of the requirements when performing work safely in a confined space.

Scope

This instruction provides the key points relevant to working in confined spaces. It reinforces the following references:

- WA Occupational Safety and Health Regulations 1996, Division 8 – Work in confined spaces
- Australian Standard AS 2865:2009 – Confined spaces
- Western Power Safety and Health Procedure, Confined Space Procedure (DM# 4742320)
- Any other Western Power approved confined space training provisions.

Risk control

1. Establish a register to record all workplaces defined as a confined space.
2. Fix a “Confined Space” danger sign (shown below) at all access points of every confined space.

Note:

- Only remove a “Confined Space” danger sign if the space is no longer a confined space, e.g. due to a redesign.
- Temporary confined spaces, i.e. spaces which are not normally accessible but that have been opened temporarily for works, must display the signs for the duration of the work.
Training

- In addition to the NAC requirements, personnel working in confined spaces must have a confined space authorisation.
- The following units of competence (or equivalent) must be achieved by personnel required to work in confined spaces.
  - RIIOSH202A – Enter and work in a confined space
  - MSAPMPER205C – Enter a confined space
  - MSAPMPER200C – Work in accordance with an issued permit
- The additional units below are applicable for anyone who issues the confined space entry permits or supervises work in a confined space.
  - MSAPMOHS217A – Gas Test Atmospheres
  - RIIIRIS201B – Conduct local risk control
  - MASPMPER300C – Issue work permits
- A person must be reassessed every two (2) years to maintain their competency to work in confined spaces.
- Depending on the confined space work activity risks, the key confined space training competencies may be either general awareness training or specific training.
- At least one (1) member of the work team must be trained in the following first aid competencies:
  - HLTCPR201B – Perform CPR
  - HLTFA211A – Provide basic emergency life support
  - When working in remote locations – HLTFA302C – Provide first aid in remote situations
- If there is a possible fire risk, ensure that an appropriate number of team members are trained in the use of fire fighting equipment.
- Anyone who needs to use atmospheric monitoring equipment must be trained in its use and calibration requirements.
Permits

Before starting any confined space activities, a Western Power approved Confined Space Entry Permit must be issued in addition to any other relevant permits (see Appendix 2 (Standard forms) in this manual).

Instructions

1. Consider methods of completing the work without entering the confined space.
2. The work parcel or any pre-job instruction must include all possible risks associated with the confined space work activity.
3. The person receiving the Confined Space Entry Permit is responsible for:
   • accepting and relinquishing the permit and managing the work activities to ensure compliance with approved procedures and processes
   • assigning accountabilities related to the confined space activity
   • conducting a risk assessment for all work activities to be done in the confined space, which may include:
     o entry and exit restrictions
     o engulfment by fumes, gas or liquid
     o engulfment by soil or sand
     o dangerous oxygen levels
     o breathable oxygen levels, i.e. 19.5–23.5%
     o explosion or fire
     o electrical arcing
     o unsafe temperatures
     o harmful noise levels
   • ensuring the risk controls are implemented and followed and that all permits are completed
4. Confirm that all team members understand all risk controls.
5. Postpone the work activity if all the confined space risk controls cannot be implemented.
6. Perform atmospheric testing if harmful fumes or gases may be existing or introduced due to things such as:
   - work processes
   - stored materials
   - any possible risk

7. Designate a competent safety observer.

8. Establish and document an Emergency Rescue Plan appropriate to the confined space risk.

9. Establish a communication system.

10. Identify a method to isolate any power supply in the event of an emergency.

11. Anyone working in the confined space work must wear personal protective equipment (PPE) appropriate to the risk. For more on this, see field instruction 3.1 (Clothing and personal protective equipment requirements) in this manual.

12. Work must be done in compliance with all instructions.

13. When work in the confined space is finished, sign off the Confined Space Entry Permit and secure the confined space from unauthorised access.

---

**DANGER**

Sulphur hexafluoride (SF₆) gas is five times heavier than air. Escaped SF₆ gas will displace oxygen at ground level, especially in confined spaces. If SF₆ gas is present, it could present a danger of asphyxiation due to oxygen deficiency to anyone working in tanks, enclosed vessels, ducts, trenches and pits.

---

**References**

- **Work Practice Manual:**
  - Field instruction 3.1 (Clothing and personal protective equipment requirements)
  - Appendix 2 (Standard forms)
- **Western Power Safety and Health Procedure Confined Space Procedure (DM# 4742320)**
- **AS 2865-2009: Confined spaces**
- **WA Occupational Safety and Health Regulations 1996, Division 9 – Work in confined spaces**
2.15 Network tags

Purpose

This work practice outlines the minimum requirements of Western Power's electrical tagging system by explaining the application and use of the five operational tags that are approved for use on the Western Power Network.

Training, authorisation and permissions

Personnel applying and removing network tags must be suitably trained and authorised in their roles and functions, as shown in Table 1, below.

Table 1: Network tag permissions

<table>
<thead>
<tr>
<th>Role/function of person</th>
<th>Applying tags</th>
<th>Removing tags</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do Not Operate (Danger)</td>
<td>Out of Service (Warning)</td>
</tr>
<tr>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Authorised switching operator/issuing officer</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tester in charge during electrical apparatus operation</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Person responsible for maintenance, construction or commissioning</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Network field staff – in a more general sense</td>
<td>✗</td>
<td>✓</td>
</tr>
</tbody>
</table>

1 Issuing Officers can apply and remove tags within the limit of their authorisation. For specific work this includes authorised protection and control Issuing Officers.

2 The Tester in Charge (TIC) can temporarily remove and then reapply earths associated with the 'Restricted Use' danger tag during the process of changing the state of an electrical apparatus. This procedure may require the removal and reapplication of the tag.
**Transmission only**: there are provisions in the *Electrical System Safety Rules (ESSR)*, 2012 to allow a restricted number of activities where the Recipient in Charge (RIC) is also authorised to remove/reapply this tag e.g. phase issuing colours, insulation resistance tests and circuit breaker timing tests.

3 Those responsible for maintenance are likely to be general network field staff. However, in this context they are tasked with repairing/maintaining. They may need to remove the warning tag as part of this task, and can leave the ‘Out of Service’ warning tag on or replace it if the equipment is returned as serviceable. If the equipment to be repaired requires isolation and network access, then a danger tag must also be in place.

4 Any person can apply the ‘Information’ caution tag, but if this is done as part of a switching program, the tag must be applied and removed under the direction of an authorised switching operator (ASO).

5 Any authorised person can remove the ‘Information’ caution tag when normal operating conditions have been restored.

6 Primarily used for de-energisation at consumer service installations on the equipment in meter cabinet/cubicle.

**Note:**
- See ‘12.4 Testing under an EAP for zone substation maintenance’ in the *ESSR* for additional ‘Restricted Use’ danger tag fitting and removing exemptions.
- There is no requirement to report the affixing or removal of the ‘Do not access or alter’ warning tag to Network Control (NC). This is why this tag is not described in the *ESSR*.

**Important**

Personnel applying tags without completing all required fields of information may have their switching authorisation cancelled.

**Approved tags**

The five approved tags for use on Western Power’s network apparatus are:
- ‘Restricted Use’ danger tag
• ‘Do Not Operate’ danger tag
• ‘Out of Service’ warning tag
• ‘Do not access or alter’ warning tag
• ‘Information’ caution tag.

Danger tags

‘Restricted Use’ danger tag

Reorder number: 18697732

• Prohibits all personnel, other than the person nominated on the tag, from operating the apparatus.
• Must be attached and removed by the issuing officer or switching officer when issuing a Sanction to Test (STT).
• Must be fitted/removed in accordance with the approved switching program unless during fault conditions (where tags will be fitted as instructed by NC).
‘Do Not Operate’ danger tag

- Prohibits operation of the apparatus.
- May only be used when work is being carried out on the system.
- Must be attached to apparatus:
  - that has been isolated and earthed in accordance with a switching program
  - for which an Electrical Access Permit (EAP) or STT has been issued.
- Must be fitted and removed in accordance with the approved switching program unless during a fault condition (where tags will be fitted as instructed by NC).
- Must be attached to all isolation points of the plant/equipment in a clearly visible position, including normally-open points (NOP) that are used as a point of isolation.
- Must be removed after all work has been completed.
- If any defect is still present on the apparatus, and work has ceased on the apparatus or the apparatus is not to be returned to operation, the ‘Do Not Operate’ danger tag must be replaced with an ‘Out of Service’ warning tag.
- When further work is to be done on the plant/equipment at a later date, a new ‘Do Not Operate’ danger tag must be attached to the plant/equipment.
Removing danger tags

- Danger tags (i.e. ‘Do Not Operate’ and ‘Restricted Use’) can only be removed per the switching schedule, or in fault conditions as directed by NC.
- Tags discovered in the field with no current schedule can be removed by:
  - the person who affixed the tag
  - other authorised personnel who have contacted one of the following:
    - the operating authority (e.g. NC, Field Protection Services)
    - the person who fitted the tag
    - the team leader of the group responsible for fitting the tag
    - the formal leader of the person who fitted the tag.

**Important**

- Removing a danger tag without authorisation has the potential to create a serious hazard to the Network Total Workforce (NTW) or the general public. Ensure that the appropriate process has been followed and that the removal of a tag is part of an approved step process to change the status of the apparatus.
- Following this process will help to ensure that:
  - the removal of the tag will not put any person at risk
  - the removal of the tag will not affect any other work that is being performed
  - all people who are involved know that the tag has been removed.
- For more on the application and removal of tags, see ‘3.8 Electrical tags.’ in the ESSR.

- If a ‘Do Not Operate’ danger tag is encountered in the work environment and it cannot be determined why it has been affixed, the following must occur before work proceeds:
  1. Identify and contact the person who placed the tag or, if unavailable, their formal leader.
  2. Identify why the tag was placed on the equipment.
3. Contact NC to check if any work is being carried out on the system and if a permit is in existence for the apparatus.

4. Be familiar with, and authorised to operate, that equipment (e.g. a switching operator).

5. Check for any personnel working on the equipment or on any associated section of the network.

6. Check the condition of the equipment and any associated section of the network.

7. Remove the tag and record it in the appropriate system (as directed by NC).

8. Inform your formal leader of this event.

9. Check equipment operates correctly with the use of the relevant commissioning checks.

**Warning tags**

'Out of Service' warning tag

Reorder numbers: 18697730 (thick), 18697731 (thin)

- Prohibits the operation of apparatus, specifically to prevent damage to the apparatus or network and to ensure that personnel who may operate the apparatus are not endangered.
- Must be fitted to apparatus that is unserviceable, awaiting repair or being repaired.
• Must be used to indicate a General and Unusual Operating Instruction (GUOI).
• When an ‘Out of Service’ warning tag is used and has been fitted for switching on primary apparatus, NC must be advised.
• Must be applied directly to the defective component in a clearly visible position.
• Apparatus with remote control must be tagged at all control points.
• May be used for non-operational use (non-electrical or outside of NC’s control) and does not have to be recorded with NC.

Removing an ‘Out of service’ warning tag

This warning tag may only be removed in the following circumstances:

• The apparatus that it is affixed to has been repaired and tested.
• The apparatus has been replaced.
• The apparatus has been isolated from the system by removal of conductor/s or a piece of equipment and is deemed ‘Out of service’ by NC.

‘Do not access or alter’ warning tag

Table 2: Reorder numbers

<table>
<thead>
<tr>
<th>Tag type</th>
<th>Reorder no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Power Fluoro Yellow Safety Sticker Small 140x50mm</td>
<td>18899933</td>
</tr>
<tr>
<td>Western Power Fluoro Yellow Safety Sticker Large 300x100mm</td>
<td>18899934</td>
</tr>
<tr>
<td>Western Power High Visibility Yellow Safety Magnet 300x100mm</td>
<td>18899935</td>
</tr>
</tbody>
</table>
Prohibits the operation of apparatus, specifically to prevent damage to the apparatus or network, and to ensure that consumers and personnel who operate the apparatus are not endangered.

Must be used to inform consumers and NTW personnel that de-energisation has been performed on the consumer’s supply by attaching the tag to metering equipment as described below.

The tag must be affixed to the following apparatus:
- across the de-energised service protection device (SPD) (small sticker)
- across the main switch after it has been set to the off position (small sticker)
- across the meter terminal cover – when load neutral is removed (small sticker)
- on the front of the meter box (magnetic for metal or large sticker for wood)

Removing a ‘Do not access or alter’ warning tag

The tag can only be removed from the switchboard once:
- the Service Connection Test has been performed on all associated apparatus
- the test has confirmed that the switchboard is serviceable to be energised.

Caution tags

‘Information’ caution tag

Reorder number: 18697729

- Used for conditions that do not require a ‘Do Not Operate’ danger tag, ‘Out of Service’ warning tag or ‘Restricted Use’ danger tag.
• The ‘Information’ caution tag provides information about changed or unusual network operating conditions.
  ○ For use as an indication of a network ‘Change of status’, but not a point of isolation for a permit. Typically, when an NOP is closed or moved for operational reasons, this tag would be applied as part of the switching program.
  ○ If it was attached as part of a switching program, it may only be removed under the direction of the ASO when the apparatus is returned to ‘normal’ (e.g. when a NOP that was closed for operational purposes is restored to ‘open’ status again).
• Where an ‘Information’ caution tag is attached to any equipment, all personnel that work on the equipment must comply with any instruction or information on the tag prior to commencing, and during, any tasks associated to the tagged equipment.
• Used for isolation on secondary non-network operational isolations.
• May be used for non-operational use.
• When not used as part of a switching program, the ‘Information’ caution tag should be removed by the person who attached it. However, it may be removed by another person after normal conditions have been restored and the tag is no longer applicable.

Fitting and recording of tags

Fitting tags

• Only approved tags are permitted for use.
• For the tags to be effective, the following must be done:
  ○ All relevant information must be filled out correctly and clearly.
  ○ The tag must be placed in a visible location on the apparatus.
  ○ The tag must remain in place for the duration of the condition indicated on the tag.
• The tags may be attached using the hasp of a padlock through the hole in the tag, or attached to the equipment with string or cable ties. The exception to this is the ‘Do not access or alter’ warning tag, which is applied either by adhesion or a magnetic backing.
Pole wraps

Pole wraps provide high visibility and a means of attaching a tag to a pole that supports switching apparatus that is part of a current switching program.

High visibility pole wraps (stock code CZ5014)

- Pole wraps must be positioned at least one meter above ground-level, wrapped around the pole, and secured with a cable tie (stock code HG1082)
- Pole wraps are reversible, and can be applied in one of the following ways:
  - red side visible with a ‘Do Not Operate’ or ‘Restricted Use’ danger tag at a point of isolation
  - yellow side visible with an:
    - ‘Information’ caution tag at a ‘closed’ NOP
    - ‘Out of Service’ warning tag for apparatus that is out of service.
- Only one tag per pole wrap. If more tags are to be applied to a pole, each tag must be attached using a separate pole wrap.

Recording affixed tags

- Whenever a tag is fitted to network apparatus, it must be recorded:
  - on the switching schedule or by NC when:
    - configuring the system for a permit
    - reinstating the system after the permit is relinquished
  - on the permit – for other isolations (e.g. confined space or Construction Authority Work Permit).
- Recording the details of an affixed tag may also be required when contacting NC in relation to identifying an unknown tag.
‘Do not access or alter’ warning tags do not need to be reported to NC.

‘Information’ caution tags do not need to be reported to NC. However, it may be necessary to record the details of an ‘Information’ caution tag due to the extent of the information associated, or for management purposes of the apparatus.

Note:
Secondary systems and communication systems use other tags that are not covered in this field instruction. These other tags must not be used on the network.

References

- Electrical System Safety Rules (ESSR), 2012 (DM# 9199327). 28 May 2015:
  - 3.8 (Electrical tags)
  - 12.4 (Testing under an EAP for zone substation maintenance).
- Work Practice Manual, Appendix 1 (Tags and signs)
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2.16 Fire precautions for field work

Purpose

This work practice outlines the required fire precautions for field work. When performing work where there is a risk of starting a fire, it is mandatory to comply with the requirements described in this instruction. The controls that are required to eliminate or reduce the risk of damage or harm must be recorded in the risk assessment.

Training

Any person who works in areas where there is a possibility of a fire starting must have been trained in the use of the fire fighting equipment. It is recommended that training is obtained by completing one of the following:

- Basic fire extinguisher and bushfire awareness – provided by Power Training Services WA (PTS WA)
- an equivalent course with another approved registered training organisation

Responsibilities of the person in charge

- Assess the conditions to ensure that the work can be done without the risk of starting a fire.
- Complete a risk assessment for the task.
- Ensure that the correct fire-fighting equipment for the conditions and location is onsite.
- Ensure that all fire-fighting equipment is working correctly.
- Ensure that all people who are required to operate the fire-fighting equipment have been trained in the use of the equipment.
- Ensure that an emergency escape plan is discussed with the entire work team and is documented in the risk assessment.

General requirements

- Vehicles which are primarily used for construction and/or maintenance of the distribution network and are likely to travel off-road in a fire risk area must be fitted with at least one of the following, or a combination of the following, as a minimum:
Fire precautions for field work

- 2 x 9 litre pressurised water fire extinguisher
- 2 x 16 litre knapsack spray
- A 2.3 kg dry chemical powder fire extinguisher (recommended for light passenger vehicles only)

- All other vehicles travelling off-road in a fire risk area must be fitted with at least one of the following as a minimum:
  - 1 x 9 litre pressurised water fire extinguisher
  - 1 x 16 litre knapsack spray
  - 1 x 2.3 kg dry chemical powder fire extinguisher (recommended for light passenger vehicles only).

- Where possible, before attempting to extinguish a fire that is likely to become out of control, immediately call 000 or the local government/shire council. For more on this, see Appendix 4 (Emergency contact information) in this manual.

- Any person who starts and then extinguishes a fire must advise the local government/shire council for the district in which the work is being done (see Appendix 4 (Emergency contact information)). The government/shire council will monitor the area in case of a flare up.

- Western Power has been a smoke-free workplace since 2009, which means that smoking is prohibited on all sites/depots, including car parks and other outdoor areas.

**Note:**

Smoking on Western Power sites/depots presents a fire hazard and the disposal of used cigarette butts and paraphernalia on the ground is an environmental issue.

- Do not use open flames or spark producing tools and equipment in areas that contain combustible materials, unless proper precautions are taken.

**Fire seasons**

**Non-fire season – March to October (this period can be changed by the Department of Fire and Emergency Services (DFES))**

- Weather conditions are not as severe; therefore, the lighting of fires does not require a permit.
- Always take care when conducting activities that can cause a fire to start.
Fire season – October to March (this period can be changed by DFES)

- Weather conditions can be severe; therefore, the lighting of fires requires a permit.
- Before leaving any formed road, inspect the vehicle’s exhaust system to ensure that it is in a sound condition. Remove any grass that is caught in/under the vehicle.
- Operators of vehicles equipped with a diesel particulate diffuser (DPD) must perform a manual regeneration (check the vehicles operating manual for the correct procedure) before entering a worksite where there is a fire risk.

**Note:**

During manual regeneration of the DPD, the muffler and exhaust pipe become extremely hot while the engine is running. Any dry grass, paper waste or other flammable material that is near the vehicle could catch fire.

- Exercise care when operating vehicles and plant in areas with dry grass or other combustible materials. Never leave the vehicle unattended with the motor running.
- Vehicles and plant must be parked in an area that is free from vegetation and combustible materials.
- Do not use open flames or spark producing tools in areas with dry grass or other combustible materials, unless proper precautions are taken.

**Harvest and Vehicle Movement Ban**

- The Fire Control Officers of the local government/shire council issue the ‘Harvest and Vehicle Movement Ban’.
- Approval from the Fire Control Officers of the local must be obtained before entering any areas that are covered by the ban to carry out any fault restoration or work (see Appendix 4 (Emergency contact information) in this manual).
- The minimum amount of fire fighting equipment that is required must be agreed on with the Fire Control Officer of the local government/shire council where the work is being done.
- Generally, the ‘Harvest and Vehicle Movement Ban’ is enforced in conjunction with a DFES total fire ban; however, they may also be issued in isolation.
• Any planned work that is off-road, or on or near a road verge, must be cancelled (unless permission and specific conditions have been obtained from the local government/shire council where the work is to be undertaken).

• In fault situations where lives and property are at risk, only the following work can be done:
  o Isolate supply to make safe.
  o Undertake repairs to fallen poles and powerlines.
  o Remove vegetation that is touching overhead lines.
  o Restore power supply.

• All conditions as outlined in the ‘Off road – fault finding’ section (below) must be adhered to when the ban is in place.

**Total fire ban**

**DFES total fire ban exemption requirements**

The exemption applies to Western Power employees and contractors for the conduct of emergency repairs only (restoration of essential services) during a total fire ban, including the following:

• Off road access by vehicles and equipment for the purpose of fault finding and conducting repairs.

• Hot works (welding, cutting, grinding and heating) at substations and other infrastructure.

• Operating of overhead and ground mounted high voltage (HV) and low voltage (LV) switchgear to energise or isolate the electrical network.

• Performing disconnection and reconnection of customer supplies.

• Performing repairs to fallen poles or wires.

• Removing vegetation that is in contact with overhead powerlines.

**Note:**
During a local government ‘Harvest and Vehicle Movement Ban’, work under the DFES exemption cannot continue (see ‘Harvest and Vehicle Movement Ban’ section, in this document).
Notification when performing work in a total fire ban

- If works are to be conducted within the metropolitan area, the DFES State Hazards Operations Officer is to be notified on (08) 9395 9201 on the day and prior to the activities occurring during a total fire ban.
- If work is to be conducted outside the metropolitan area:
  - the following must be notified on the day prior to the activities occurring during a total fire ban:
    - The nearest DFES regional office.
    - The local shire in the district that the work is being performed in.
  - It is the responsibility of the field staff to contact DFES prior to the commencement of any work, fault restoration or repairs in a total fire ban area.
- If the work is to be conducted within 3 km of a state forest, the respective District Duty Officer of the Department of Parks and Wildlife must be informed (see Appendix 4 (Emergency contact information) in this manual):
  - on the day
  - prior to any works that require an exemption
- Where possible, the person who owns the property that the work is to be performed on is to be advised prior to the activity occurring.

Note:

- Any fire that occurs on the worksite, whether extinguished or not, must be reported to the DFES Communications Centre on 9395 9210.
- Call 000 immediately if the fire cannot be controlled and/or suppressed.

Sites within the gazetted metropolitan area, regional cities and townships

Note:

For an overview of the information outlined in this section, see Table 1 (Sites within the gazetted metropolitan area).

Where works are to be conducted at sites that are free from any area/s of combustible bush or grassland for a radius of 100 m, the following points must be adhered to:

- Welding screens and/or the wetting down of surrounding area is required to reduce possible spark ignition around the immediate worksite.
• The provision of two operational fire extinguishers (16 litre knapsack sprays or 9 litre pressurised air/water or a combination of both) to be placed on the ground near the immediate work area in a readily accessible position.
• The site to be fully inspected for any potential fire activity and declared safe prior to their departure.

Where works are to be conducted at sites with area/s of combustible bush or grassland, (of less than 500 square metres and vegetation not higher than 20 cm) within a radius of 100 m:
• Welding screens and/or the wetting down of surrounding area is required to reduce possible spark ignition around the immediate worksite.
• The provision of two operational fire extinguishers (16 litre knapsack sprays or 9 litre pressurised air/water or a combination of both) to be placed on the ground near the immediate work area in a readily accessible position.
• A fire suppression unit is to be onsite, comprising a minimum of 400 litres of water, with an operational pump and 20 m of 19 mm diameter hose (minimum), capable of delivering water through an adjustable nozzle.
• At least one able bodied person (trained in extinguisher/unit operation) and wearing the appropriate personal protective clothing (PPC) is to be in attendance and dedicated solely to the detection and suppression of any fire.
• The site is to be fully inspected for any potential fire activity and declared safe prior to their departure. Supervision of the site to remain for 30 minutes after fire risk activity has ceased.

Where works are to be conducted at sites with area/s of combustible bush or grassland, (of greater than 500 square m and/or vegetation higher than 20 cm) within a radius of 100 m:
• Welding screens and/or the wetting down of surrounding area is required to reduce possible spark ignition around the immediate worksite.
• The provision of two operational fire extinguishers (16 litre knapsack sprays or 9 litre pressurised air/water or a combination of both) to be placed on the ground near the immediate work area in a readily accessible position.
• A single or multiple, fire suppression units are to be onsite, comprising a minimum of 800 litres of water, with an operational pump and 20 m of 19 mm diameter hose (minimum), capable of delivering water through an adjustable nozzle.
Each fire unit is to be crewed by at least two able bodied persons (trained in extinguisher/unit operation) and wearing the appropriate personal protective clothing (PPC) is to be in attendance and dedicated solely to the detection and suppression of any fire.

The site is to be fully inspected for any potential fire activity and declared safe prior to their departure. Supervision of the site to remain for 30 minutes after fire risk activity has ceased.

### Table 1: Sites within the gazetted metropolitan area

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Vegetation near worksite is...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>More than 100 m away</td>
</tr>
<tr>
<td>To reduce possible spark ignition around the immediate worksite:</td>
<td>✓</td>
</tr>
<tr>
<td>- use welding screens</td>
<td></td>
</tr>
<tr>
<td>- wet down the surrounding area</td>
<td></td>
</tr>
<tr>
<td>Have two operational fire extinguishers on the ground near the immediate work area in a readily accessible position:</td>
<td>✓</td>
</tr>
<tr>
<td>- 2 x 16 litre knapsack sprays or</td>
<td></td>
</tr>
<tr>
<td>- 2 x 9 litre pressurised air/water or</td>
<td></td>
</tr>
<tr>
<td>- a combination of both</td>
<td></td>
</tr>
<tr>
<td>Have a fire suppression unit onsite, comprising of a minimum of 400 litres of water, with an operational pump and 20 m of 19 mm diameter hose (minimum), capable of delivering water through an adjustable nozzle.</td>
<td>✓</td>
</tr>
<tr>
<td>Have the following onsite:</td>
<td></td>
</tr>
<tr>
<td>A single or multiple, fire suppression units comprising a minimum of 800 litres of water, with an operational pump and 20 m of 19 mm diameter hose (minimum), capable of delivering water through an adjustable nozzle.</td>
<td></td>
</tr>
</tbody>
</table>
## Vegetation near worksite is...

<table>
<thead>
<tr>
<th>Requirement</th>
<th>More than 100 m away</th>
<th>Within 100 m, is less than 500 m² and less than 20 cm high *</th>
<th>Within 100 m, is more than 500 m² and/or more than 20 cm high *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have at least one able bodied person onsite who is:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• trained in extinguisher/unit operation</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• wearing the appropriate PPC</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• dedicated solely to the detection and suppression of any fire</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have at least two able bodied persons onsite who are:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• trained in extinguisher/unit operation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• wearing the appropriate PPC</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• dedicated solely to the detection and suppression of any fire</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• Fully inspect the site for any potential fire activity and declare safe prior to departure.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• Supervision of the site to remain for 30 minutes after fire risk activity has ceased.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

* 500 m² of vegetation is roughly the size of two tennis courts.

### Sites outside the gazetted metropolitan area, regional cities and townships

#### Note:

For an overview of the information outlined in this section, see Table 2 (Sites outside the gazetted metropolitan area).

### Where works are to be conducted at sites that are free from any area/s of combustible bush or grassland for a radius of not less than 100 m:

- Welding screens and/or the wetting down of surrounding area is required to reduce possible spark ignition around the immediate worksite.
- The provision of two operational fire extinguishers (16 litre knapsack sprays or 9 litre pressurised air/water or a combination of both) to be placed on the ground near the immediate work area in a readily accessible position.
• The site to be fully inspected for any potential fire activity and declared safe prior to their departure.

Where works are to be conducted at sites with area/s of combustible bush or grassland within a radius of 100 m:

• Welding screens and/or the wetting down of surrounding area is required to reduce possible spark ignition around the immediate worksite.

• The provision of two operational fire extinguishers (16 litre knapsack sprays or 9 litre pressurised air/water or a combination of both) to be placed on the ground near the immediate work area in a readily accessible position.

• A single or multiple, fire suppression units are to be onsite, comprising a minimum of 800 litres of water, with an operational pump and 20 m of 19 mm diameter hose (minimum), capable of delivering water through an adjustable nozzle.

• Each fire unit is to be crewed by at least two able bodied persons (trained in extinguisher/unit operation) and wearing the appropriate personal protective clothing (PPC) is to be in attendance and dedicated solely to the detection and suppression of any fire.

• At least two able bodied people are to remain at the worksite for at least 30 minutes after the works have been completed to ensure the site remains safe and the site is to be fully inspected for any potential fire activity prior to their departure.
Table 2: Sites outside the gazetted metropolitan area

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Vegetation near worksite is...</th>
<th>more than 100 m away</th>
<th>less 100 m away</th>
</tr>
</thead>
<tbody>
<tr>
<td>To reduce possible spark ignition around the immediate worksite:</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>• use welding screens</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• wet down the surrounding area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have two operational fire extinguishers on the ground near the immediate work area in a readily accessible position:</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>• 2 x 16 litre knapsack sprays or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 2 x 9 litre pressurised air/water or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• a combination of both</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have the following onsite:</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>• A single or multiple, fire suppression unit, comprising a minimum of 800 litres of water, with an operational pump and 20 m of 19 mm diameter hose (minimum), capable of delivering water through an adjustable nozzle.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each fire unit is to be crewed by at least two able bodied persons (trained in extinguisher/unit operation) that are:</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>• wearing the appropriate PPC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• dedicated solely to the detection and suppression of any fire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Fully inspect the site for any potential fire activity and declare safe prior to departure.</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>• Supervision of the site to remain for 30 minutes after fire risk activity has ceased.</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

**Off road – fault finding**

If proceeding off-road for the purpose of undertaking a preliminary assessment of the safety or condition of the powerline network, there must be a minimum of the following present:

- A mobile fire suppression unit, to be crewed by two able bodied and trained people, comprising of a minimum of 400 litres of water, with an operational pump and 20 m of 19 mm diameter hose (minimum), capable of delivering water through an adjustable nozzle.
• Power re-instatement of overhead powerlines – non identified faults

• Where a fault cannot be identified visually on the affected network, after carrying out a line patrol, the following shall apply:
  o Risk assessment prior to reinstatement of power.
  or
  o Reinstatement of power is only to be undertaken on a Falling Fire Danger Index (FDI) and not before the FDI falls below 32 (high rating 12 to 31);
  or
  o In an emergency, DFES may request the reinstatement of power by the network operator.

Pole top switches and fuse replacement

If HV fuses or pole top switches need to be operated live and the above fire-fighting unit is not onsite, the operation must be performed under de-energised conditions (opening of the feeder breaker or recloser).

Off road use of vehicles and plant when fault finding

• All vehicles and stationary motors are to be inspected prior to leaving any formed road to ensure that the exhaust systems are in sound condition.

• All vehicles and stationary motors are to be refuelled on clear ground and in an appropriate method to avoid the release of static energy.

• Operators of vehicles equipped with a diesel particulate diffuser (DPD) must perform a manual regeneration before entering a worksite, where there is a fire risk (check the vehicle operating manual for the correct procedure). This operation will cause the muffler and exhaust pipe to become extremely hot.

• All vehicles and plant must be parked in an area away from flammable materials.

• All vehicles and plant must be parked in an area free from vegetation and combustible material.

• Never leave a vehicle or plant unattended with the engine running.

• Always turn the vehicles or plant engine off when not in use.

• All scrap materials and rubbish are to be removed from site.

Fire weather warning information contacts

Obtain information on fire and weather warnings from:
• NOCC: 9427 0636
• SOCC: 9427 4287
• local government/shire councils (see Appendix 4 (Emergency contact information) for contact details)
• regional radio stations
• Bureau of Meteorology website (http://www.bom.gov.au/)
## FIRE DANGER RATINGS

<table>
<thead>
<tr>
<th>Fire danger rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CATASTROPHIC</strong></td>
<td>These are the worst conditions for a bush or grass fire. If a fire starts it will be extremely difficult to control. Spot fires will start well ahead of the main fire and cause rapid spread of the fire. The only safe place is away from the bush fire risk area.</td>
</tr>
<tr>
<td><strong>EXTREME</strong></td>
<td>These are very hot, dry and windy conditions for a bush/grass fire. If a fire starts it will be unpredictable, move very fast and difficult to bring under control. Spot fires will start and move quickly. The only safe place is away from the bush fire risk area.</td>
</tr>
<tr>
<td><strong>SEVERE</strong></td>
<td>These are hot, dry and possible windy conditions for a bush/grass fire. If a fire starts it may be hard to control.</td>
</tr>
<tr>
<td><strong>VERY HIGH</strong></td>
<td>These are hot, dry and possible windy conditions for a bush/grass fire. If a fire starts it may be hard to control.</td>
</tr>
<tr>
<td><strong>HIGH</strong></td>
<td>If a fire starts, it is likely to be controlled in these conditions. Be aware how fires can start and reduce the risk.</td>
</tr>
<tr>
<td><strong>LOW-MODERATE</strong></td>
<td></td>
</tr>
</tbody>
</table>

To seek further information, listen to local radio, go to [www.fesa.wa.gov.au](http://www.fesa.wa.gov.au) or call the FESA information line on 1300 657 209

**Call 000 to report a fire**
Fire Districts

Northern
1. North Kimberley Coast
2. West Kimberley Coast
3. Kimberley Inland
4. East Pilbara Coast
5. West Pilbara Coast
6. East Pilbara Inland
7. Ashburton Inland
8. Exmouth Gulf Coast
9. North Interior

Central and Eastern
10. Gascoyne Coast
11. Gascoyne Inland
12. Goldfields
13. Eucla
14. South Interior

South West Land Division
15. Coastal Central West - North
16. Inland Central West - North
17. Coastal Central West - South
18. Inland Central West - South
19. Lower West Coast
20. Lower West Inland
21. Geographe
22. Leeuwin
23. Nelson
24. Stirling Coast
25. Stirling Inland
26. Ravensthorpe Shire Coast
27. Ravensthorpe Shire Inland
28. Esperance Shire Coast
29. Esperance Shire Inland
30. Upper Great Southern
31. Roe
32. Beaufort
33. Lakes
34. Mortlock
35. Ninghan
36. Avon
37. Jilbadjgie

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(Source: Bureau of Meteorology 2012, Western Australian Fire Forecast Areas Maps; used under the Creative Commons (CC) Attribution 3.0 Australia licence.)
References

- Work Practice Manual, Appendix 4 (Emergency contact information)
- Bush Fire Act 1954 – Notice of Exemption Total Fire ban Section 22C (DM# 10738607)
- Department of Parks and Wildlife (www.dpaw.wa.gov.au)
2.17 Chainsaw safety

Purpose
This field instruction outlines the minimum requirements for the safe use and maintenance of chainsaws.

Scope
This instruction:
- applies to anyone authorised to use a chainsaw while doing work for Western Power
- only reinforces the key safety requirements relevant to chainsaw use. It does not attempt to replace the work practices contained in the manufacturers operating instructions, or enterprise training courses provided by recognised training organisations.

Chainsaw personal protective equipment
Personal protective equipment (PPE) must be worn per field instruction 3.1 (Clothing and personal protective equipment requirements) and, in conjunction with a risk assessment process, the following additional PPE may be required.
- Face shield – that complies with AS 1337 (WP stock code QE0154). When working near live conductors, you must wear a non-conductive face shield.
- Helmet to face shield adaptor – that complies with AS 1337 (WP stock code QE3081).
- Hearing protection – that complies with AS 1270.
- Leg chaps – that comply with AS 4453 (WP stock code QC4000). Not required when working from an elevated work platform basket.

Training
A person operating a chainsaw at a Western Power worksite must be competent in its use and possess evidence of accreditation from a registered training organisation (RTO). The user must only operate the chainsaw within their physical capability and training.
Only trained and experienced personnel are permitted to carry out tree felling. For more, see Section 10 (Vegetation management work) in this manual.

Instructions

- Read the chainsaw manufacturer’s manual and follow the instructions.
- Conduct a job risk assessment before using a chainsaw.
- Confirm that a trained first aider is at the worksite and a stocked first aid box is available.
- Select the correct chainsaw for the job.
- Remove or enclose any loose garments or jewellery to prevent them from getting caught in the chainsaw.
- Set up a clear work area with firm footing before using a chainsaw. Chainsaws may be operated from an elevated work platform basket, an approved working platform and from trees but not from a ladder.
- Create a planned emergency retreat path from the work area.
- If required, set up a restricted access area to prevent others from becoming at risk from the chainsaw work being done.
- If required, use road traffic control, barriers or a competent safety observer who has been specifically instructed in the recognition of relevant workplace hazards.
- Always cut below shoulder height and never operate the chainsaw while holding it with one hand.
- The chainsaw, fuel and other components must be stored securely during transport.
- When carrying the chainsaw outside the immediate work area, the engine must be stopped, the guide bar covered with a scabbard and facing the rear.
- Take regular rest breaks to avoid fatigue.
- To prevent fires, refuel in a clear area. If the work area is a fire risk, position fire extinguisher’s nearby.

Care and maintenance

- Conduct pre-start checks and regularly service the chainsaw.
• Confirm that the chainsaw bar, chain and brake are in good condition and that all safety devices are working. When in doubt, seek clarification from personnel competent with the chainsaw.

References

• Work Practice Manual:
  o field instruction 3.1 (Clothing and personal protective equipment requirements)
  o Section 10 (Vegetation management work)
• AS 2727-1997 Chainsaws – Guide to safe working practices
• AS/NSZ 1337.2:2012: Personal eye protection – Mesh eye and face protectors for occupational applications
• AS/NZS 4453.3:1997/Amdt 1:1998 : Protective clothing for users of hand-held chainsaws - Protective legwear
2.18  Pyrolysis in vehicle tyres

Purpose

This work practice defines tyre pyrolysis and outlines the causes, preventative measures and precautions to take if tyre pyrolysis is suspected. It also addresses what to do if a vehicle is struck by lightning or makes contact with overhead powerlines.

Overview

It is possible for the tyres on trucks, cranes and other heavy vehicles to catch on fire and explode; sometimes there are no external signs and combustion takes place inside the tyre.

Whenever excess heat is developed in, or applied to, a tyre, it can initiate a process within the tyre known as pyrolysis. Pyrolysis is the chemical decomposition of an organic material after it has been exposed to high temperatures. Flammable gases and pressure build up within the tyre, which can cause it to rupture or explode.

Important

Exploding tyres can propel parts of wheel rims and tyre fragments over long distances.

Causes

Pyrolysis in vehicle tyres can be caused by:

- a lightning strike
- contact with live high voltage apparatus
- defective or under-inflated tyres
- the application of heat (such as oxyacetylene or welding) on wheel rims with tyres attached
- overheated brakes
- close proximity to fire
Instructions

Before commencing work:

- conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

Preventative measures

- Ensure that tyres are in good condition and are inflated to the correct pressure.
- Before raising any tray, crane jib, EWP boom or similar, look up to ensure clearance from overhead conductors.
- Remove all tyres when welding or carrying out any oxy-acetylene works on wheel rims.
- Report any suspected vehicle brake overheating to Fleet Services.

If tyre pyrolysis is suspected

- If there is a safety concern relating to tyre pyrolysis:
  o remove all personnel to a distance or protected area (approximately 100m) that will mitigate any danger of an explosion of the tyre
  o secure and control entry to the site until the appropriate authorities have inspected and released the vehicle
- Update the risk assessment immediately after a vehicle’s tyres have been exposed to the effects of extreme heat.
- If practicable and safe, drive or tow the pyrolysis-affected vehicle into a nearby area that is clear.

Note:

Before moving or towing the vehicle, personnel must gain approval from the appropriate authorities e.g. Network Operations, their formal leader and Fleet Services. Ensure that the Western Power vehicle intended to be moved is identified to the authorities.
Vehicle contact with lightning or overhead powerlines

- If a vehicle is struck by lightning or makes contact with live overhead powerlines personnel must remain clear of plant until proved de-energised and earthed.
- If the conductor is touching the vehicle or plant and the driver appears to be injured, remain clear until the conductor is proven de-energised and earthed.
- The driver of a vehicle that is in contact with a powerline must remain in the vehicle until the electrical supply has been isolated.

Note:

- If the driver is alone, they should attempt to seek assistance using a mobile phone or radio.
- If there is an immediate risk of a fire or potential explosion, the driver should leave the vehicle by jumping clear with both feet together to put significant distance between their body and the vehicle. The driver must advise all other personnel or members of the public to stay clear.

- Arrange for the control centre to have the supply isolated and call 000 so that the Department of Fire and Emergency Services (DFES) can manage the risk of any potential fire (see Appendix 4 (Emergency contact information) in this manual).
- Once the supply has been isolated the driver may exit the vehicle and move outside the exclusion zone if one has been established.
- If the vehicle cannot be moved as deemed by the appropriate authorities, contact your formal leader to arrange for an exclusion zone to be established around the vehicle to a distance of at least 100 m and keep the vehicle isolated for 24 hours before approaching.

References

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - Appendix 4 (Emergency contact information)
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2.19 Crane use in substations and near powerlines

Purpose

This work practice outlines the safe work requirements when operating a crane in a substation or near powerlines.

Scope

This work practice is applicable to crane operators.

For information on the role of a dogger, including when a dogger is required on Western Power construction sites, see work practice 2.20 (Dogger – construction worksite) in this manual.

Authorisation and training

- The onsite person in charge must possess a Network Access level 3 (NA3) authorisation.
- The crane operator must:
  - be competent to perform the task
  - have a High Risk Work Licence for the crane they are operating
  - have a Network Authority Card (NAC)
  - have Network Access level 2 (NA2) or be directly supervised by a person with Network Access level 3 (NA3)

Note:

To use supplementary attachments such as the ones listed below, the crane operator must have completed the relevant additional training:

- pendulum borer
- hydraulic pole jacks
- screw anchors
- pole erection through low voltage conductors

This training is covered by courses such as Crane operator supplementary, supplied by Power Training Services WA (PTSWA).
Instructions

Before commencing work:

- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- ensure that a drop zone is established (see work practice 2.3 (Height safety) in this manual).

The onsite person in charge must:

- observe substation entry requirements (see work practice 9.2 (Substation entry requirements) in this manual).
- observe applicable permitting processes
- record attendance in the substation logbook
- identify and issue any permit required for the task
- establish a worksite evacuation plan relevant to the task (see work practice 2.1 (Worksite evacuation plan) in this manual).
- conduct a risk assessment and job briefing. The risk assessment must record any safety observers. For more on:
  - job briefings, see work practice 2.28 (Job briefing process)
  - safety observers, see work practice 2.2 (Safety observer role)
- confirm that everyone involved in the task understand the risk controls
- determine if a dogger is required
- position barriers and/or signs to mark the perimeter of the work area

The crane operator must:

- perform the logbook pre-start crane operation checks
- check and inspect all chains, slings and other lifting devices for wear, tear damage and counterfeit
- comply with the crane manufacturer’s specifications and recommendations
- ensure that the crane is suitable for the lift capacity and jib manoeuvrability
- never leave the crane unattended unless all safeguards have been implemented
• control any risks associated with step and touch potential by imposing a ground approach distance (GAD) in accordance with the *Ground approach distance* section, below
• earth the crane in accordance with the *Earthing of cranes* section, below
• where practicable, position the crane so that the maximum reach of the jib is unable to enter the minimum approach distance of live or de-energised apparatus. Consider inadvertent movement clearances.
• position the crane and outriggers on stable ground. Be aware of cable trenches.
• when using side controls:
  o stand on an equipotential mat electrically bonded to the vehicle. For more on this, see the *Earthing of cranes section*, below.
  or
  o wear insulated gloves rated to at least the voltage of the nearby conductors
• attach non-conductive 16 mm tag lines to the suspended load to provide additional manoeuvring control
• stow the crane jib when travelling (except when performing pick and carry movements)
• only drive the crane across trafficable trench or cable covers
• only use the crane for lifting or supporting disconnected apparatus
• comply with the maximum 15 km/h speed restriction. When performing pick and carry movements, do not exceed walking speed.
• when travelling within a live substation, securely attach a trailing 10 mm diameter bright or galvanised drag chain to the crane (minimum 150 mm of chain in contact with ground)
• when using chain shorteners:
  o the safe working load (SWL) of the chain is reduced. The specific chain load chart (which may be found on a plate attached to the device) for the lifting equipment must be checked before use. If the information cannot be sourced, do not use the chain shorteners.
  o ensure that claw-type shorteners are securely fitted as any sideways pressure that is applied to the link may cause it to twist which could result in the load falling
Note:
Chain shorteners must not be used when raising or lowering poles into ground holes.

Ground approach distance (GAD)

- Everyone involved in crane operations must maintain a GAD around the base of the crane (stabilisers/outriggers included) when used near live apparatus. See Table 1 and Figure 1, below.
- Where a GAD must be maintained, a barrier must be placed around a crane prior to the boom operation where inadvertent electrical contact may occur. This is for the protection of personnel and members of the public, and may require measures such as traffic control.
- If personnel must enter the GAD for any reason, they must wear insulating gloves rated to the highest voltage within the boom reach on the structure.

Table 1: Crane ground approach distance (GAD)*

<table>
<thead>
<tr>
<th>Voltage of conductor</th>
<th>Ground approach distances (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low voltage</td>
<td>1,000</td>
</tr>
<tr>
<td>High voltage 1 kV up to 33 kV</td>
<td>1,200</td>
</tr>
<tr>
<td>66 kV</td>
<td>1,500</td>
</tr>
<tr>
<td>132 kV</td>
<td>1,800</td>
</tr>
<tr>
<td>Over 132 kV</td>
<td>3,000</td>
</tr>
</tbody>
</table>

* If the above clearances cannot be maintained, for voltages up to 33 kV insulating gloves rated to the highest voltage within the boom reach on the structure must be used. For voltages of 66kV and above the GAD must be maintained.
Earthing of cranes

- The crane must be earthed to ground or a known earth when working on or near any above ground electricity conductors (whether energised or de-energised).
- Before use, inspect the earth lead and confirm:
  - that the test date is not expired
  - the tightness of bolted connections
  - the general condition of earthing leads
- Earth leads must be:
  - a minimum of 150 mm² aluminium when working on 66 kV and 132 kV lines
  - a minimum of 95 mm² aluminium when working on 1kV to 33 kV lines
- Where a permanently installed earth point is not available, pole reinforcing steel columns are the next preferred earth point. The last preference for the earthing point is the temporary earth electrode.
- Temporary earth electrodes:
  - should be placed close to vehicles to reduce step and touch potentials
  - must be barriered to a minimum radius of two metres to guard against step and touch potentials
  - must be inserted into the ground to a minimum depth of 300 mm and up to a maximum depth of 600 mm. Although calling 'Dial Before You Dig' is not
mandatory, care must be taken to avoid driving earth electrodes into an underground service.

- If more than one mobile plant is involved:
  - if they are within a distance of two metres of any part of each other – they must be connected (bonded) to a common earthing point
  - if they are separated by more than two metres – each mobile plant must have its own direct earth connection applied, there must be a minimum of five metres between the earth points

- The earth lead must be bolted to the earth lead of the vehicle or plant chassis or connected with a screw-on clamp.

- A G-clamp must be used to securely connect the earth lead to the permanently installed earth point or temporary earth electrode.

**Note:**

Spring loaded clamps must not be used to secure the earth lead to either the vehicle, temporary earth electrode or permanently installed earth point.

- Personnel must stand on an equipotential mat while operating base controls on a stationary vehicle or plant which is on or near live high voltage overhead electrical apparatus. Attach the earthing lead of the equipotential mat (either bonded or clamped) to the approved bonding point or a clean metal surface on the vehicle.

- **Do not** connect the vehicle earth lead to any of the following LV neutral, SWER wire or down earth. A separate temporary earth electrode must be used.

**Note:**

Where an electrical access permit (EAP) has been issued, working earths have been applied, and no other live conductors are in the vicinity of the work, then there is no requirement to earth the crane.
Figures 1 and 2: Examples of vehicle earth connections

References

- Work Practice Manual:
  - work practice 2.1 (Worksite evacuation plan)
  - work practice 2.2 (Safety observer role)
  - work practice 2.3 (Height safety)
  - work practice 2.20 (Dogger – construction worksite)
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 9.2 (Substation entry requirements)
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2.20  Dogger – construction site

Purpose

This work practice outlines the requirements for doggers to sling and direct loads to be lifted by cranes on Western Power worksites.

The onsite person in charge must provide a dogger on a construction site wherever there is a requirement to:

- apply slinging techniques to a load, including:
  - calculating the safe angle for sling or chain
  - selecting the type of sling or chain to be used
  - selecting the correct method to secure the load
  - selecting the safe method to lift or turn the load
- direct the operator of a crane or hoist in the movement of a load when the load is out of the view of the operator

Authorisation

The dogger must:

- meet the requirements for worksite access. For more on this, see work practice 5.17 (Construction site access – minimum requirements) in this manual.
- possess a current *High Risk Work Licence – DG*
- when working near live conductors or apparatus, be authorised and qualified to work on that equipment or have a competent and authorised safety observer assigned

Safety

The onsite person in charge must ensure that the team carrying out the lift:

- participates in a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
- complies with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- is aware of any minimum approach distances (MADs) that must be maintained for each lift
• plans each crane lift appropriately

Instructions

Prior to any lift

• The onsite person in charge must ensure that:
  o the necessary tools and equipment required by a dogger are available for the task before a lift is carried out (e.g. communication device, barricades, and the appropriate slings, chains and shackles for the lift)
  o a drop zone is established. For more on this, see work practice 2.3 (Height safety) in this manual.

• The dogger and crane operator must work together to:
  o complete an assessment of the worksite and scope of the lift, including the safe working load (SWL) of lifting equipment. If required, they must develop a preliminary dogging plan.
  o apply all controls that are required to eliminate or reduce the risk of injury or damage
  o establish a communication system suitable for the environment such as:
    – voice
    – hand signals
    – whistle signals
    – two-way radio

• The dogger must:
  o inspect the required lifting gear and tag and remove any unserviceable equipment
  o calculate the approximate load weight and centre of gravity prior to the lift
  o ensure that the lifting gear is connected to the load in accordance with the manufacturer’s specifications

During the lift

If at any time the load will be out of the crane operator’s view during the lift, the dogger must:
• direct the crane operator until the load is in its final position
• adopt a position where the dogger is able to view the load throughout the entire lift and can provide their undivided attention to the crane operator

Note:

Work must cease if the dogger’s view is impaired.

• ensure that the crane operator ceases all crane movements if, for any reason, the dogger has to leave their position
• stop the crane operation if an at-risk situation is imminent. The dogger or any member of the team can raise the alarm.

Chain shorteners

• Ensure that claw-type shorteners are securely fitted as any sideways pressure that is applied to the link may cause it to twist which could result in the load falling.
• When using chain shorteners, the SWL of the chain is reduced. The dogger must check the specific chain load chart (which may be found on a plate attached to the device) for the lifting equipment before use. If the information cannot be sourced, do not use the chain shorteners.
• Chain shorteners must not be used when raising or lowering poles into ground holes.

References

• Work Practice Manual:
  o work practice 2.2 (Safety observer role)
  o work practice 2.3 (Height safety)
  o work practice 2.19 (Crane use in substations and near powerlines)
  o work practice 2.28 (Job briefing process)
  o section 3 (Personal protective equipment)
  o work practice 5.17 (Construction site access – minimum requirements)

Related reading

• AS 2550.1-2011: Cranes, hoists and winches - Safe use - General requirements
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2.21 Traffic management

Purpose

This instruction outlines the minimum requirements for the safe movement of vehicle and pedestrian traffic through, around or over a Western Power worksite.

Scope

This instruction provides the key points relevant to Western Power worksites and does not attempt to replicate the relevant codes of practice or other referenced documents.

Training and authorisation

- Only a person who has successfully completed the appropriate Main Roads Western Australia (MRWA) Traffic Management training course can administer the control of traffic, placement of signs and the erection of temporary safety barriers.
- Re-accreditation of the appropriate MRWA Traffic Management training course is required every three (3) years.
- Anyone entering a Western Power worksite must possess a Western Power Network Authority Card.

Instructions

Traffic management

- At the planning stage, determine the required level of traffic management.
- Complete a risk assessment form for basic traffic management or submit a Traffic Management Plan (TMP) for complex traffic management arrangements. The risk assessment form or TMP must clearly define the method of traffic control.
- Inform property owners or occupants when the erection of safety barriers or warning signs will restrict them from entering or leaving their property. Give at least three (3) days notice for planned tasks and use the Western Power Public Notice form (Appendix 2 – Standard forms). If this is not possible, designate a competent safety observer who has received instruction on recognising the
relevant workplace hazards. The safety observer must prevent the public from entering the immediate worksite.

- When conducting the on-site risk assessment, determine if temporary safety barriers or warning signs are needed
- If the risk assessment identifies any hazard that could put the public at risk of injury or harm do one or both of the following:
  - erect temporary MRWA-approved safety barriers or warning signs, positioning them so that they will not become a hazard or a workplace obstruction
  - designate a person to direct pedestrians
- On completion of work, remove all temporary road management signs and barriers.

**Temporary safety barriers**

- The following are approved temporary safety barriers:
  - high-visibility barrier mesh
  - high-visibility flag-rope barriers
  - MRWA-approved road safety barriers
  - temporary fencing
  - high-visibility road traffic management cones and bollards
- Appropriate warning or advisory signs must be erected in conjunction with the barriers listed above. Walls, fences or other impassable permanent barriers may be used as part of a temporary safety barrier.
- If star pickets are used to support temporary safety barriers or warning signs, drive them into the ground firmly to a maximum depth of 600 mm.

*Note:* Take care to avoid driving star pickets into underground services. For more on this, see field instruction 7.2 (Excavation work) in this manual. Cover the top of the star picket to prevent injury.

**High-visibility barrier mesh**

- Use high-visibility barrier mesh around excavations, exposed cables, poles or generators to stop members of the public from entering a hazardous worksite.
Note:
Barrier mesh is not designed to prevent a fall into a trench.

- Erect high-visibility barrier mesh to a minimum height of 900 mm from ground level.
- To prevent the barrier from collapsing, fasten and secure it to star pickets or ground screws no more than two (2) metres apart.

High-visibility flag-rope barriers
- High-visibility flag-rope is used:
  - to safely guide members of the public around or through a hazardous worksite
  - in substations to indicate working, live, or safe areas
- Position the high-visibility flag-rope barrier between 900 mm and 1200 mm above the ground.
- Tie high-visibility flag-rope to star pickets, ground screws, freestanding bollards, suitable permanent supports or selected supports using a suitable fastener.
- Position star pickets, ground screws or freestanding bollards up to a maximum distance of three (3) metres apart to prevent the flag-rope from sagging below 900 mm.

MRWA-approved road safety barriers
- Only use MRWA approved road safety barrier system which is specifically designed to prevent an out-of-control vehicle entering the work area.
- A trained person is required to install road safety barrier systems under a traffic management plan and in accordance with Australian Standards and the Traffic Management for Works on Roads Code of Practice.
In circumstances where an off-road (outside the road reserve) hazard requires safety barrier protection from moving plant and vehicles, a trained person is required to correctly install and maintain the barrier in accordance with the manual and any relevant worksite conditions identified during the job risk assessment.

Temporary fencing

- Use temporary fencing to prevent unauthorised entry to worksites.
- Install temporary fencing at a distance that will not create an additional hazard to the general public.
- Install temporary fencing where enclosures are required to stop unauthorised entry to electrical apparatus, plant, and equipment.
- Construct temporary fencing to a minimum height of 1,800 mm with the panel sections consisting of either:
  - steel mesh
  - plastic fencing
  - chain wire
  - metal hoarding
- If access gates are fitted, ensure they can be locked.
  - For increased security, attach barbed wire extensions to the top of the temporary fencing.
  - Make sure temporary fencing is far enough away from the safety barrier to provide protection against a vehicle collision.
  - If the risk assessment identifies a particular hazard erect temporary warning or advisory signs in conjunction with temporary safety barriers.
High-visibility road traffic management cones and bollards

Use plastic barriers to redirect pedestrian traffic away from a worksite. Do not install them to provide a physical barrier between the pedestrian walkway and the work area.

Warning or advisory signs

- Warning or advisory signs that can be used on Western Power worksites include:
  - Powerline Work in Progress
  - Pedestrians This Way
  - Do Not Enter
  - Caution – Excavation Work in Progress
  - Danger – Live Cables
  - Authorised Entry Only
- Put warning and advisory signs where they are clearly visible and do not obstruct pedestrians and vehicular traffic.
- Ensure all warning and advisory signs are legible and in good condition.

Worksite storage areas

- Based on a risk assessment, select the appropriate temporary barrier to prevent access to, or isolate, a worksite storage area. Stores include poles, hardware, cables, etc.
- In residential areas or near schools and playgrounds, worksite storage areas may be in place for a maximum of two (2) weeks. In other places where there is a low threat of public injury or damage, the storage period should be based on the risk assessment.
Operational work practice standards

- Inspect temporary barriers periodically based on the risk assessment, potential vandalism and the time that the stores remain on the worksite.
- Position poles left on a ‘dead-man’ so that the raised end of the pole faces away from oncoming traffic.

Emergency response generators

Refer to the Emergency Response Generators Manual (see References) for detailed standards on temporary fencing for emergency response generator deployment.

References

- Work Practice Manual:
  - Field instruction 7.2 (Excavation work)
  - Appendix 2 – Standard forms
- AS 1743-2001: Road Sign – Specification
- Emergency Response Generators Manual (DM# 3065204)
- MRWA Traffic Management for Works on Roads Code of Practice (May 2010)
- WA Occupational Safety and Health Regulations (1996)
2.22 Asbestos and fibreglass working procedures

Purpose

This instruction outlines the steps to be followed when working on equipment that contains, or is suspected of containing, asbestos materials. It also provides advice on working with fibreglass to ensure exposure standards are not exceeded.

Scope

This instruction applies to anyone working with asbestos containing materials (ACMs) used in transmission and distribution assets. ACM includes, but is not limited to:

- asbestos, Lebah and Zelemite meter boards
- porcelain fuse cartridge holders with asbestos braiding
- vinyl floor tiles in substations
- low-voltage underground pillars
- cable ducts
- cable lagging

This instruction does not cover working with or around thermal and acoustic insulation, roofing materials or automotive equipment containing or suspected of being ACM.

Specialist support and advice service

For advice on ACMs or in situations which are outside the scope of this field instruction, contact the Parsons Brinckerhoff Occupational Hygiene Team on 0437 806 692 at any time.

- Proactive Service – must be used during the planning stage of any job where ACM is known to be, or is likely to be, present.
- Reactive Service – must be used for unplanned events where ACM was not identified before starting the work, e.g. faults.

Training and authorisation

Work on or near Western Power networks must be performed by personnel that hold a Network Authority Card (NAC) as a minimum.
There are no specific training requirements for the activities covered by this Instruction. If you do not feel that you have the required knowledge, skills and training to carry out the activities covered by this field instruction, discuss this with your formal leader and/or consult Parsons Brinckerhoff.

**Safety**

An onsite risk assessment for the task must be performed to identify and record the equipment that is, or is suspected of being, ACM, and the control measures taken to minimise:

- the release of asbestos fibres
- exposure to asbestos fibres

Note other ACMs in the immediate vicinity of the work area, such as thermal and acoustic insulation, roofing materials, etc.

Personal protective equipment (PPE), including clothing, must be worn for all work. For more on PPE, see Section 3 (Personal protective equipment) of this manual.

When removing or working with ACM, the PPE worn must be in line with what is in the risk assessment. The minimum PPE is (but is not limited to):

- Class P2 respirator (QE-0138)
- PVC disposable gloves (QH-064 or QH-0068) with extra wrist length protection
- reusable dust-proof goggles (QE-0071)
- disposable coveralls (QC-0316-18)

Signage (Asbestos Related Work In Progress) and barriers to the area must be displayed for the duration of the task.

**Instructions**

Any work with ACM poses some risk of disturbing asbestos strands that can become airborne and inhaled. Usually the asbestos material contained in moulded panels and other items remains passive until cut, drilled or sustains some type of damage. The friability (crumbliness) of ACM is also a factor, which is usually caused by weathering or abrasion. The following instructions must be followed to reduce the amount of airborne asbestos fibres to an acceptable level [less than 0.1 fibres/mL – NOHSC:2018(2005)].
DANGER

- **DO NOT** place fan-cooled instruments inside a meter enclosure. The dust disturbed by the fan may contain hazardous asbestos particles.
- **DO NOT** use brushes, brooms or compressed air to remove suspected asbestos-containing dust from the workplace.
- **DO NOT** use power tools for ACM work.
- **DO NOT** use sandpaper, rasps or any types of abrasives on ACM.

The use of wetting agents is an essential but temporary part of managing asbestos dust. Wetting agents include:

- wet cloths for wiping
- water spray bottles
- grease or petroleum jelly

Wet cloths **must not** be rinsed and reused, as the water then becomes contaminated. They may be folded to expose a clean surface and reused. Wet cloths must be placed in the asbestos disposal bag immediately after use.

**Electrical meter panels**

Until July 1988, panels with asbestos products known as Zelemite, Lebah, and Asbestos were used. These panels can be identified by their appearance:

- They are black, bitumen, and approximately 12 mm to 30 mm thick.
- The material name (in most cases) will be stencilled on the back of the panel.
- These panels should not be confused with black Formica® panels (between 6 mm and 10 mm thick).
- Panels installed before 1988 must not be modified by cutting or drilling.

**Panels containing, or suspected of containing, asbestos materials**

1. Before removing any meters, fuses, relays or any other electrical fitments, disconnect the service cable or consumer mains from all sources of supply (including the neutral) and prove de-energised.
2. Smear a small amount of grease or petroleum jelly the width of the device, just below its base, and then remove it.
3. Immediately after removing the device, place grease or petroleum jelly over the fixing holes.

4. Smear a small amount of grease or petroleum jelly around the device panel screws or fixings and then remove the panel.

5. Immediately after removing the panel, dampen it with a low-pressure hand-held water spray.

6. Wipe away all dust and minor amounts of panel debris within the meter enclosure with a wet cloth.

7. Do not return the meter with a panel attached – always remove the meter from the panel.

8. Place the panel and the wet cloths into the small plastic bag (OC-3106) then seal it and place it in the large plastic bag (OC-3109) marked “Caution – Asbestos”.

9. When work is complete, place disposable coveralls, respirator and gloves into the large plastic bag.

Note:

Old meters may be replaced without changing the panel provided that:

- the replacement meter has an identical ‘footprint’
- no additional holes or cutting is required
- the work can be done without creating and releasing loose asbestos strands

Porcelain fuse-bases and holders with asbestos braiding

Some older porcelain fuse bases or holders attached to the panels are likely to have asbestos braiding inside to prevent the panel from over-heating.

1. Before removing porcelain fuse bases and holders, disconnect from all sources of supply (including the neutral) and prove de-energised.

2. Remove porcelain fuse bases and holders with asbestos braiding by leaving the fuses in the porcelain fuse bases and removing the panel according to the panel removal instructions.

Distribution pillars

Low-voltage underground distribution pillars were introduced in the late 1970s and were made of chrysotile, a white asbestos fibre cement. The asbestos material
contained in these pillars usually remains passive until the pillar deteriorates through age and starts to crumble or gets damaged.

These pillars can be identified by their appearance, which is like light grey cement, and are relatively heavy.

Take the following steps when removing the lid or the entire pillar:
1. Before removing the lid, dampen down the outside of the pillar with a low-pressure water spray.
2. Place a large plastic bag (OC-3109) over the lid of the pillar and remove.
3. If the pillar is being replaced, seal the bag then place it in a second large plastic bag marked “Caution – Asbestos”.
4. Before removing the pillar base, isolate or make safe all cables within the pillar.
5. Place a large plastic bag over the pillar base and remove it from the ground.
6. Seal the bag and place it into a second large plastic bag marked “Caution – Asbestos”.
7. When work is complete, place disposable coveralls, respirator and gloves into the large plastic bag marked “Caution – Asbestos”.

Cable ducts
Cement fibre cable ducts are made of chrysotile white asbestos fibre cement and can be identified by either of the following:
- light grey in colour, usually 100 mm in diameter and approximately 4 metres in length
- 50 mm channel-shaped duct mainly used in streetlight circuits in and around central business districts

The asbestos materials in the cement fibre cable ducts usually remains passive until the duct deteriorates through age or gets damaged.

When removing and replacing ducts, take the following steps:
1. Disconnect all cables within the duct from all sources of supply and prove de-energised.
2. Dampen down the outside of the ducting with a low-pressure water spray.
3. Apply a cable slipping compound to the cable duct (and cable) at the opposite end to the cable exit point, minimising the release and possible exposure to any released material.
4. Withdraw the cables and remove ducting, taking care not to cause any unnecessary damage that may release the asbestos fibres.

5. Place the cable ducting on plastic sheeting (OC-7891), double wrap, seal, and mark “Caution – Asbestos”.

6. When work is complete, place disposable coveralls, respirator, and gloves into the large plastic bag (OC-3109) marked “Caution – Asbestos”.

Vinyl floor tiles

Some substations have ACM floor tiles on the floating floors. Where additional holes are required to be made in these tiles the following methods are to be used.

Small holes:
- Use a hand drill to drill holes in vinyl floor tiles. Do not use power tools or battery-operated tools.

Large holes:
1. Mark the intended location for the hole.
2. Dampen down marked area and around it.
3. Cut the tile by hand outside the marked area. Do not use a rotating or reciprocating blade.
4. If required, heat the tile piece to be removed to soften the tile and glue.
5. Remove the cut-out section in the largest pieces possible and place in the small plastic bag (QC-3106).
6. Seal the edges of the cut tile with grease or petroleum jelly.
7. Wipe up any remaining moisture with a wet cloth and place in the small plastic bag with the tile pieces.
8. Cut the required hole in the timber portion without cutting into the tile.

Storage and disposal

Bags containing asbestos waste must be taken to the depot for proper disposal. Place the bags marked “Caution – Asbestos” (containing panels, porcelain fuses and bases, asbestos braiding and contaminated PPE) into the designated receptacles at the local depot. Care must be taken not to puncture the bags when moving or handling bagged ACM.

- Large panels, pillars and cable ducts must be retained in the designated storage area.
• Ensure all bags and double-wrapped asbestos equipment and products are sealed and undamaged before placing them in the designated storage areas.

• Additional bags can be obtained from Facilities Management.

Facilities Management will ensure the removal of asbestos waste from the depots on a monthly basis. More frequent removal can be requested if required.

Facilities Management can be contacted at: facilities.management@westernpower.com.au

**Fibreglass**

A risk assessment must be conducted before handling fibreglass equipment. If in doubt about risk and risk controls contact the Environment Section or the Safety and Health consultant.

Western Power’s Environment section can be contacted at: 
environment@westernpower.com.au

Western Power’s Safety and Health branch can be contacted at: safety@westernpower.com.au

The WA Occupational Safety and Health Regulations 1996 set an exposure standard for all synthetic mineral fibres, including traditional fibreglass, as 0.5 fibres/mL.

The fibres may irritate the eyes, nose and throat and may sting or itch when rubbed on the skin. This usually occurs in the folds of skin and around wristbands, collars and waistbands of clothing. Perspiration will aggravate the condition, but showering to remove the fibres will provide relief.

Fibreglass dust and fibres are eventually dissolved or expelled by the body and not known to cause long-term damage. Most people quickly develop tolerance, and any irritation should only be temporary.

• Where possible, polishing or damping down the fibreglass is effective in preventing fibres from becoming airborne.

• Wear appropriate eye protection and a Class P2 dust mask if fibres become airborne. Wear protective clothing to avoid skin irritation.

• Wash protective clothing that has been exposed to airborne fibreglass fibres.

• Wear suitable gloves, tucked under overall cuffs, to prevent hand irritation.
• Cover or wrap unwanted fibreglass equipment in a plastic bag or plastic wrapping, then place it into a designated container and dispose of it according to local depot or council regulations.

References

• Work Practice Manual, Section 3 (Personal protective equipment)
• Department of Consumer and Employment Protection (WorkSafe WA) Code of Practices for the management and control of asbestos in workplaces [NOHSC:2018(2005)] available through the Worksafe website
• WA Occupational Safety and Health Regulations (1996):
  o REG 3.1 – Identification of Hazards, Assessing Risks in Workplaces, Part 5:4:1 – Asbestos
  o REG 5.43 – Identification and assessment of asbestos hazards at workplaces
• Western Power’s Hazardous Substances Management Standard (DM# 8765033)
• Western Power’s Procedure for Handling, Storage, Transport and Disposal of Controlled Waste (DM# 1397111)
2.23 Electronic communications in vehicles and operational areas

Purpose
This instruction describes the requirements for using electronic communication equipment (mobile phones) and visual display units (e.g. GPS, laptops and Go-Books) in vehicles.

Scope
This instruction applies to all drivers working for or on behalf of Western Power and includes all vehicles and plant that are driven.

Instruction
Mobile phones may only be used by the driver of a vehicle to make or receive calls while driving (this includes stopped at traffic lights or stationary in a traffic queue) if the phone is either:

- secured – in a mounting affixed to the vehicle
- not secured – can be operated without touching it (e.g. using a Bluetooth hands-free controller).

Drivers shall not send or look at text messages, video messages, email or similar while driving.

Visual display units shall be:

- an integrated part of the vehicle design
- secured in a commercially designed mounting, affixed to the vehicle while it is being used.

Switch mobile phones off when:

- working on live electrical apparatus (other than extra low voltage cables and apparatus) or put the phone in a position whereby it is not a distraction to a safety observer or anyone involved in the work
- operating or refuelling machinery
- driving a vehicle that is not equipped with a hands-free unit.
Guidance

Taking the eyes off the road to operate or take a momentary look at a device screen such as a mobile phone, Go-Book or GPS while driving is a distraction and considered an at-risk behaviour. Research indicates that using hands free kits degrades driving performance to the same extent as the use of a hand held mobile phone. The following actions should be taken whilst driving.

- Where possible avoid making or receiving calls whilst driving.
- If calls are taken whilst driving they should be limited to short, essential calls.
- The safer option is to stop and park the vehicle in a safe place then make or return a call.
- Program and activate GPS units prior to beginning your journey.
- Adjust all vehicle controls, including the radio, before setting off.

Note:

Western Power will not pay or refund any road traffic penalties imposed on an employee.
2.24 LV ground work rescue procedures

Purpose

This work practice outlines how to do the following tasks when personnel are performing live low voltage (LV) work at ground level or below:

- Set up the worksite so that live LV hazards are controlled.
- Rescue personnel when they are working on live LV apparatus.

Training

Personnel working on live LV apparatus must:

- be trained in LV rescue procedures
- hold a current qualification in UETTDRRF06B – Perform rescue from a live LV panel (renewed annually)

Setting up the worksite to control hazards

- Perform a risk assessment as described in the Instructions section of work practice 2.27 (Construction site hazard management forms) in this manual. Particular items to include when preparing for live LV work are listed below.
  - Nominate a:
    - safety observer. For more on this, see work practice 2.2 (Safety observer role) in this manual.
    - rescuer who meets the requirements listed in Training, above. This could be the safety observer or another person who will not be carrying out the live LV work.
  - Discuss the rescue plan:
    - Identify adjacent live apparatus and isolation points that will require isolation in the case that a rescue must be performed. Attach an ‘Information’ caution tag to the isolator (see Appendix 1 (Tags and signs) in this manual).
    - Identify where insulated covers, mats and barriers are required to reduce the risk of inadvertent contact with live LV.
Wear appropriate clothing and personal protective equipment (PPE) for the task. For more on this, see section 3 (Personal protective equipment) in this manual. This applies to:

- personnel performing the live LV work
- the nominated rescuer – in addition to the minimum PPE for the worksite, the rescuer must also have 500 V electrically insulated gloves and protective outers, which are a part of the rescue kit (described below)

**Note:**
These gloves must be worn by the rescuer at all times.

Before starting live LV work, assemble a rescue kit that includes the following:

- first aid kit
- 500 V electrically insulated gloves and protective outers
- insulated crook
- fire blanket
- wound dressing
- torch (where relevant)

**Note:**

- The rescue and first aid kits must be inspected prior to job commencement to ensure that all contents are present and in good condition. Damaged or out-of-date equipment must be replaced.
- The rescue kit must be kept close to the worksite.

Barricade the worksite and post signage around it (where applicable).

Personnel carrying out the live work must stand on an insulated ground mat which:

- is within its test date (not exceeding 6 months)
- complies to testing described in *AS/NZS 2978:1995 Insulating mats for electrical purposes*
Performing a rescue

If a worker comes into contact with live LV apparatus, the rescuer must act as outlined below.

**Important**

- During the rescue, the rescuer must not make any direct contact with any live apparatus or the casualty. The rescuer must only make direct contact with the casualty to administer first aid once they have been removed from the electrical hazard.
- At 75 mA and above, the victim undergoes ventricular fibrillation (very rapid, ineffective heartbeat). This condition can cause death within a few minutes, so obtaining expert medical attention as soon as possible is vital.

- Take control of the situation.
- If a third person is available, instruct them to call 000 for an ambulance.
- Isolate supply at the previously fitted ‘Information’ caution tag.
- If the supply cannot be isolated immediately, wearing insulated gloves with protective outers, use the rescue crook to break contact where the casualty is in contact with live apparatus.
- The rescuer must not make any direct contact with the casualty until they have removed them from the hazard, and must never make contact with any live apparatus.
- Once the casualty has been removed from the hazard, immediately call 000 for an ambulance (if this has not already been done).
- Provide first aid treatment to the casualty (see Appendix 6 (First aid information) in this manual).
- The casualty must be given a professional medical examination, even if they say that they feel fine. If the casualty is not handed over to medical staff (e.g. ambulance paramedics) at the worksite, take the casualty to a medical facility for an examination as soon as possible. Do not allow the casualty to drive, return to work or operate any plant.
**Important**

- Disturbance of the site where the incident took place must be kept to a minimum.
- The worksite must be made safe before final departure.

- Within an hour of the incident happening, report the incident to:
  - your formal leader
  - the Incident Hotline on 1300 CALL WP (1300 2255 97)

**Note:**
If you are tending to the casualty and there is no other person present to report the incident, report the incident as soon as is practicable.

- Note down details of the incident while they are fresh in your mind, as this will be valuable when the incident is investigated.

**References**
- Work Practice Manual:
  - work practice 2.2 (Safety observer role)
  - work practice 2.27 (Construction site hazard management forms)
  - section 3 (Personal protective equipment)
  - Appendix 1 (Tags and signs)
  - Appendix 6 (First aid information)
- AS/NZS 2978:1995 Insulating mats for electrical purposes
- Electrical System Safety Rules (ESSR):
  - 11.2 Procedure for LV switching
  - 11.3 Minimum rules for work on live LV

**Related reading**
- AS/NZS 4836:2011 Safe working on or near low-voltage electrical installations and equipment
2.25 In-service safety inspection and testing of portable electrical equipment

Purpose
This instruction describes the minimum requirements when inspecting and testing portable electrical equipment before use, including:

• ensuring that all tools and equipment used by Western Power have residual current device (RCD) protection from the power source
• Low voltage (LV) and polyphase electrical equipment connected to the electrical supply by a flexible cord or connecting device, including equipment that is:
  o new and being placed into service for the first time
  o already in-service
  o serviced or repaired
  o returning to service from a second-hand sale
  o available for hire
• RCDs, except those within the scope of AS/NZS 3003:2011 (Electrical Installations – Patient Areas and NZS 6115:2006 Electrical Installations – Mobile medical facilities) i.e. patient treatment areas of Hospitals, medical and dental practices and dialyzing locations.

Instructions
The following are typical examples of equipment covered by this instruction.

• Portable generator sets which must have RCD protected outlets.
• Portable, hand-held and stationary equipment, designed for connection to the LV supply by a supply cord, an appliance inlet or pins for insertion into a socket-outlet.
• Cord sets, cord extension sets and outlet devices (also known as electrical portable outlet devices (EPODs) or power boards).
• Flexible cords connected to fixed equipment in hostile environments.
• Portable power supplies (includes power adaptor/plug-pack, of both the safety isolating transformer and switch-mode types).
• Battery chargers, including those for commercial or industrial use.
Table 1: Indicative testing and inspection intervals for electrical equipment for all Western power substations, workshops and office areas

CAUTION: This table must be read in conjunction with AS/NZS 3760 as a whole, particularly clause 2.1.

<table>
<thead>
<tr>
<th>Type of environment and/or equipment</th>
<th>Interval between inspection and tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equipment including Class I equipment, Class II equipment, cord sets, cord extension sets and EPODs</td>
</tr>
<tr>
<td></td>
<td>Push-button test by user</td>
</tr>
<tr>
<td></td>
<td>Portable (c)</td>
</tr>
<tr>
<td>(a) Factories, workshops, places of: manufacture, assembly, maintenance or fabrication</td>
<td>6 months</td>
</tr>
<tr>
<td>(b) Environment where the equipment or supply of flexible cord is NOT subject to flexing in normal use and is NOT open to abuse and is NOT in a hostile environment</td>
<td>5 years</td>
</tr>
</tbody>
</table>

(Source: AS/NZS 3760:2010 In-service inspection and testing of electrical equipment Table 4.)

* All Western Power substations, workshops, etc. fall into this category.
<table>
<thead>
<tr>
<th>Environment</th>
<th>Transportable structures, Class I (earthed conductive parts) and Class II (doubled insulated) Electrical equipment</th>
<th>Portable Equipment</th>
<th>Residual current devices (RCDs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportable structures, fixed and transportable equipment and construction wiring including switchboards</td>
<td>Pushbutton test (by user)</td>
<td>Portable</td>
<td>Non-Portable fixed</td>
</tr>
<tr>
<td>Construction and demolition sites in accordance with Clause 1.1</td>
<td>After connection to a socket or before connection of equipment, and at least once every day in use</td>
<td>Portable fixed</td>
<td>Non-Portable fixed</td>
</tr>
<tr>
<td></td>
<td>6 months</td>
<td>3 months</td>
<td>1 month</td>
</tr>
<tr>
<td></td>
<td>3 months</td>
<td></td>
<td>3 months</td>
</tr>
<tr>
<td></td>
<td>6 months</td>
<td></td>
<td>12 months</td>
</tr>
</tbody>
</table>

(Source: AS/NZS 3012:2010 Electrical installations-Construction and Demolition Sites)
References

- AS/NZS 3012 (Electrical installation – Construction and demolition sites-testing of generator set RCDs and invertors)
- AS/NZS 3760:2010 (In-service inspection and testing of electrical equipment)
- Occupational Safety and Health Regulations 1996, Division 6 – Electricity, subsections:
  - 3.60 (Residual current devices, duties as to)
  - 3.62 (Tested portable electrical equipment etc., information required on tags on)
2.26 Safe refuelling techniques

Purpose

This work practice outlines the minimum requirements that must be adhered to when refuelling motor vehicles and petrol operated equipment. The steps must be followed in order to reduce the risk of static electricity discharge creating a spark and igniting fuel vapours.

Important

- Do not smoke, use a cigarette lighter, light matches or have a naked flame within the vicinity of the refuelling area.
- Only use your hand to operate a refuelling nozzle. Do not use any object to hold a refuelling nozzle’s trigger in the open position.
- Do not use any portable electric/electronic equipment within the vicinity of the refuelling area, e.g. radio, iPod or mobile phone.
- Be cautious of fuel accidentally splashing as fuel entering the eye may cause irritation and discomfort. If this occurs, irrigate immediately with water. If the problem persists, seek medical advice.

Instructions

Refuelling a vehicle

- Turn the motor vehicle ignition switch off and disable any other auxiliary sources of ignition to avoid the risk of spark generation.
- When exiting a motor vehicle, touch a metal part of the vehicle (such as the door or hood) with your bare hand to discharge any static electricity build up.
- Do not re-enter the vehicle while refuelling is in progress.
- If a fire occurs while refuelling, leave the nozzle in the fill pipe of the vehicle and immediately move away from it. Notify the station attendant immediately so that all dispensing devices and pumps can be shut off with emergency controls.
Refuelling from portable containers

- Before commencing decanting of fuel or refuelling small engines on a worksite:
  - conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual).

**Important**

- Always refill away from any ignition source.
- Do not store fuel containers near a heat source or direct sunlight.

- Use only approved containers that meet Australian Standards (see AS/NZS 2906:2001 *Fuel containers – Portable-plastic and metal*).
- Check the condition of the container prior to use. Do not use the container if there are any signs of damage or leakage.
- A fuel container must only be filled if it has been placed on the ground in a stable position. Never fill in the vehicle or on the back of a utility or trailer.
- Keep one hand on the container while filling, this is to reduce the likelihood of any static electricity build up and discharge as well as preventing the container from falling over.
- Keep the nozzle in contact with the container during filling.
- Fill slowly to reduce build-up of static electricity and to avoid fuel spillage and splashing.
- Do not fill the container to more than the containers indicated full mark.
- Ensure that the container cap is replaced tightly before lifting the container into the vehicle for storage.

**Note:**

There must be an air gap so that fuel vapours can expand if the container is subjected to heating.
• Wipe off any fuel spill on the container or ground and dispose of the paper or rag in a safe place.

**Refuelling portable equipment**

• Inspect the equipment to ensure that the fuel tank is fully filled before commencing work.

• Prior to refuelling, ensure that a fire blanket or an extinguisher suitable for flammable liquid fires (not a water extinguisher) is available and within reach.

• Select the equipment’s ignition switch to ‘Off’ and allow cooling before refuelling.

• Establish a refuelling site that has a firm footing

• Use a funnel to prevent spillage.

• Do not refill in low lying areas sources.

• Ensure that access and egress routes are free from obstructions.

**References**

• Work Practice Manual:
  o work practice 2.28 (Job briefing process)
  o section 3 (Personal protective equipment)

• AS/NZS 2906:2001 *Fuel containers – Portable-plastic and metal*
2.27 Construction site hazard management forms

Purpose
This instruction describes how to comply with Western Power requirements for the use of construction site hazard management forms. The objective is to create a safe working environment by systematically identifying and controlling hazards.

Scope
Controlling and recording hazards is a legal requirement. This instruction applies to any work performed on a Western Power construction site.

- Western Power employees must use the Workplace Risk Assessment Plan (WRAP) and any applicable Safe Work Methods Statement (SWMS).
  - WRAP* – a site specific hazard management form that must be filled out at the start of each task on a Western Power construction site and amended if the task or site conditions change
  - SWMS* – generic, task-specific, pre-filled hazard management sheets that must be used for high risk tasks
    - a WRAP must be filled out as well, in order to capture the site-specific risks
- Contractors and subcontractors may use:
  - the WRAP and any applicable SWMS, or
  - contractor supplied equivalents

* For the rest of this instruction, we refer only to the hazard management forms used by Western Power, i.e. WRAP and SWMS. If you are a contractor and choose to use an equivalent process, replace WRAP or SWMS with the name of the form you use in its place.

Training
Training in the use of hazard management processes must be completed by anyone responsible for construction site hazard management. This training, available through Power Training Services (PTS), covers the use of SWMS and the WRAP:
PTS 773 – Distribution Hazard Identification SWMS and WRAP
Instructions
The person responsible for the work must follow the hazard management process before, during and after the work.

The basic hazard management approach is:
1. Identify all hazards.
2. Assess the exposure to each hazard. (What harm/damage could this hazard cause?)
3. Determine control measures using the hierarchy of hazard control.
4. Implement control measures.
5. Monitor and review the effectiveness of the controls.
6. Always leave the site in a safe state.

Planning stage

• Planned work
  Complete the following before departing to the construction site.
  
  o Refer to the work parcel and note down any hazards identified during the development stage.
  
  o If the job involves any high risk tasks, select the applicable SWMS.
    – If there is no SWMS for that high risk task, contact your formal leader to determine the appropriate procedure.
    – If there will be a safety observer for the task, they must familiarise themselves with the applicable SWMS.
  
  o Discuss the hazard controls.

• Unplanned work
  
  o Work resulting from such things as emergencies may require an immediate response to identified hazards. In these situations, it is acceptable to conduct the hazard management process without immediately completing a form. However, a WRAP must be completed without delay when the site has been made safe.

Construction site stage

• Where there is more than one person involved in the task, a job briefing must be carried out before the work begins, e.g. during tool box meetings.
• All team members must contribute to any discussion about the identified hazards of a job.

• Complete a WRAP.
  o If there is a SWMS for the task, the WRAP only needs to record the hazards and controls that are specific to the site and are not identified in the SWMS.
  o Where necessary, update the form during the task. This includes:
    – having any new personnel to the site sign onto the WRAP
    – assessing the possible hazards created when any new equipment / plant is introduced to the site and then determining the appropriate controls

• In the event of an unexpected hazard, it is acceptable to conduct the hazard management process without immediately updating the WRAP. However, a WRAP must be completed without delay when the site has been made safe.

• The person responsible for the construction site must confirm that roles and responsibilities are delegated and understood before the work begins.

• When new members of staff or plant arrive on the construction site, review, amend and sign onto the form to identify the possible hazards this may create.

Review the job

• Conduct a debriefing to discuss how well the work went and record the details of any improvements identified during the work.

• Confirm that the WRAP and SWMS are completed.

• File the WRAP and SWMS with the job parcel.

Where to get the forms

• WRAP books can be ordered from Corporate Express – stock code 18641873.

• SWMS are available on Depot Pack, busbar and the Western Power website.
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2.28  Job briefing process

Purpose

This work practice:

• provides a uniform methodology and minimum key requirements for the job briefing process, which must be done before every job commences
• outlines the roles and responsibilities of the worksite team leader and site coordinator

Scope

This work practice is applicable to:

• any team performing planned or unplanned work on Western Power construction sites
• multiple teams working on the same construction site

Risk control

As part of the job briefing process, an onsite risk assessment must be performed to achieve the following:

• Identify the hazards – identify all of the hazards that are associated with the tasks and situations that could potentially cause harm.
• Assess the risks – consider what could happen (i.e. the consequence) if someone is exposed to a hazard and the likelihood of it happening.
• Control the risks – list appropriate control measures. The methods of controlling risks are ranked from the highest level of protection and reliability to the lowest.

1. Elimination (the most effective control measure) – the hazard or hazardous work practice is removed.
2. Substitution – the hazardous process or material is replaced with one that is less hazardous. This will reduce the hazard, and so reduce the risk.
3. Isolation – isolating or separating the hazard or hazardous work practice from the people who are involved in the work, or the people in the general work area (e.g. install barriers, guards or covers)
4. Engineering – engineering control measures are used to minimise the risk.
5. Administrative – involves the use of safe work practices to control the risk.
6. Personal protective equipment (PPE) – the last resource of risk control which must never be used in isolation of other risk controls.

- Review the control measures – continually review the control measures implemented to control the risks. If necessary, revisit the control measures:
  - when the control measure is not effective in controlling the risk
  - before there is a change at the construction site which is likely to cause a new or different hazard that the measure may not effectively control
  - if a new hazard is identified
  - if the result of consultation indicates that a review is necessary
  - if anyone who requests a review on behalf of their team, or a member of their team, finds circumstances where they believe that a control measure has not been adequately reviewed

**Instructions**

The job briefing process must be performed before the commencement of any task and as required throughout the duration of the task. The process of thinking through a task in advance improves efficiency and can result in decisions that will prevent serious injuries and/or damage.

This process outlines the tasks that are to be accomplished, the location, tools, equipment and material requirements, and safety rules or procedures that apply.

Key elements of the job briefing process include:

- adherence to permit procedures
- task procedures that are involved
- roles of each team member and task allocation
- allocate identification armbands:
  - worksite team leader – blue armband (optional)
  - safety observer – green armband
  - site coordinator – orange armband
- hazards associated with the task and the control measures
- work area establishment and set up
- emergency response plan
Worksite team leader

The worksite team leader directs team members to accomplish a task safely, efficiently and within the constraints of the relevant standards, procedures and practices.

Worksite team leaders are appointed based on their assessed competence and suitability for the role, they must understand the role responsibilities and obligations, and lead the team effectively.

The worksite team leader at any construction site:

- may wear a blue, ‘Team Leader’ armband for the duration of work
- must do the following:
  - Meet with the site coordinator and record the site coordinator’s name and contact number on the risk assessment.
  - Ensure that all team members actively participate in the job briefing process.
  - Ensure that all team members hold current competencies and authorisations to perform the task.
  - Provide supervision and coaching where required.
  - Identify the hazards and associated risk controls and document this information in the risk assessment, which is then signed by all of the team members.
  - Where a Safe Work Method Statement (SWMS) for a specific task is available, any hazards that are not identified by the SWMS must be recorded on the risk assessment.
    For more on SWMS, see work practice 2.27 (Construction site hazard management forms) in this manual.
  - Appoint a safety observer, if required, and issue them with a green, safety observer armband (see work practice 2.2 (Safety observer role) in this manual).
  - Ensure that team members are wearing the required PPE and that they use it properly.
  - Ensure that permit procedures are followed, if required.
  - Make safe work practices the main priority at the worksite.
Confirms that all tools and items of equipment are within test dates and are safe to use.

- Report any incidents immediately by calling 1300 225 597.

**Site coordinator**

Whenever work is being done at a Western Power construction site where more than one team is present, one worksite team leader must act as the site coordinator.

‘Team’ refers to a group of two or more people working on the same task at a worksite.

**Single team onsite**

If there is only one team onsite, the worksite team leader is the default site coordinator.

**Multiple teams onsite**

- When more than one team is working on any construction site, the site coordinator is determined by the following criteria.
  - If there is a single work team onsite and other team/s arrive later – the initial worksite team leader will be the site coordinator and will maintain these duties unless otherwise agreed to by the worksite team leaders. They will remain the site coordinator until they have completed their work and intend to permanently leave the worksite.
  - If more than one team attends a worksite at the same time – the team leader of the team that will remain onsite for the longest amount of time will be the site coordinator unless an alternative arrangement is agreed to by the worksite team leaders.
  - If the initial site coordinator’s team intends to permanently leave the worksite, they must consult the remaining worksite team leaders and reassign the site coordinator role.
  - The new site coordinator must be:
    - informed of the change and accept the role
    - briefed by the outgoing site coordinator

- This applies equally to all members of the Network Total Workforce (NTW). No preference is to be assumed by either Western Power or contractors.
• The site coordinator role may be rotated during tasks/projects of long duration.

**Note:**

• The site coordinator does not take charge of other teams or their work.
• Worksite team leaders must still delegate specific tasks or duties within the team and ensure that their teams adhere to all the mandatory safety requirements such as permits and risk assessments.
• When any of these roles are transferred to another person a formal handover must take place between all of the personnel involved.

**Small teams and switching operators’ onsite**

Small teams are required to be part of the collective group at a worksite, but are not required to perform site coordinator duties. The leader of a small team may wear the blue ‘Team Leader’ armband. A small team consists of:

• two people
• two switching operators performing switching activities

**Site coordinator responsibilities**

The site coordinator must:

• wear the orange ‘Site Coordinator’ armband for the duration of their role
• coordinate with the other worksite team leaders and discuss the following site specific details.
  o Type of permits that are in place.
  o Individual team tasks (what, where, how) and schedules.
  o Contact details (worksite team leaders, local emergency services).
  o Any special/abnormal conditions (specialised plant, visitors, and deliveries).
• have their name recorded on each team’s risk assessment
• be available onsite at all times when anyone else is onsite
• respond to or escalate queries by other worksite team leaders in regard to the overall task/project
• be familiar with site access requirements. All people requiring entry must comply with work practice 5.17 (Construction site access) in this manual.
Visitors to the site

- Anyone who is approached by a visitor must direct them to the site coordinator, who will either:
  - request that the visitor wait offsite and then the site coordinator will call the relevant worksite team leader to come and take charge of the visitor and perform a site induction
  - perform a site induction and then direct the visitor to the relevant worksite team leader
- Where a site induction is required, the site coordinator or their delegate (e.g. a team leader) must update the risk assessment to include any additional hazards and controls that may arise from the arrival of inducted personnel.
- If there is no valid reason for the visitor to be onsite, the site coordinator has the authority to ask the visitor to leave the site immediately. This applies to all visitors, including Western Power personnel.

References

- Work Practice Manual:
  - work practice 2.2 (Safety observer role)
  - work practice 2.27 (Construction site hazard management forms)
  - section 3 (Personal protective equipment)
  - work practice 5.17 (Construction site access – minimum access)
- Workplace Risk Assessment Plan – available through Staples (stock code 18641873)
3.1 Clothing and personal protective equipment requirements

Purpose
This field instruction describes the selection, use and maintenance of approved personal protective equipment (PPE), including clothing.

Scope
PPE reduces the risks associated with coming into contact with anything that may cause harm, injury or any identified risk.

This instruction:
- applies to everyone, including visitors, who enter a Western Power operational depot or construction site, or undertakes any work for Western Power
- excludes special PPE requirements for substations and gas or oil-filled equipment as defined in material safety data sheets or other specific safe work instructions

Requirements
- As with other PPE, protective clothing must not be used in isolation of other risk controls.
- Only PPE approved by Western Power may be used.

Selecting the correct PPE
Tables 1 and 2 (below) are used to select the correct level of PPE required when performing switching and/or working on different types of live electrical equipment. A higher level of clothing must be worn if the Safe Work Method Statement (SWMS), risk assessment or switching operator deem it necessary according to the circumstances, (e.g. on or near live low voltage busbars/conductors, live low voltage cable jointing, load testing or when racking switchgear).
Table 1: Minimum PPE for the Network Total Workforce (NTW) when switching/working on live Distribution electrical equipment

<table>
<thead>
<tr>
<th>Flame retardant (FR) cal rating</th>
<th>PPE level</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level 1</td>
<td>Level 2</td>
<td>Level 3</td>
<td>Level 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safety footwear plus hi-vis FR long-sleeved shirt and long trousers or overalls</td>
<td>Level 1 plus overalls plus face shield with safety glasses worn under</td>
<td>Level 1 plus FR switching jacket and/or FR switching trousers plus face shield with safety glasses worn under</td>
<td>Level 1 plus FR switching jacket plus FR switching trousers plus FR hood with safety glasses worn under</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>14</td>
<td>37</td>
<td>37</td>
<td></td>
</tr>
</tbody>
</table>

- HV O/H equipment
- LV O/H and underground equipment
- LV-pillar insulated live connections
- LV-pillar exposed live connections
- Transformer LV frame up to 315 kVA air insulated
- Transformer LV frame greater than 315 kVA air insulated
- HV RMU SF6 insulated
- HV RMU air insulated
- HV RMU oil insulated

**Note:**

A risk assessment may determine the need for a higher level of PPE than the minimum requirement.
Table 2: Minimum PPE for the Network Total Workforce (NTW) when switching/working on live Transmission electrical equipment

<table>
<thead>
<tr>
<th>Personal protective equipment</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety footwear plus hi-vis FR long-sleeved shirt and long trousers or overalls</td>
<td>Level 1 plus overalls plus face shield with safety glasses worn under</td>
<td>Level 1 plus FR switching jacket and/or FR switching trousers plus face shield with safety glasses worn under</td>
<td>Level 1 plus FR switching jacket plus FR switching trousers plus FR hood with safety glasses worn under</td>
<td></td>
</tr>
<tr>
<td>Flame retardant (FR) cal rating</td>
<td>7</td>
<td>14</td>
<td>37</td>
<td>37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of electrical equipment</th>
<th>Terminal and Zone substation outdoor equipment, air insulated</th>
<th>Zone substation indoor equipment (Gas and vacuum)</th>
<th>Zone substation indoor equipment (Oil)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>✅</td>
<td>✅</td>
<td>✅</td>
</tr>
</tbody>
</table>

Note: Flame retardant (FR) cal rating values are 7, 14, 37, and 37.
Note:

It may be appropriate to wear a different level of PPE to that specified in the table above, based on the following situations:

- A risk assessment may determine that there is a need for a higher level of PPE than the minimum requirement.
- Some switching methods may allow the worker to be outside of physical contact with the electrical equipment. A comparison of the following may reveal that the level of PPE may be reduced (to a minimum of Level 1).
  - Distance between the worker and the electrical equipment for that switching method.
  - Relevant Substation Arc Flash Guidelines (see Appendix 5 (Western Power facilities information)) for that substation.

Minimum PPE

The minimum PPE for everyone visiting Western Power operational depots or construction sites in a non-operational capacity and remaining at all times outside of the three (3) metre danger zone of any exposed electrical apparatus:

- high-visibility clothing or high-visibility vest
- long-sleeved shirt (buttoned to the wrist) and long trousers
  OR
  overalls (buttoned to the wrist)
- enclosed footwear
- eye protection relevant to the risk
- head protection relevant to the risk

Level 0 – Clothing must be 100% cotton

The minimum PPE when carrying out operational, construction or maintenance activities and remaining at all times outside of the three (3) metre danger zone of any exposed live electrical apparatus:

- high-visibility clothing
  - long-sleeved shirt (buttoned to the wrist) and long trousers
  OR
  overalls (buttoned to the wrist)
• safety footwear
• eye protection relevant to the risk
• gloves relevant to the risk
• head protection relevant to the risk

**Level 1 – Clothing must have flame retardant cal rating ≥ 7 cal/cm²**

The minimum PPE when carrying out operational, construction or maintenance activities inside the three (3) metres danger zone of any exposed live electrical apparatus:

- High visibility flame retardant clothing
  - long-sleeved shirt (buttoned to the wrist) and long trousers
  OR
  - overalls (buttoned to the wrist)
- safety footwear
- eye protection relevant to the risk
- gloves relevant to the risk
- head protection relevant to the risk

**Level 2 – Clothing must have flame retardant cal rating ≥ 14 cal/cm²**

The minimum PPE when carrying out operational, construction or maintenance activities (as described in Tables 1 and 2):

- High visibility flame retardant clothing
  - long-sleeved shirt (buttoned to the wrist) and long trousers
- flame retardant overalls over shirt and trousers
- face shield with safety glasses worn under it
- safety footwear
- gloves relevant to the risk
- head protection relevant to the risk
Level 3 – Clothing must have flame retardant cal rating ≥ 37 cal/cm²

The minimum PPE when carrying out operational, construction or maintenance activities (as described in Tables 1 and 2):

- High visibility flame retardant clothing
  - long-sleeved shirt (buttoned to the wrist) and long trousers
  OR
  - overalls (buttoned to the wrist)
- flame retardant switching jacket and trousers (cal rating = 30 cal/cm²)
- face shield with safety glasses worn under it
- safety footwear
- gloves relevant to the risk
- head protection relevant to the risk

Level 4 – Clothing must have flame retardant cal rating ≥ 37 cal/cm²

The minimum when carrying out operational, construction or maintenance activities (as described in Tables 1 and 2):

- High visibility flame retardant clothing
  - long-sleeved shirt (buttoned to the wrist) and long trousers
  OR
  - overalls (buttoned to the wrist)
- flame retardant switching jacket and trousers (cal rating = 30 cal/cm²)
- head protection with hood and safety glasses worn under it (cal rating = 40 cal/cm²)
- safety footwear
- gloves relevant to the risk

Wet weather, thermal clothing, undergarments and jewellery

- Wet weather and thermal protective garments obtained from Western Power authorised suppliers can be worn over the protective clothing.
- Non-natural fibre garments (e.g. nylon or polyester) are not recommended to be worn under protective clothing.
- Unnecessary metallic objects (e.g. neck chains, earrings, rings, watches, bracelets and other jewellery) must not be worn when undertaking live work.
Arc flash protective clothing (switching suits)

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition (taken from Electrical System Safety Rules)</th>
</tr>
</thead>
<tbody>
<tr>
<td>arc flash</td>
<td>An arc flash is the heat and light energy released when an insulator fails and current flows through a normally nonconductive media such as air. The flash produced due to this breakdown is similar to the light radiation emitted by a commercial electrical arc welder. The heat that is released may cause severe burns, especially to unprotected flesh and eyes.</td>
</tr>
<tr>
<td>blast</td>
<td>A blast is an arc flash that yields an explosion (a massive amount of energy that rapidly vaporises metal conductors, blasting molten metal and superheated material (plasma) outward with extreme force). This violent event can cause destruction of switchgear and nearby equipment. The high velocities of molten metal particles can cause severe burns, blindness, internal organ damage or death through inhalation.</td>
</tr>
</tbody>
</table>

- Consider the level of arc flash protection clothing necessary when conducting switching operations.
- Before approaching any apparatus, assess the risks and consequences of a potential arc flash.
- Determine an emergency action plan based on a potential arc flash event.
- Consider using a safety observer.

The following contribute to the level of arc flash:
- fault current level
- working distance from the device
- insulation/construction of the device
- device environment
- weather

Face shield and safety glasses used at a LV frame.
Care and maintenance

- Inspect PPE before use and replace any item that is damaged or in poor condition.
- Do not alter any items of PPE, including clothing.

References

- Work Practice Manual, Appendix 5 (Western Power facilities information)
3.2 Glove protection

Purpose
This instruction outlines the minimum requirements for the use of gloves, as described in AS/NZS 2225 (Insulating gloves for electrical purposes), EN 388 (Protective gloves against mechanical risks) and AS 2161.10 (Occupational protective gloves – Protective gloves against chemicals and micro-organisms – Terminology and performance requirements), when working:
- on the high voltage network
- on the low voltage network
- with chemicals

Instructions

Maintenance
All types of gloves must be kept in a condition that is fit for purpose by maintaining them appropriately. There are specific requirements for electrically rated gloves.

Electrically rated gloves:
- do not have a shelf life, but must have the issue date recorded on them
- if rated over 3,300 volts, must be electrically tested before initial use
- must be stored in an approved glove bag and/or a dry location
- must be tested every six months from date of issue
- must have the last tested date recorded on them

Inspection
Before using gloves:
1. check the last date the gloves were tested – if more than six months since the last test date, the gloves must pass a retest before they can be used
2. make sure that the gloves are in good condition – for electrically related and chemical gloves, use air pressure testing to check for any cuts or punctures
3. discard any gloves that:
   - are damaged or are in poor condition
   - fail the air pressure test
**Gloves worn during work on the overhead network**

When working at heights on energised or de-energised high voltage or low voltage conductors, the worker must wear the approved gloves. For more on this, see AS/NZS 2225 (Insulating gloves for electrical purposes). They must wear the gloves from the time they leave the ground until they return to the ground, whether working from an elevated work platform or a ladder.

**Note:**
Gloves may only be removed when outside the minimum approach distance and with approval of the safety observer.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Working on live low voltage structures with a single voltage present</strong></td>
<td>Wear 500 volt rated gloves with approved wrist length mechanical protective gloves.</td>
</tr>
<tr>
<td><strong>Working on isolated and earthed/shorted structures with a single voltage present</strong></td>
<td>Wear approved wrist length mechanical protective gloves.</td>
</tr>
<tr>
<td></td>
<td>If testing after earthing/shorting indicates inductive voltages are present, then a minimum of 500 volt rated gloves with approved wrist length mechanical protective gloves must be worn.</td>
</tr>
<tr>
<td></td>
<td>Comply with the minimum approach distance for all voltages.</td>
</tr>
<tr>
<td></td>
<td>Wear the gloves and outer protectors for the conductor voltage being worked on.</td>
</tr>
<tr>
<td></td>
<td>Wear rated gloves with outer protectors when entering the elevated work platform basket.</td>
</tr>
<tr>
<td></td>
<td>Before commencing work, the worker will indicate to the safety observer that he has his gloves on and is ready for work. The safety observer will then give the approval for the work to commence.</td>
</tr>
<tr>
<td></td>
<td>Should the worker want to remove their gloves, permission must be sought from the safety observer to do so (once outside the contact area).</td>
</tr>
<tr>
<td></td>
<td>The safety observer will only allow work to recommence when the worker has confirmed his gloves are back on.</td>
</tr>
<tr>
<td><strong>Working on live high voltage structures with different voltage levels (glove and barrier)</strong></td>
<td></td>
</tr>
</tbody>
</table>
### Operating high voltage switchgear

3,300 volt minimum rated insulating gloves with approved wrist length arc flash mechanical protective gloves must be worn.

- When working on isolated and earthed/shorted conductors on shared voltage structures, 500 volt rated gloves with approved wrist length mechanical protective gloves must be worn.
- Adhere to the minimum approach distance.
- If the minimum approach distance cannot be maintained, the conductors must be isolated and earthed or the work suspended.
- If testing after earthing/shorting indicates inductive voltages are present, minimum 500 volt rated gloves with approved wrist length mechanical protective gloves must be worn.

### Working on shared structures with different voltage levels

• When working on isolated and earthed/shorted conductors on shared voltage structures, 500 volt rated gloves with approved wrist length mechanical protective gloves must be worn.

• Adhere to the minimum approach distance.

• If the minimum approach distance cannot be maintained, the conductors must be isolated and earthed or the work suspended.

• If testing after earthing/shorting indicates inductive voltages are present, minimum 500 volt rated gloves with approved wrist length mechanical protective gloves must be worn.

### Working where there is a knife cut hand injury risk

Wear a cut resistant glove rated 2542 or greater on the hand exposed to the cut risk (normally the left hand for a right-handed person).

### Working where there is a hand injury risk (other than knife cut injury)

Wear approved wrist length mechanical protective gloves rated 3121 or greater.

### Working with chemical or hazardous substances

Refer to the material safety data sheet (ChemAlert) for correct glove type.

### Note:

See field instruction 2.9 (Induced voltage) for more information.

#### Example of a cut resistant glove (rated 2542) is shown in the table below.

<table>
<thead>
<tr>
<th>Technical features</th>
<th>Test method standard</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion</td>
<td>EN 388 Mechanical Protection</td>
<td>Performance level 2</td>
</tr>
<tr>
<td>Cut resistance</td>
<td>EN 388 Mechanical Protection</td>
<td>Performance level 5</td>
</tr>
<tr>
<td>Tear</td>
<td>EN 388 Mechanical Protection</td>
<td>Performance level 4</td>
</tr>
<tr>
<td>Puncture</td>
<td>EN 388 Mechanical Protection</td>
<td>Performance level 2</td>
</tr>
</tbody>
</table>

#### Legend

Performance level: 1 = low … 5 = high
References

- Work Practice Manual, field instruction 2.9 (Induced voltage)
- ChemAlert: http://www.chemalert.com/
- AS/NZS 2161.10.1:2005 (Occupational protective gloves - Protective gloves against chemicals and micro-organisms - Terminology and performance requirements)
- AS/NZS 2225: 1994 (Insulating gloves for electrical purposes)
- AS 2225-1994/Amdt 1-1996 : Insulating gloves for electrical purposes
- EN 388:2003 (Protective gloves against mechanical risks)
3.3 Head protection

Purpose

This instruction outlines the type of approved head protection that must be worn while carrying out work on the Western Power network.

Head protection is required to reduce the risk of injury from falling objects, arc flash burns and exposure to UV radiation.

As with any personal protective equipment (PPE), head protection must not be used in isolation of other risk controls.

Instructions

During the risk assessment process, the onsite person in charge has the authority to make decisions about head protection if there are circumstances that require specific measures.

Safety helmets

- All personnel must wear a Western Power approved safety helmet (see AS/NZS 1801:1997(Occupational protective helmets)) when:
  - there is a risk of a person:
    - being struck on the head by a falling object
    - hitting their head on a stationary object
  - the site displays a “Safety Helmet Area” sign
- Record the date of issue inside the safety helmet.
- Inspect the safety helmet before use.
- Secure the safety helmet with a chinstrap if there is a possibility that it may fall off.
- Immediately replace a safety helmet that is damaged or suspected of being damaged.
- Replace the safety helmet after two years service in an operational environment.
Arc flash visor
- Only wear approved visors as described in field instruction 3.1 (Clothing and personal protective equipment requirements) in this manual.
- Inspect the visor before use.
- Cracked or damaged visors must not be used.

Sun Visor
- For maximum sun protection, use a plastic snap brim (Western Power stock code QC0114).

References
- Work Practice Manual, field instruction 3.1 (Clothing and personal protective equipment requirements)
- AS/NZS 1801:1997 (Occupational protective helmets)
3.4 Other personal protective equipment

Purpose

This work practice outlines the requirements for the use and maintenance of eye, face, hearing and respiratory protection. Eye, face, hearing and respiratory protection is required to eliminate the risks associated with flying particles, extreme heat radiation, extreme noise or any other risk which these types of personal protective equipment (PPE) may mitigate.

PPE must not be used in isolation of other risk controls in a safety management system.

Instructions

All safety equipment:

- must meet Western Power’s minimum safety requirements as outlined in this work practice
- should be purchased through a Western Power approved supplier. This can be done by:
  - Western Power personnel – via Ellipse
  - non-Western Power personnel – via your purchase system

Eye protection

- Eye protection must comply with AS/NZS 1337.1:2010 Personal eye protection – Eye and face protectors for occupational applications.
- Wear the eye protection that is appropriate for the hazard that is to be encountered:
  - Safety glasses – this is the minimum level of eye protection. Glasses must have:
    - at least a medium impact rating
    - frames made of a non-conductive, non-metallic material
  - Goggles – must be worn when:
    - advised by the material safety data sheet (MSDS) of the product being worked with
– the risk assessment identifies that wearing goggles will mitigate a risk (e.g. when there are high concentrations of dust particles in the air or working with chemicals that may irritate the eye)

- Eye protection must be worn day and night:
  - in designated (signed) eye protection areas
  - as instructed in work practices, procedures, or by the site owner
  - when working on live electrical apparatus
  - when operating switchgear
  - in zone and terminal substations and power station switchyards
  - in workplaces where there are:
    - mechanical hazards, e.g. flying particles, sparks, molten metal splash, wire or conductor recoil
    - chemical hazards, e.g. splashes, fumes and dust
    - thermal and radiation hazards, e.g. heat, glare, ultraviolet rays, infrared rays

- For arc flash protection, wear eye protection underneath the face shield or arc flash hood.

- Before putting on eye protection, ensure that you are aware of the correct fitting technique for the type of eye protection that is being used.

- Prior to removing goggles, wipe over outside surface to remove contaminants.

**Note:**

For more on eye protection, see AS/NZS 1337:2010 Personal eye protection – Eye and face protectors for occupational applications.

**Face protection**

- Face protection must comply with AS/NZS 1337.1:2010 Personal eye protection – Eye and face protectors for occupational applications.

- Wear face protection (e.g. face shield, welding helmet) with safety glasses or goggles when:
  - grinding (e.g. bench, angle), cutting, brazing and welding
  - using a chainsaw or chipper
  - any machining tasks that produce flying particles
  - advised by the MSDS of the product being worked with
o the risk assessment identifies that the wearing of face protection will mitigate a risk

- Ensure that face protection:
  - has impact rated lenses
  - is not lifted when performing the task for which the protection is required (e.g. welding, cutting with a chainsaw)

- Before putting on face protection, ensure that you are aware of the correct fitting technique for the type of face protection being used.

**Note:**

For more on face protection, see *AS/NZS 1337:2010 Personal eye protection – Eye and face protectors for occupational applications.*

**Hearing protection**

- Hearing protection must comply with *AS/NZS 1270:2002 Acoustics – Hearing protectors.*

- Wear the hearing protection that is appropriate for the decibel noise level that is to be encountered.

Hearing protection will have a class code on the packaging that relates to the decibel (dB) noise environment. The classes are stipulated for a specific dB(A) level. Use Table 1, below, to select the hearing protection related to the maximum dB level that you may be exposed to. If a decibel meter is not available, use the *Perceived loudness* column as a guide.

**Table 1: Hearing protection – classes and ratings**

<table>
<thead>
<tr>
<th>Class</th>
<th>Rating dB(A)</th>
<th>Perceived loudness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90</td>
<td>Diesel truck at 10 m</td>
</tr>
<tr>
<td>2</td>
<td>95</td>
<td>A subway train at 60 m</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>Disco, 1 m from speaker</td>
</tr>
<tr>
<td>4</td>
<td>105</td>
<td>Jet engine, take-off power at 60 m</td>
</tr>
<tr>
<td>5</td>
<td>110</td>
<td>Chainsaw at 1 m</td>
</tr>
</tbody>
</table>

Information taken from *AS/NZS 1270:2002 Acoustics – Hearing protectors*

- Before putting on hearing protection, ensure that you are aware of the correct fitting technique for the type of hearing protection that is being used.
Note:
For more on hearing protection, see AS/NZS 1270:2002 Acoustics – Hearing protectors.

Respiratory protection

- Respiratory protection must comply with both of the following:
  - AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment
  - AS/NZS: 1716:2012 Respiratory protective devices
- Wear the respiratory protection that is appropriate for the hazard that is to be encountered.
- Before putting on respiratory protection, ensure that you are aware of the correct fitting technique for the type of respiratory protection that is being used.

Note:
For more on respiratory protection, see AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment.

Care and maintenance

- Wear, use and maintain PPE in accordance with manufacturer’s guidelines and maintenance specifications.
- Inspect PPE before use and replace any damaged or unserviceable item.

References

- Work Manual, work practice 3.1 (Clothing and personal protective equipment requirements)
- AS/NZS 1270:2002 Acoustics – Hearing protectors
- AS/NZS 1337.1:2010 Personal eye protection – Eye and face protectors for occupational applications
- AS/NZS 1337.1:2010/Amdt 1:2012 Personal eye protection – Eye and face protectors for occupational applications
- AS/NZS 1715:2009 Selection, use and maintenance of respiratory protective equipment
- AS/NZS: 1716:2012 Respiratory protective devices
4.1 Switching activities

Purpose

This work practice outlines the required actions and behaviours of personnel in an area where switching operations are taking place.

Scope

This work practice is applicable to the following personnel during the performance of switching operations:

- authorised and trainee switching operators
- all members of the Network Total Workforce (NTW)

Safety

Important

Personnel must be aware that in-service breakers and switchgear could operate at any time. Operation could be due to:

- protection operation (trip and possible auto-reclose)
- automatic voltage management (capacitor circuit breakers)
- load shedding

The switching operator must complete a risk assessment before starting switching operations, listing all the hazards associated with the particular switching task and the control measures implemented. This may include:

- using correct PPE (see section 3 (Personal protective equipment))
- appointing a safety observer (work practice 2.2 (Safety observer role))
- appointing a trainee switching operator
- if arc flash is listed as a hazard – ensuring that only the switching operator that is operating the switchgear is within the arc flash envelope
- other personnel in the vicinity
Note:

- If any members of the general public are close enough to be at risk, or place the switching officer at risk, during the performance of switching operations, personnel must ask them to move away to a safe distance.
- If other services attend the substation (e.g. Department of Fire and Emergency Services (DFES)), the switching operator must advise the service’s team leader of the energised/de-energised status of all primary and secondary plant and limits of access.

Instructions

- The order of priority of switching operations is:
  - emergency switching takes precedence over all non-emergency work
  - programmed switching takes precedence over all non-programmed work
- If the risk assessment notes the presence of personnel in the vicinity of the planned switching activities, the switching operator and the onsite Recipient in Charge (RIC) or Tester in Charge (TIC) must agree on the control measures to be taken. Such control measures may include:
  - requesting that non-switching personnel vacate the area
  - not distracting the switching operator during the performance of switching duties
  - confirming that applicable protection systems are in service
- Personnel who find themselves in an area where switching operations are to take place must:
  - adhere to requests by the switching operator
  - vacate the immediate area
  - alert the switching operator to any abnormalities that may affect switching operations
  - alert the switching operator if any at-risk actions or situations are observed
- Points of isolation and the position of program earths may only be confirmed to the RIC/TIC when the permit is being issued.
- Network Operations Control (NOC) has primary control of the electricity systems.
When planning to visit a Western Power substation, personnel must refer to:

- work practice 9.2 (Substation entry requirements)
- Network Operations Bulletin: Extra Safety Precautions Prior to Entering CBD and Remote Controlled HV Substations (DM# 8355258)

The number of personnel present at transmission and zone substations is viewable through the **Check in – Check out** system on **busbar > Quick links**.

**References**

- Work Practice Manual:
  - work practice 2.2 (Safety observer role)
  - section 3 (Personal protective equipment)
  - work practice 9.2 (Substation entry requirements)
- Electrical System Safety Rules (ESSR)
- Network Operations Bulletin: Extra Safety Precautions Prior to Entering CBD and Remote Controlled HV Substations (DM# 8355258)
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4.2 Fault job communications

Purpose

This work practice outlines the minimum requirements that must be adhered to when communicating with Network Operations Control (NOC) during fault jobs.

Instructions

- Before commencing work:
  - conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

  **Note:**
  If responding to an emergency where the public or property is at immediate risk, assess the risks and make the worksite safe before completing a risk assessment form.

- If applicable, confirm that all team members are aware of their roles and responsibilities.
- Apply appropriate controls to any identified risks before commencing a fault job.
- Notify NOC that the team has arrived onsite and confirm the fault description and repair assessment (this could be via an on-board vehicle communication system).
- Fault jobs that are received from NOC must include the following information:
  - Fault job number
  - Fault type
  - Priority
  - Location
  - Message content
  - Contact phone number
• Provide clear and concise information. Repeat instructions back to the NOC controller for confirmation before proceeding.
• If required, contact NOC for further assistance (quote the fault job number).
• NOC may issue a maximum of three concurrent fault jobs at separate work locations.

References

• Work Practice Manual:
  o work practice 2.28 (Job briefing process)
  o section 3 (Personal protective equipment)
5.1 Restricted access vehicle escort service

Purpose

This instruction outlines the safe work practices for escorting restricted access vehicles on roads where there is a risk of encroaching the minimum approach distances to overhead powerlines.

Overview

The vehicle escort responsibilities include but may be limited to:

- conducting route surveys
- arranging switching schedules
- issuing relevant Western Power permits
- checking documentation relevant to the escort
- conducting a pre-start meeting with any person directly involved in the escort.

This instruction does not apply to or override the responsibilities of the Transport Company, Western Australian Police Department and escort pilots.


(Home → Safety → Working near powerlines → Oversize vehicles).

Instructions

The following applies to the escort service team.

Planning stage

- Review and confirm the start-to-end escort route and travel times.
- Check the escort route conductor height clearances.
- Confirm the escort service team vehicle and personnel requirements.
Pre-start meeting

- The designated escort service’s team leader must perform a job risk assessment.

- The designated escort service’s team leader will conduct a pre-start meeting with all those involved in the escort, including the transport company representative and the pilot vehicle operator.

Workers are required to wear the minimum personal protective equipment, refer to Field instruction 3.1 (Clothing and personal protective equipment requirements).

Escort vehicle

- A member of the conductor lifting team is permitted on the tray of a moving escort vehicle under the conditions stipulated on the exemption permit 46V11CP3TM (DM# 7276033).

- The exemption permit requires that the vehicle be fitted with a fall restraint system which must be used whenever a person is travelling on the tray.

- A copy of the exemption permit must be retained in the vehicle at all times.

- In accordance with the Road Traffic Regulations, members of the conductor lifting team are not permitted to access or egress a moving vehicle.

- As a minimum, the lead escort vehicle must have a driver and safety observer.

- The lead escort vehicle must be fitted with an adjustable height indicator stick and lifting rod that complies with Western Power’s testing requirements.

- If it is determined that the height indicator stick will make contact with the overhead conductor, the lead escort vehicle must stop to allow the conductor lifter to exit the lead escort vehicle and lift the conductor to allow the lead escort vehicle and the load to pass safely through.

- The height indicator stick is to be set to a height greater than the height of the transported load. See conductor clearances (Table 1: Distribution voltages and Table 2: Transmission voltages).
Lifting conductors

- Only an authorised person using the approved tools and equipment can lift live low voltage or isolated and earthed high voltage conductors, providing clearance for over-height vehicles.
- To lift conductors use the insulated lifting rod and an adjustable rod support.
- Live high voltage conductors can only be lifted by trained and authorised live line-trained personnel using approved high voltage live line methods and equipment.

High voltage switching

- The designated escort services team leader will be provided with a copy of the Switching Schedule.
- Where HV switching is required, an EAP or VP will be issued by the issuing officer (IO) in accordance with the requirements of the ESSP (Electrical System Safety Procedures).

Table 1: Distribution voltages

<table>
<thead>
<tr>
<th>Conductors</th>
<th>Voltage</th>
<th>Escorted</th>
<th>Unescorted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stays and earth wires</td>
<td>100 mm</td>
<td>600 mm</td>
<td></td>
</tr>
<tr>
<td>Insulated streetlights and pilot wires</td>
<td>300 mm</td>
<td>600 mm</td>
<td></td>
</tr>
<tr>
<td>Insulated conductors including aerial bundled cable</td>
<td>300 mm</td>
<td>600 mm</td>
<td></td>
</tr>
<tr>
<td>Bare</td>
<td>600 mm</td>
<td>600 mm</td>
<td></td>
</tr>
<tr>
<td>High voltage aerial bundled cable</td>
<td>700 mm</td>
<td>900 mm</td>
<td></td>
</tr>
<tr>
<td>Bare</td>
<td>700 mm</td>
<td>900 mm</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Transmission voltages

<table>
<thead>
<tr>
<th>Conductors</th>
<th>Voltage</th>
<th>Escorted</th>
<th>Unescorted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bare</td>
<td>1,000 mm</td>
<td>2,100 mm</td>
<td></td>
</tr>
<tr>
<td>Bare</td>
<td>1,200 mm</td>
<td>2,100 mm</td>
<td></td>
</tr>
<tr>
<td>Bare</td>
<td>1,800 mm</td>
<td>2,900 mm</td>
<td></td>
</tr>
<tr>
<td>Bare</td>
<td>3,000 mm</td>
<td>3,400 mm</td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Vertical separation of conductors (escorted clearances only)

<table>
<thead>
<tr>
<th></th>
<th>Upper circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>132,000 volts</td>
</tr>
<tr>
<td>Lower circuit</td>
<td></td>
</tr>
<tr>
<td>LV insulated, bare and covered</td>
<td>1,500 mm</td>
</tr>
<tr>
<td>Conductive cables, such as earth wire</td>
<td>1,500 mm</td>
</tr>
</tbody>
</table>

References

- Western Power Work Practice Manual:
  - Field instruction 2.2 (Safety observer role)
  - Field instruction 2.6 (Elevated work platform safety)
  - Section 3 Personal protective equipment
  - Section 4 Switching, permits and communications
  - Section 6 Overhead work
- Western Power Electrical System Safety Procedures
- Western Power Incident Reporting Procedures (DM# 3245027)
- National Guidelines for Safe Approach Distances to Electrical Apparatus ENA NENS 04-2006
- Guidelines for the Design and Maintenance of Overhead Transmission and Distribution Lines ENA C(b) 1 – 2006
- Department for Transport Exemption 46V11CP3TM (DM# 7276033)
- Western Power Instruction – Restricted Access Vehicle Escort Services (DM# 8341579)
5.2 Telstra notification of new HV earth installation

Purpose

This work practice outlines the conditions for notifying Telstra before:

- moving an existing permanent high voltage (HV) earth electrode
- installing a new permanent HV earth electrode

Note:

This work practice does not apply to replacing or maintaining an existing high voltage earth.

Instructions

Before commencing work:

- conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
- all personnel must comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- all personnel must comply with NAC requirements
- contact Dial Before You Dig (DBYD) before any excavation takes place

Note:

When contacting Telstra, they will require the associated DBYD reference.

New installation

- Any proposed new HV overhead or underground system earthing installation must maintain the following distances from a Telstra pit:
  - 15 m (for distribution substations and pole earths)
  - 40 m (for transmission substation grid earthing 66 kV and above)
- If these distances cannot be maintained, the Lines and Cables Design team (part of the Engineering & Design Function) will liaise with Telstra to reach a design agreement.
- The final design drawings must show the location of all Telstra pits within the area of work.
• Check the actual location distances against the design drawings before installing any HV earth.
• If a Telstra pit is found which was not shown on the design, notify the Lines and Cables Design team and await their response before installing the HV earth.

**Existing installation**

• Telstra must be consulted before any existing HV underground or overhead system earth electrodes are moved to within the following distances of a Telstra pit:
  o 15 m (for distribution substations and pole earths)
  o 40 m (for transmission substation grid earthing 66 kV and above)
• To notify Telstra, email the following items to F1102490@team.telstra.com:
  o a completed copy of the *Telstra notification of new HV earth installation* form (DM# 5237319)
  o a scale drawing of the proposed earth installation location. The scale for the drawing can be either 1:1000 or 1:2000. Telstra can be contacted on 1800 810 443 (0800 – 1700 AEST).
• There is no need to contact Telstra if the HV earth electrodes are being replaced in the same location.

**References**

• Work Practice Manual:
  o work practice 2.28 (Job briefing process)
  o section 3 (Personal protective equipment)
  o Appendix 2 (standard forms)
  o Telstra notification of new HV earth installation form (DM# 5237319)
5.3 Streetlights – damaged or faulty steel columns

Purpose

This work practice outlines the steps to be taken when attending to steel standard streetlights that have been reported as electrically faulty, or the columns damaged due to wind, storm or motor vehicle impact.

Compliance with this work practice will ensure a safe environment is maintained for the general public, Western Power personnel and contractors responding to the report.

Instructions

There are two types of streetlight column designs in use:

- Frangible – impact absorbent hexagonal column (10.5 m and 12.5 m) with a split seam feature where all sides are intermittently welded in the vehicle impact zone. (This zone is up to two metres from ground level).
- Non-frangible – solid, one section pieces of hexagonal column with a continuous weld on seams, or a one-piece pipe column.

Prior to the commencement of any work on a steel standard streetlight:

- Ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- Conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
- Test the streetlight column using an approved voltmeter (Cat. III – 1,000 volts or Cat. IV – 600 volts) and an independent earth to ensure it is not energised.

Streetlight columns that have fallen or are at risk of falling

- Immediately arrange traffic management measures, such as temporary barriers and warning signs, or arrange with police to prevent public access to the fall area (see work practice 2.21 (Traffic management) in this manual).
- Immediately arrange for the support of the streetlight column by a crane.
- Make the electrical connection safe, de-energise, isolate, and danger label.
- Remove the streetlight column.
Important

Treat the luminaire and outreach arms as unstable and either make them safe prior to pole removal, or ensure the pole-removal area is clear from vehicular and pedestrian traffic before removing the pole.

Damaged streetlight columns

If a streetlight column has any of the following damage, immediately arrange for its support and removal:

- a frangible column with one or more seam welds broken
- a non-frangible column with more than one of the hexagonal surfaces damaged
- the column is bent below ground level and leaning

Note:

Support the streetlight column with a crane before excavating at the base of the column.

References

- Work Practice Manual:
  - work practice 2.21 (Traffic management)
  - work practice 2.28 (Job briefing process)
  - Section 3 (Personal protective equipment)
5.4 Instruments – testing and calibration

Purpose
This work practice outlines the minimum standard for test instruments and their recalibration requirements.

Scope
- This work practice applies to the Network Total Workforce and in particular to those who may be required to use test instruments on the high voltage (HV) or low voltage (LV) network.
- The minimum acceptable standard for test instruments used on the LV network is: Category III – 1,000 volts, or Category IV – 600 volts.
- Meters not meeting these minimum standards can only be used on the LV network on receipt of approval to do so from the Work Practice Development & Training function.

Instructions
- Non-standard voltage testers and test lamps are no longer approved instruments.
- Staff assigned with the responsibility of managing test instruments must ensure regular testing and re-calibration takes place and appropriate records are kept.
- Inspect any new instruments or test equipment before use.
- New test instruments must have a valid calibration certificate.
- Carry out annual inspections and calibrations on all instruments or test equipment used for commissioning purposes, per the National Association of Testing Authorities (NATA) recommendations.
- Document and file calibration process for auditing purposes.
- Tag out defective or unsafe equipment with an “Out of Service” warning tag.
Using instruments

- The operator of the test instrument must check the validity of the date of calibration.
- If the date has passed or is not shown, the operator must seek direction from the formal leader. The formal leader must check the database or records to determine the calibration status of the test instrument.
- When the calibration status is current – the test instrument can be used.
- When the calibration status is not current – the test instrument must be tagged using an “Out of Service” warning tag and calibration arranged.
5.5 Pilot cables boxes

Purpose
The purpose of this instruction is to outline the minimum safety requirements for access to pilot cable termination link and pilot isolation transformer boxes.

Instructions

General
For the purpose of working on pilot equipment by substation protection section staff, the permit recipient must be certified for receiving permits on pilot cables. In the case of other staff, an NA3 (recipient in charge) authority is required. It is also a requirement for the recipient to have undertaken specific training in pilot cable safety (refer to DM# 2494273).

Before commencing work

- Obtain all relevant permits from the controlling authority for the apparatus to be worked on.
- Isolate the pilot cable termination link or pilot isolation transformer box.
- A portable pilot cable high voltage class 2 insulated mat must be used when carrying out work on a pilot cable termination link or pilot isolation transformer box.
- Use barriers, shrouds, or isolating transformers to maintain an earth-free environment around the pilot cable termination link or pilot isolation transformer box.
- A suitably rated isolation transformer must be used when bringing external power cords into the earth-free exclusion zone of the pilot cable termination link or pilot isolation transformer box.
Inspection and testing

- Check the insulated mats for signs of damage and deterioration before use.
- If the insulated mat is damaged or has deteriorated, remove it from service.
- Test insulated mats according to Field instruction 2.11 (High voltage insulated tools and equipment – testing and use) in this manual.

References

American Standard ASTM D 178-01 (matting)
5.6 Transformers and metering units – handling and transport

Purpose

This work practice outlines how to handle and transport transformers and metering units using forklifts and cranes that are fitted with Western Power’s purpose made lifting attachments.

Authorisation and training

- Forklift operators must:
  - hold a current WorkSafe WA forklift operator certificate
  - have completed training in the use of lifting attachments through a registered training organisation
  - watch the relevant training DVD (available at each storage facility)
- Crane operators must hold a current *High Risk Work Licence* for the crane they are operating.
- Each storage facility must keep and maintain a register of all forklift and crane operators who work at that facility who are trained to safely use lifting attachments and beams.

Safety

- If at any time it is identified that oil is leaking from the transformer or meter unit, act according to work practice 11.1 (Leaking oil-filled equipment) in this manual.

Instructions

**Western Power’s purpose-made lifting attachments**

To transport a transformer or metering unit with a forklift or crane, one of the following purpose-made lifting attachments must be used:

- WPSA1 – slipper attachment for 2–2.5 tonne forklifts (see Figure 1)
- WPSA2 – slipper attachment for 4–8 tonne forklifts (see Figure 2)
- WPLB1 – lifting beam (see Figure 3)
Selecting and attaching the appropriate lifting attachment

- Confirm the stock ID of the item to be transported.
- Consult Table 1, using the item’s stock ID to:
  - determine which lifting attachments may be used to transport the item
  - if using a forklift, its required lifting capacity
- Attach the lifting attachment to the forklift or crane.
  - Do not use worn attachments (e.g. shackles, pins, chains).
  - If using a forklift, secure the lifting attachment by locking the pins to the forklift.

Table 1: Lifting devices and attachments for handling transformers and metering units

<table>
<thead>
<tr>
<th>kVA</th>
<th>Transformer / Metering unit</th>
<th>Stock ID</th>
<th>Weight (kg)</th>
<th>Lifting device and attachment*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pole top</td>
<td>Ground-mounted</td>
<td>Forklift 2–2.5 T + WPSA1</td>
<td>Forklift 4–8 T + WPSA2 or WPLB1</td>
</tr>
<tr>
<td>10</td>
<td>XT0007</td>
<td></td>
<td>130-195</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>XT0018</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>XT0022</td>
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<tr>
<td></td>
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<tr>
<td>15</td>
<td>XT00198</td>
<td></td>
<td>150</td>
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</tr>
</tbody>
</table>

Selecting and attaching the appropriate lifting attachment

• Confirm the stock ID of the item to be transported.
• Consult Table 1, using the item’s stock ID to:
  o determine which lifting attachments may be used to transport the item
  o if using a forklift, its required lifting capacity
• Attach the lifting attachment to the forklift or crane.
  o Do not use worn attachments (e.g. shackles, pins, chains).
  o If using a forklift, secure the lifting attachment by locking the pins to the forklift.

Table 1: Lifting devices and attachments for handling transformers and metering units

<table>
<thead>
<tr>
<th>kVA</th>
<th>Transformer / Metering unit</th>
<th>Stock ID</th>
<th>Weight (kg)</th>
<th>Lifting device and attachment*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pole top</td>
<td>Ground-mounted</td>
<td>Forklift 2–2.5 T + WPSA1</td>
<td>Forklift 4–8 T + WPSA2 or WPLB1</td>
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<tr>
<td>10</td>
<td>XT0007</td>
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<td>130-195</td>
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<td></td>
<td>XT0018</td>
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<td>kVA</td>
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<td>Lifting device and attachment*</td>
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<td>--------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pole top</td>
<td>Ground-mounted</td>
<td>Weight (kg)</td>
<td>Forklift 2–2.5 T + WPSA1</td>
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<td>XA2255</td>
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<td></td>
<td>XT0184</td>
<td></td>
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</tr>
</tbody>
</table>

* Use Tables 2 and 3 to determine which shackle hole number to use on the lifting attachment.
Table 2: Shackle hole to use when using the WPSA1 lifting attachment

<table>
<thead>
<tr>
<th>Stock ID</th>
<th>Pole top</th>
<th>Ground-mounted</th>
<th>Shackle hole number</th>
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<tbody>
<tr>
<td></td>
<td>XT0007</td>
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<td>XT0024</td>
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<td>XT0127</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>XT0141</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The symbols □ indicate that the shackle hole is not used with that Stock ID and Pole top combination.
Table 3: Shackle hole to use when using the WPSA2 or WPLB1 lifting attachments

<table>
<thead>
<tr>
<th>Stock ID</th>
<th>Pole top</th>
<th>Ground-mounted</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td>XT0040</td>
<td>XT0198</td>
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</tr>
<tr>
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<td>XT0022</td>
<td>XT0024</td>
<td>XT0026</td>
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<td>XT0040</td>
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<td>XT0008</td>
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<td>XT0010</td>
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<td>XT0181</td>
<td>XT0182</td>
<td>XT0183</td>
<td>XT0184</td>
<td>XT0185</td>
<td></td>
</tr>
</tbody>
</table>
Handling the item

- Ensure that the safe working load (SWL) of the lifting attachment and the forklift or crane are appropriately rated to lift the weight of the transformer or metering unit.
- Do not use worn attachments (e.g. shackles, pins, chains).
- Lifting chains must be secured to the same pair of numbered holes on the lifting attachment. When attached to the load, all chains should be within five degrees from the vertical line projected from the edges of the suspended load. For the correct shackle hole number to use, see Tables 2 and 3.
- If using a forklift:
  o centralise the forklift side shift before lifting any load on the hooks
  o the item must be lifted with the forklift mast in vertical position

Load the item onto a truck

When loading transformers or metering units onto a truck, they must be:

- placed onto a rubber mat, 20-25 mm thick
- positioned with the large bushings facing the truck tray sides to facilitate non-swivel hook offloading
- secured with rated, ratchet soft tiedowns:
  o via lifting eyes
  or
  o if lifting eyes not present, over the tank top

References

- Work Practice Manual, work practice 11.1 (Leaking oil-filled equipment)
- AS 4991-2004 Lifting devices
5.7 Transformers – return and refurbishment

Purpose
This work practice outlines the minimum requirements and inspection process for all transformers that are returned from service and are to be refurbished and disposed of.

Scope
A transformer is considered taken out of service when it is removed from the network. Transformers must be taken out of service in accordance with work practice 11.1 (Leaking oil-filled electrical equipment).

Instructions

Transformer tagging and identification
Transformers that are returned from service must be tagged using one of the following tags:

- The orange ‘Faulty’ tag (see Figure 1) must be used for transformers taken out of service when they:
  - are suspected of having a problem
  - have failed in service
  - are damaged during transport
  - are not fit for service

  **Note:**
  Leak repairs must be stated on this tag

- The yellow ‘Removed’ tag (see Figure 2) must be used for transformers that are taken out of service that were in working order prior to removal.

  **Note:**
  The reason for return must be stated on the ‘Faulty’ and/or ‘Removed’ tags (in the reason for return section).

In both cases, a tag detailing the transformers origin and status as well as a *Reverse Logistics Transport Request Form* (DM# 8182831) must be attached.
Note:

Each transformer that is being returned must have a Reverse Logistics Transport Request Form (DM# 8182831) securely attached to the transformer within a plastic A4 sheet protector. All relevant details must be provided to assist determining if the plant is to be scrapped or refurbished.
Handling and transporting from site

- Transformers that are taken out of service must be sent to the nearest major Western Power depot.
- Transformers must be placed on rubber mats and tied down during transportation.
- If a leak on a transformer has been repaired with putty treatment, the transformer must be placed on:
  - metal spill trays (1,170 mm x 1,300 mm) for aerial transformers and small ground mount transformers up to 63 kVA
  - plastic spill trays for large (160 kVA to 1,000 kVA) ground mounted transformers.

  The plastic spill trays are owned and held by the Western Power material logistics provider at the Jandakot Hope Road store. They will be issued by truck to a site when requested by telephone ((08) 9411 7895).

  The plastic trays come in two sizes: large 1.4 m x 1.4 m and small 1.4 m x 0.7 m.
- If you are in a country area, you will need to allow longer for truck delivery times for spill trays. Use black plastic to wrap the leaking transformer and deliver to the nearest Western Power country depot in preparation to be delivered to Perth on a spill tray.
- Each tray contains a replaceable absorbent mat under the grating. Personnel must use the absorbent mat to form spill trays for all ground mounted distribution transformers (up to five tonnes in weight) either on truck trays or on the ground (i.e. with the load evenly supported under the entire tray area).

  See Figure 3 (Ground or truck mount spill tray arrangements).
- Transformers that have had leaks repaired must remain on spill trays and be placed on the transformer storage catchment tray at the depot. The Western Power material logistics provider is responsible for handling and disposing oil absorbent mats.
- The Western Power material logistics provider is responsible for:
  - coordinating the return or disposal of all transformers.
  - returning metal trays to depots
  - supplying metal and plastic spill trays to staff and contractors for leak repaired transformer returns
- managing and cleaning metal and plastic spill trays that are returned to stores.

**Transformer type**
MPS/NON MPS, 750 KVA schneider, packaged subs and older Westalian Transformers.

![Diagram of spill tray arrangements](image)

**Figure 3: Ground or truck mount spill tray arrangements**

**References**
- Work Practice Manual, work practice 11.1 (Leaking oil-filled equipment)
- Reverse Logistics Transport Request Form (DM# 8182831)
5.8 Pitch removal

Purpose
This instruction outlines the requirements for the removal of pitch from cable boxes.

Scope
Pitch must only be removed using the melt-out process which is described in this
instruction. This instruction does not address electrical isolations, cable preparation
or repacking of the cable box.

Training
All personnel who are required to remove pitch must have attended and
successfully completed the course PTS 711 – Cable Box Pitch Removal.

Safety
• All personnel who are required to remove pitch must wear personal protective
equipment (PPE). For more on this, see Section 3 (Personal protective
equipment) in this manual. PPE may include, but is not limited to:
  o safety glasses or a face shield
  o nitrile, PVC or leather gloves
  o a leather or PVC protective apron (or disposable overalls may be worn)
• Key controls:
  o no naked flames on pitch
  o electrical isolations performed
  o ventilation must be in place during the melting activities
• All personnel who are required to remove pitch must be familiar with the
  following documents:
  o Western Power’s Safety and incident reporting, available on the Western
  o Material Safety Data Sheet (MSDS) for insulating pitch, available on the
    ChemAlert website: http://www.chemalert.com
Instructions

Equipment
The approved equipment that is required to perform a melt-out of a pitch box is:

- heat lamp box assembly
- pitch troughs (2)
- aluminium chutes (2)
- grease for lining troughs and chutes
- aluminium fold-up scaffold
- ventilation system
- LPG gas torch, hose and gas bottle
- 10 amp 1-phase extension leads (3)
- RCD power box
- wooden mallet
- rags and kerosene
- pitch waste drum (1 x 200 litre drum with securable lid)
- fire extinguisher (CO₂)
- electric heat gun

Preliminary arrangements for pitch removal in substations
Prior to setting up for a pitch melt-out, a risk assessment must be conducted and the following arrangements must be made:

- contact the Asset Management branch and obtain details about:
  - the replacement insulator medium that is required for the cable box
  - any other materials that are required
- carry out an assessment on:
  - scaffold installation
  - ventilation system placement
  - adjacent apparatus that may affect, or be affected by, the pitch melt-out process. This could include preventing the fumes from the pitch melt-out affecting adjacent vented equipment by placing a solid barrier between the vented equipment and the melt-out position
Pitch removal process

Permits and outage

Prepare the apparatus for work by:

- ensuring that any electrical hazards are removed by switching, earthing and/or racking
- completing all necessary permits
- ensuring that any pitch removal equipment can be positioned without encroaching on any other adjacent electrical hazards

Scaffold

- Position scaffold in front of the cable box and adjust the legs to ensure that the platform is level.
- Place the removable platform section to a lower rung level for the pitch trough support so that it is suitable to catch the molten pitch from below the cable box.

Pitch box preparation and ventilation

- Place the pitch trough on the platform.
- Set up chute sections between the pitch box and the trough.
- Grease the inside of the trough at least 2/3 of the way up from the bottom of the trough.
- Loosen all the nuts that are securing the cable box lid.
- Connect the sections of exhaust system together so that the hood end is on the air suction side and is ready to hang on the scaffold opposite the end where people enter the scaffold.
- Tie the hood to a scaffold rail approximately 1.5–2 metres from the pitch box at about one (1) metre higher than the box. The opening must be facing the box.
- The exhaust end of the ducting must be positioned at least two (2) metres outside the nearest door opening with the duct running alongside the building wall.
- Connect the exhaust system to a local power outlet. Switch on and leave on for the duration of the work.
- Using a gas torch, heat the lid exterior to break the inside bond between the pitch and the lid. The bond can be loosened by tapping or levering the lid off. Take care not to damage the lid.
DANGER

Items associated with this process may become hot. The use of appropriate PPE is required.

Heat lamps

- Adjust the telescopic mast for attachment of the heat lamp box. The box must have its bottom side level with the bottom of the pitch cable box, and be positioned approximately 100 mm from the box face.
- Connect the heat lamp box to an RCD protected power outlet. Switch on and check the operation of all lamps.

Pitch melt-out

- When initial pitch flow commences, carry out a visual check to ensure that the chute and pitch trough are catching all the pitch.
- The melt-out time will vary depending on the box size. Ambient temperature and air movement in the pitch box vicinity can also affect the melt-out time.
- Check the box for melt-out progress every 15 minutes. The work site must not be left unattended at any time.
- For larger pitch boxes, anticipate replacing the trough with a second (greased) trough before the half melt-out stage.

Clean up

- At the completion of the full melt-out stage, switch off the heat lamps and allow to cool before removing the lamp box.
- While the pitch remnants are still hot, use an electric heat gun on medium setting (approx 300 °C) and rags dipped in kerosene to remove any remaining traces of pitch from the bushings and corners of the box.
- Remove the pitch troughs to a safe and well ventilated area to cool and harden (two people are required to lift the trough).

Refilling and disposal

- Perform any cable tests or replacement changes.
- Leave the ventilation system operating while the emptied pitch box is being repacked with the new insulating medium.
• On a hard surface, turn the pitch box over and tap the underside with a timber mallet to release the pitch.
• When released, place the pitch blocks in pitch waste drums and secure the lids.
• Return the pitch waste and drums to the hazardous waste area at the depot for collection (notify Facilities Management).

References

• Work Practice Manual, Section 3 (Personal protective equipment)
• Material Safety Data Sheet (MSDS) for insulating pitch available on the ChemAlert website: http://www.chemalert.com
• Safety and incident reporting in accordance with the Western Power Website: http://www.westernpower.com.au/networkcontractors/Safety.html
5.9 Restricted access areas

Purpose
This instruction outlines the requirements to access reserves and easements controlled by other entities such as:

- Railway Operators
- Dampier Bunbury Pipeline (DBP) (operates the Dampier to Bunbury Natural Gas Pipeline)
- APA Group (operates the Parmelia Pipeline and Laterals)

Scope
This field instruction is applicable to all members of the Network Total Workforce (NTW) who are required to perform Western Power work within the restricted access areas mentioned in this field instruction. Accessing these areas places personnel at risk.

For access to environmentally sensitive areas, see Section 11 (Environmental) of this manual.

Training and authorisation
Applicable personnel must be trained and have the correct authorisation to meet the various work requirements of the task.

Safety
Western Power’s safety requirements are the minimum. Always perform a risk assessment before starting work. PPE must be worn as described in Section 3 (Personal protective equipment) of this manual. Additional requirements may be set by the authority controlling the reserve, or as identified by the risk assessment.

Special attention must be given to site-specific requirements, which may include:

- overhead services such as power lines, railway overhead catenaries (25kV) and communications lines
- high-pressure gas mains
- other underground services such as LP gas lines, power cables, water and sewerage reticulation and communication cables
• traffic
• trains (when working within a rail reserve)
• environmental hazards

**Rail reserves**

Any person proposing work on, above, below or within any rail reserve must submit a written application to the appropriate rail authority.

- Brookfield Rail head office (08) 9212 2800 (see Appendix 3 (Brookfield Rail data) in this manual for emergency and local contact numbers.
- Public Transport Authority, Track Infrastructure Maintenance Manager, (08) 9326 2281
- The Pemberton Tram Company and The Hotham Valley Railway, (08)9776 1016
- Golden Mile Loop Line Tourist Railway, 0418 915 688, 0407 387 883 or 0400 196 997

For country areas contact the rail superintendent or inspector.

If there is another railway line or spur in the area which is not listed above, make sure the pre-job planning includes contacting the appropriate authority for that line.

If work is to be carried out in the Avon Valley Railway Reserve, a controlled access key may be required to unlock and relock gates to the rail reserve. This will be determined when making an application for track access.

When making an application for access to a rail reserve, the following details must be provided:

- the applicant’s details
- location of works, section of line, district, etc.
- type of works
- proximity of work to the track
- type of machinery to be used
- details of work team (the number who have Rail Safe Working Accreditation)
- time, date and duration of works

All construction work and designs must be approved by the relevant rail authority.
Track Access Permit

All persons entering the railway reserve at or closer than three metres from the nearest running line for any reason must acquire a Track Access Permit unless special permission is granted by the rail manager. Work in this area requires a supervisor level WPW15 / flag attendant. Western Power may have staff appropriately trained or use a recognised qualified contractor.

Authorised work 3 to 5 metres from the railway track does not require a Track Access Permit. Use a safety observer when working with large machinery that is capable of protruding within the 3m zone with no temporary barriers or fencing.

Work performed outside the 5m zone does not require a Track Access Permit.

![Figure 1: Railway reserve work zones](image)

**Note:**

The appropriate rail authority must be notified prior to commencing any overhead construction work outside the 3m zone that may reduce the height clearances for trains.
Emergency work

For emergencies and life-threatening situations, call the appropriate rail authority from the table below.

<table>
<thead>
<tr>
<th>Restricted access areas</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emergency work</strong></td>
<td></td>
</tr>
<tr>
<td>For emergencies and life-threatening situations, call the appropriate rail authority from the table below.</td>
<td></td>
</tr>
<tr>
<td><strong>Brookfield Rail</strong></td>
<td>(08) 92122800</td>
</tr>
<tr>
<td></td>
<td>000 or 112 (from a mobile)</td>
</tr>
<tr>
<td><strong>Public Transport Authority</strong></td>
<td>(08) 9326 2345</td>
</tr>
<tr>
<td><strong>Pemberton Tram Company</strong></td>
<td>(08) 9776 1016</td>
</tr>
<tr>
<td></td>
<td>After hours: 0427 770 051</td>
</tr>
<tr>
<td><strong>Hotham Valley</strong></td>
<td>(08) 9776 1016</td>
</tr>
<tr>
<td></td>
<td>After hours: 0427 770 051</td>
</tr>
<tr>
<td><strong>Golden Mile Loop Line Tourist Railway</strong></td>
<td>0418 915 688</td>
</tr>
<tr>
<td></td>
<td>0407 387 883</td>
</tr>
<tr>
<td></td>
<td>0400 196 997</td>
</tr>
</tbody>
</table>

Pipeline corridors

**Dampier to Bunbury Natural Gas Pipeline (DBNGP)**

The DBNGP lies within a corridor owned by the Western Australian State Government and is administered by the DBNGP Land Access Minister.

DBP are the licensed operators of the DBNGP and control all access to the pipeline corridor.

- The DBNGP corridor varies in width from 30m to 5m.
- The pipeline corridor is marked along its length by danger signs
- The signs display the emergency contact number.

**Note:**

People found trespassing within the corridor without authority can be subject to criminal prosecution and a fine of up to $10 000.
Access to the DBNGP Corridor

- Anyone requiring access to the corridor must seek approval from the DBNGP Land Access Minister.
- Work carried out within the pipeline corridor is governed by a strict set of conditions and requires prior approval before the commencement.
- Approval can be sought only by written application to the Department of Regional Development and Lands (Infrastructure Corridors)
- Approvals are given under the Dampier to Bunbury Pipeline Act 1997, Section 41 (Restrictions on land in the DBNGP corridor)

How to get approval to access the DBNGP Corridor

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Contact the Department of Regional Development and Lands (Infrastructure Corridors). Tel (08) 9347 5134, Fax (08) 9347 5007.</td>
</tr>
<tr>
<td>3.</td>
<td>Infrastructure Corridors will contact interested parties.</td>
</tr>
<tr>
<td>4.</td>
<td>Request will be assessed in terms of compliance with established government policy and safety management.</td>
</tr>
<tr>
<td>5.</td>
<td>DBP will set conditions and inform Infrastructure Corridors who will create a schedule.</td>
</tr>
<tr>
<td>6.</td>
<td>The applicant will be sent a copy and be required to complete a deed of indemnity.</td>
</tr>
<tr>
<td>7.</td>
<td>The applicant is then to contact DBP to arrange a date to conduct activities within the pipeline corridor.</td>
</tr>
</tbody>
</table>

The following information will be required when making an application:
- plan / diagram of the works in relation to the pipeline
- exact location
- details of the works to be undertaken
- time frame of the works

**Once access is approved, DBP will:**
- undertake the relevant inductions for your personnel
- provide accurate location of the pipeline
• provide appropriate onsite supervision
• provide environmental guidance for the reinstatement of the corridor
• organise and issue relevant work permit for the corridor

**APA owned pipelines**

The APA Group owns and operates the following gas pipelines:
• Goldfields Gas Pipeline – Yarraloola to Kalgoorlie (and extended to Kambalda)
• Parmelia Gas Pipeline – Dongara to Perth
• Mid West Pipeline (off DBNGP) – Eradu to Windimurra

For access into the restricted areas (easements) of these pipelines, a Western Power representative must submit a Dial Before You Dig (DBYD) enquiry through [www.1100.com.au](http://www.1100.com.au).

APA will respond to the DBYD by asking the Western Power representative to provide:
• location of the works, including a design/drawing or X & Y coordinates
• description of the proposed works within 10m of the pipeline

For more information, call APA Lands Department on (08) 6189 4564.

**All works**

Refer to field instruction 7.10 (Gas mains – Working adjacent) in this manual. Work considered to be hazardous over or near a pipeline corridor includes:
• digging
• drilling – horizontal and vertical
• trenching
• transport of heavy loads

**Emergencies**

Any of the following could indicate a gas leak and should be taken very seriously:
• hissing or roaring sound
• dead or discoloured vegetation in an otherwise green location
• purple discolouration in the soil
• bubbles in a waterlogged area
unusual odour near the pipeline

If a gas leak is suspected, the following actions must be taken:

1. Avoid creating sparks – do not start vehicles or use communication devices (cameras, etc.) in the area of the gas cloud, these can ignite the gas.
2. Leave the area immediately.
3. Once at a safe distance, immediately notify the relevant pipeline or network control room on the free-call numbers listed below.
4. Give your name, telephone number and description of the leak and its location.

IN AN EMERGENCY

- DBNGP control room – 1800 019 919
- Parmelia Pipeline & Laterals – 1800 019 966
- Goldfields Gas Pipeline (including Mid West Pipeline) – 1800 151 016
- Alternatively, call 000

References

- Work Practice Manual:
  - field instruction 7.10 (Gas mains – Working adjacent)
  - Section 11 (Environmental)
- APA Group Website: http://www.apa.com.au
- Brookfield Rail website: www.brookfieldrail.com
- Dampier to Bunbury Pipeline Act 1997, Section 41 (Restrictions on land in the DBNGP corridor)
- DBP Website: http://www.dbp.net.au/
- Public Transport Authority procedure: Access onto the PTA operating railway reserve
5.10 Land access – private property

Purpose

This instruction outlines the minimum requirements when accessing private property.

Scope

When entering private property the Network Total Workforce (NTW) must act in accordance with Western Power values, the Western Power Customer Charter and the Energy Operators Act.

Customers must be treated with respect and courtesy. This means that the NTW must:

- notify customers, wherever practical, of the intent to access their property
- cause as little interruption and damage as possible

Reasons for accessing private property include:

- inspecting new electrical work
- scoping and completion of maintenance work
- connecting or disconnecting electricity supply
- pruning vegetation around power lines
- construction work

Instructions

In advance

- Contact the Department of Parks and Wildlife (DPaW) at least 10 days before entering a DPaW land or conservation estate.
- Review the works package or job card and ensure that the contact details and environmental requirements are recorded.
- Attempt to contact the landowner and/or their representative (e.g. neighbour, farm manager, farm employee) prior to entry and record details of all attempts made (date / time / discussion). Ensure that they are advised of the nature of the work that is to be done.
Note:

- In the event of fault conditions, every effort should be made to contact the landowner and/or their representative. However, the integrity and safety of the network must take precedence.
- Electrical installation inspectors have the access authority to ‘enter without notice’ per section 14(a) of the Energy Coordination Act 1994.
- If works are to be carried out around an environmentally sensitive area, biosecurity must be considered (see Section 11 (Environmental) of this manual).

Before entry

- Ensure that the work vehicle is clean before entering the site.
- Comply with fire ban requirements.
- Review and follow all property access instructions as provided by the landowner. If you are unable to access private property in line with the minimum requirements, contact your supervisor or formal leader for further instructions prior to entry.
- Ensure appropriate identification is available, such as:
  - employee ID or contractor authorisation
  - logos
  - vehicle ID plates and stickers

During site works

- Leave all property gates as they are found:
  - open – leave open
  - closed – leave closed (ensure that livestock do not escape)
- Follow Western Power’s landowner contact etiquette:
  - Introduce yourself to the landowner.
  - State the purpose of the visit.
  - Summarise what information has been obtained to access property.
  - Complete site works in a timely manner.
  - Where possible, notify landowner of completion and departure.
Note:

- Do not inform a landowner that you have a legal right to access their property.
- Energy Operators (Powers) Act 1979 Sect 50 states that "as little detriment or inconvenience is caused and as little damage is done as is possible".

- Follow instructions on all biosecurity or other signs, or as instructed by the landowner.
- Avoid walking or driving through crops by using sealed roads, main access tracks, any existing tracks, cleared areas or fire breaks between and within properties. Never assume that it is okay to drive or walk through a crop.
- Ensure that you do not:
  - clear native vegetation without a clearing permit
  - drive through native vegetation
  - move any plant or weed material from farm to farm
- Remove all materials and reinstate land to former conditions (no rubbish or discarded hardware is to be left behind).
- Ensure that the work vehicle is clean before exiting the site.
- If assistance or advice is required, contact your formal leader.

Examples of signs that may be seen on private property gates
References

- Work Practice Manual, Section 11 (Environmental)
- Western Power Corporate Values (DM# 8568785)
- Western Power Customer Charter (DM# 5130109)
- Energy Coordination Act 1994, section 14: Powers of inspection
- Energy Operators (Powers) Act 1979 Sect 50: Restrictions on the exercise of the general powers (paragraph c)
5.11 Transporting gas cylinders in a vehicle

Purpose

This work practice outlines the generic safe work systems for transporting gas cylinders in a vehicle.

Scope

This work practice applies to any person carrying out work on behalf of Western Power who is required to transport gas cylinders in a vehicle. Gas cylinders may include:

- high pressure gas (e.g. oxygen and acetylene)
- liquefied petroleum gas (LPG)
- flammable and non-flammable gas

Important

It is the responsibility of the vehicle driver to refer to the material safety data sheet (MSDS) from ChemAlert to obtain specific information related to the type of gas that is being transported. For more information, see www.chemalert.com.

Hazards

Compressed and liquefied gases are potential hazards for the following reasons:

- Gas that is stored in cylinders is high pressure; a ruptured cylinder or valve can cause serious injury or damage.
- Heat build-up in the surrounding areas may activate pressure relief safety devices that are fitted to the cylinder, and release contents from the cylinder.
- When a liquefied gas is released, it decompresses and creates large amounts of gas.
- Some gases are highly flammable and a leakage can create an explosive atmosphere in a vehicle.
- Oxygen enrichment causes material to ignite easily and will increase the intensity of a fire. Nitrous oxide has similar properties.
- Inert gases can cause oxygen deficiency and asphyxiation.
- Toxic or corrosive gases are hazardous to health.
Note:

Information on the hazards of compressed and liquefied gases can be found on the cylinder label and in the MSDS.

Instructions

Transporting gas cylinders

Prior to transporting

- Conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual).
- Ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual).

Important

Every vehicle used to transport gas cylinders must carry a fire extinguisher suitable for vehicle fires.

- Read the gas cylinder identification label and cross-check transport safety requirements described in the MSDS or manufacturer’s documentation.

Figure 1: Gas cylinder identification labels

- Check the gas cylinders for any signs of corrosion, dents or any mechanical damage.
- Affix any placards to the vehicle in accordance with the Department of Transport and the MSDS.
- Check the condition of the load restraint equipment and vehicle body attachments.
- Fit valve protection devices where required.
• Check for gas leakage by applying a British Oxygen Company (BOC) approved leak detection fluid (LDF) or an ammonia free, soapy water solution applied with a brush.

**Transporting gas cylinders**

• Depending on the type of gas and its quantity, the vehicle used to transport gas cylinders may be required to conform to transportation requirements detailed in work practice 5.20 (Dangerous and explosive goods safety) in this manual, and the BOC Guidelines for Gas Cylinder Safety.

• Where possible, transport gas cylinders in an open vehicle that is suitably designed for the load.

• Always transport gas cylinders in an upright position.

• Always ensure that gas cylinders are secured to prevent movement in the vehicle while being transported.

• Ensure that cylinder valves are closed while in transit.

• Remove the gas cylinder regulator and any other attached equipment before transportation.

• Do not place cylinders on vehicle seats.

• Do not transport toxic and flammable gases in closed vehicles. If no open vehicle option is available, ensure that the cylinders have been thoroughly leak checked and that the vehicle is well ventilated. It is also recommended that no more than 10 kg of gas is securely transported inside a closed vehicle.

• Regardless of the vehicle type (open or closed) used, the gas cylinders must be immediately removed from the vehicle on arrival at the destination.

• For transport, reference should be made to the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (the Australian Dangerous Goods Code).
Figure 2: Transporting gas cylinders

Emergencies

• If a gas leak occurs during the transportation of gas cylinders, stop the vehicle (where practicable) and park as far away as possible from other vehicles and people. Leave the vehicle and call 000 so that the Department of Fire and Emergency Services (DFES) can provide assistance (see Appendix 4 (Emergency contact information) in this manual).

• In the event of a road accident when transporting gas cylinders, call 000 and advise DFES of the details of your load and your location.

References

• Work Practice Manual:
  o work practice 2.28 (Job briefing process)
  o section 3 (Personal protective equipment)
  o work practice 5.20 (Dangerous and explosive goods safety)
  o Appendix 4 (Emergency contact information)


• ChemAlert (MSDS) www.chemalert.com

5.12 Network asset inspection using a remotely operated video camera

Purpose

This instruction outlines the minimum requirements for using a remotely operated video camera in close proximity to conductors and equipment energised up to 33 kV.

Qualifications and skill sets

- All contractors must be:
  - in possession of a Network Authority Card
  - authorised and competent to perform work on Western Power’s assets
- Non-qualified electrical workers can only be authorised by Western Power to use a remotely operated video camera if they have successfully completed the following Power Training Services courses:
  - PTS 701 – Asset Inspection Training Package
  - PTS 757 – Operational Safety Induction

Safety

Before starting the job, the following criteria must be met.

1. A minimum of two (2) people are required to safely perform this task.
2. The minimum personal protective equipment (PPE) must be worn. For more on this, see section 3 (Personal protective equipment) of this manual.
3. A risk assessment must be completed. Refer to the Safe Work Method Statement (SWMS) – Wooden pole inspection process.
4. If the clearances mentioned in the Instructions section, below cannot be maintained the inspection must be performed using other methods (i.e. from an EWP or with the line isolated and earthed).

Equipment

- Rated and tested extendable/telescopic operating stick capable of reaching the top of the poles that are being inspected. Check that it is within the expiry date, clean the stick, and do a visual check.
For more information, see field instruction 2.11 (High voltage insulated tools and equipment – testing and use) in this manual.

- Rated and tested 500 mm extension for camera housing. Check that it is within the expiry date, clean the stick, and do a visual check.
- Type-tested housing for mini video camera.
- Mini video camera and receiver.

Instructions

- Do not allow the operating stick to come within 1 m of any live/energised parts.
- The non-rated (telescopic) section of the operating stick must remain at least 450 mm below the lowest high voltage conductors at all times. If additional height is required for the camera, an insulated extension must be attached to the top of the operating stick.

Note:
The additional weight of any extension will make the operating stick top-heavy and difficult to manage.

- Avoid bumping or resting the operating stick or camera housing against pole-top assets or conductor as this may cause injury, asset damage or loss of supply.
- Store and transport all equipment carefully to avoid moisture, dust and knocks.
- If the operating stick is damaged, immediately remove it from service and tag it pending repair or disposal.

References

- Work Practice Manual:
  - field instruction 2.11 (High voltage insulated tools and equipment – testing and use)
  - section 3 (Personal protective equipment)
- PTS 701 – Bundled pole inspection
- SWMS – Wooden pole inspection process (DM# 8843371)
- Test report – Sealed ABS box for wireless camera (DM# 9266714)
5.13 Using a hydraulic pole tamper

Purpose

The purpose of this work practice is to outline the minimum safe working requirements for using a hydraulic pole tamper (pole rammer).

Scope

This work practice applies to hydraulic pole tampers that operate in the pressure range of 1,000–2,000 pounds per square inch (psi) (6.9–13.8 megapascals (MPa)).

Instructions

• Before commencing work:
  o conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual). The risk assessment must include the risks that are associated with using a hydraulic pole tamper, such as those listed below. For more on this, see the section, Hose and hydraulic requirements.
    – The dangers of hydraulic fluid injection such as high pressure fluid loss.
    – Hydraulic hoses being uncontrolled when under pressure.
    – Hydraulic fluid being released into the atmosphere which could cause environmental damage and injury to personnel.
  o ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
• Use the Hydraulic Tamper Pre-start Checklist (DM# 8026431) to verify the condition of the pole tamper and ensure that it is safe to operate. If the hydraulic tamper does not pass the inspection, or if any part is suspected of being unsafe, tag it out of service and notify your formal leader.
• Ensure that:
  o hose protection sleeves are in place
  o the relevant personnel are familiar with how to operate a hydraulic pole tamper
Operational work practice standards

- A competent person is positioned at the vehicle hydraulic control valve to enable an emergency shut off in the event of hydraulic leak.

- Immediately report a fault or damage to the pole tamper, hydraulic connections and hoses to the person in charge then attach an ‘Out of Service’ warning tag until the fault or damage has been repaired.

**Hose and hydraulic requirements**

- Hoses must:
  - Be adequately sized to minimise pressure loss and avoid damage from heat generation due to excessive fluid velocity.
  - Be fire resistant and anti-static (FRAS) rated and be abrasion resistant where applicable for their intended application.

- Hose assemblies must:
  - Be compatible for the fluid type being used.
  - Have plastic caps securely fastened to each end to ensure no possible ingress of contamination prior to installation.

- Hose fittings must be fitted with a double-acting connection type so it is impossible to have a fitting failure due to improper engagement or excess line pressure.

- Hydraulic systems (including pole tampers and associated vehicles) must:
  - Be fitted with:
    - An on/off control valve on the pole tamper handle. There must be a label on the control valve outlet which clearly indicates the pole tamper control valve and restrictor valve.
    - A quick disconnect coupler.
  - Have hoses and adaptors that are guarded by specially designed sleeving to protect personnel, hydraulic equipment and the environment if a hose fails. The sleeving ensures that, in the event of hose or fitting failure, escaping pressures and fluids are contained. Protective sleeves must be clamped at each end of the hose or fitting. The sleeve must:
    - Cover the hoses from the pole tamper to where the hoses of the pole tamper couple with the line feed hoses.
    - Cover the hoses at the vehicle hydraulic control valve.
if it has an operating pressure higher than 2000 psi (6.9 MPa), be fitted with pressure limiters, restrictor valve installed behind the hydraulic outlet connection. This is to limit the pressure to any hoses attached to the tamper to 1000–2000 psi (6.9 – 13.8 MPa).

**Storage and transport**

- The vehicle used to store and transport pole tampers must be fitted with a storage box or rack to minimise the risk of damage to the tamper. The operating hoses must have their own respective hose reel system or storage compartment.

**Inspections and maintenance**

- Hydraulic pole tampers must undergo an annual inspection and maintenance program.
- At the time of the annual inspection, a tag must be attached to the hydraulic tamper. The tag must include:
  - the date of inspection
  - the next inspection date
- Records must be kept of all inspections, maintenance and repairs.

**References**

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - Appendix 2 (Standard forms)
5.14 Blank

Details on wood pole failure evidence collection have been moved and can now be found in work practice 5.22 (Network incident evidence collection) in this manual.
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5.15 Intent to carry out works notice to local government

Purpose

The purpose of this work practice is to describe the process for informing local governments of the Network Total Workforce’s (NTW’s) intent to carry out works in their area.

Instructions

- The Intent to carry out works notice to local government form (DM# 7701624) (see Figure 1) has been developed for use as Western Power’s standard advice to local governments.
- The form must be provided to local government at least three days before Western Power commences works involving:
  - advanced traffic or pedestrian management
  - the removal and reinstatement of local government assets (e.g. footpaths, road crossings)
  - directional drilling and excavation works in the road verge
  - pole replacements
  - conductor replacement
- See Appendix 4 (Emergency contact information) for contact details for all local governments within the Western Power network.

Important

Issuing this notice is:

- a legislative requirement under the Electricity Act 1945 and the Energy Operators (Powers) Act 1979
- an obligation under the Utility Providers Code of Practice
- in accordance with the following Western Power Policies:
  - Consulting with local government when working in the road reserve (DM# 2687632)
  - Consulting with Main Roads WA when working in the road reserve and placement of equipment in main roads (DM# 2668842)
Intent to carry out works notice to local government

References

- Work Practice Manual, Appendix 4 (Emergency contact information)
- Consulting with local government when working in the road reserve (DM# 2687632)
- Consulting with Main Roads WA when working in the road reserve and placement of equipment in main roads (DM# 2668842)
- Intent to carry out works notice to local government form (DM# 7701624)
- Electricity Act 1945
- Utility Providers Code of Practice for Western Australia
5.16 Removing embedded poles from the ground for test purposes

Purpose

This work practice outlines the approved methods for removing poles that are embedded in the ground in order for them to be tested for structural integrity.

Note:

If poles are not required for test purposes – refer to work practice 6.17 (Removal of poles embedded in the ground) in this manual.

Instructions

- Ensure that the pole has been inspected prior to starting the removal process.
- Ensure that all personnel are:
  - authorised and competent to work on Western Power’s assets
  - possess an appropriate Network Authority Card.
- Obtain the relevant permits (e.g. Electrical Access Permit (EAP), Vicinity Access Permit (VA)) for the apparatus that is to be worked on.
- Conduct a risk assessment and confirm that all team members are aware of their roles and responsibilities.
- Wear appropriate personal protective equipment (PPE) for the task being performed (see section 3 (Personal protective equipment) in this manual).

Before commencing work

Prior to excavating or removing poles that are embedded in the ground, paint a stripe around the pole at ground level or cover with duct tape (around the pole at ground level) so that the ends of the tape overlap by at least 300 mm. The bottom edge of the painted stripe or tape will represent the level of the ground surface (see Figure 1). Each pole must be allocated an individual number relative to the test project (i.e. 1–50). This is the Pick ID number.
• Fit an evidence tag holder around the pole. The evidence tag will be inserted into the evidence tag holder with all of the relevant information recorded on the tag (see Figure 2).

Figure 2: Evidence tag information holder (Stock code: CZ5013)

• Write the Pick ID number on the tape at ground level before the pole is removed.
• Record all information on the evidence tag (see Figure 3).

Note:

• Poles that are located in inaccessible locations (e.g. paddocks) should be moved as carefully as possible to the nearest accessible road for collection.
• Lay poles on the verge if a flatbed truck is not onsite when the pole is extracted.
Pole orientation

- Mark a dot or ‘X’ on the side of the pole under the overhead lines.
- Record the number of tee-offs coming off the pole.
- Mark an ‘N’ at the centre line of the northern face of the pole (see Figure 4).

Note:

All pole markings must be made in permanent, durable ink/paint. This will allow for analysis comparative to the actual load direction and exposure to the elements.
After the dot or ‘X’ has been drawn, take photographs of the pole prior to removal.

If a global positioning system (GPS) is available, record the GPS coordinates of the pole position to allow approximate climatic exposure and other external factors to be considered.

Record information of the soil to identify the conditions that the pole was exposed to at and below ground level. Ensure that the following is recorded:

- **Type of soil** – sand (loose, course, fine, hard packed), clay (soft, firm, hard) rock, concrete backfill, silt, rock, gravel, organic peat or combinations of these. The dominant soil would be recorded last (i.e. sandy firm clay would be mainly firm clay with some sand present).

- **Moisture** – just an indication of whether the soil was dry, moist, or saturated and if the soil condition was typical of that location.

- **Other impositions** – such as pole reinforcing supports, cable guards and concrete paths that are in close contact to the pole and influence the pole exposure conditions at the ground line. Mark the centreline of the location of reinforcing nails and cable guards on the pole before removal.

- **Support condition** – in-line pin support, termination, angle structure, etc. The number of conductors supported, and the presence of a transformer or other pole attachments would be beneficial.

- **ELLIPSE and SPIDA** – provide any additional information relative to the inspection and maintenance of the pole that is available and will assist in the accuracy of the testing process.
Removing poles

Poles must be removed in accordance with work practice 6.17 (Removal of poles embedded in ground) in this manual. However, as these poles are to be sent away for testing, the following precautions must be followed in order to minimise damage.

- Ensure that poles:
  - are not damaged in the process of pole recovery and subsequent loading onto transport vehicles. Any pole damage could influence the test result.
  - that have less than 25 mm of good wood at the butt end and are hollow for some distance due to termites are not selected for structural testing.
  - are carefully handled at all stages of removal and transport to minimise any damage.

**Note:**

Dropping a pole at any stage will affect the test results.

- Do a complete excavation around the pole (as deep as required) to avoid the using pullers which could damage the pole and affect the test results.

- Have someone monitor the ground line during removal and listen for fibre cracking and any other signs of distress which will help to determine if any further excavation is required.

- Avoid damaging the surface of the poles by using chains. If unavoidable, the chains should only be allowed more than half way between the ground line and the pole top.

- Take extra care around the ground line area on fragile, old and termite damaged poles.

**Loading poles onto vehicle**

- Removed poles must be stripped of all hardware before loading.

- Poles must be loaded onto a flatbed transport vehicle immediately after removal. Pole trailers must not be used. Once the flatbed transport vehicle is fully loaded, it must be transported to Koppers Australia Pty Ltd (ex-Western Poles) located at Keysbrook WA.

- Poles must be supported by no less than four blocks so that loader tongs or slings may be able to be placed under the poles. The blocks may include the horizontal ties or bolsters.
To avoid damage to the pole in transit, bearers or tie downs on the transport vehicle should be:
- more than 1.5 metres above the nominal ground line
- more than 600 mm below the ground line.

Place no more than two layers of poles on the vehicle load bed.

The bottom row of poles must have blocks that are not within 1.5 metres of the ground line.

The second layer of poles requires the same block arrangements as the first layer.

Once in position on the truck, ensure that the pole is supported and cannot bend.

Removed poles must be stripped of all hardware before loading.

For more information about pole removal, transport, loading, unloading and storage, see *Pole testing capability review and recommendations* (DM# 9138772).

If a pole has a revenue metering equipment attached to it, see work practices 8.3 (Revenue meters – fitting and replacing) and 8.4 (Revenue meters, fuses and terminal blocks – sealing).

**References**

- Work Practice Manual:
  - Section 3 (Personal protective equipment)
  - work practice 6.17 (Removing embedded poles from the ground)
  - work practice 7.2 (Excavation and directional drilling)
  - work practice 8.3 (Revenue meters – fitting and replacing)
  - work practice 8.4 (Revenue meters, fuses and terminal blocks – sealing)

- Pole testing capability review and recommendations (DM# 9138772)
5.17 Construction site access – minimum requirements

Purpose

This instruction outlines the minimum requirements for anyone entering a Western Power construction site.

Scope

The people covered by this instruction are anyone who is part of the Network Total Workforce (NTW) or visitors. Anyone requiring access to any work areas must meet Western Power’s requirements to work onsite, visit or deliver/pick up items.

- Workers onsite must have the minimum NTW requirements
- All visitors; whether picking up/delivering items or viewing, must meet the requirements listed for visitors.

The work areas covered by this instruction include:

- Pole/line works, ring main units, pad-mounts and transformer compounds
- Western Power substations (see field instruction 9.2 (substation entry requirements) in this manual.

Instructions

The NTW and all visitors must meet the following requirements.

Network Total Workforce must:

- wear clothing and personal protective equipment (PPE) as described in field instruction 3.1 (Clothing and personal protective equipment requirements)
- have a Western Power Network Authority Card (NAC). This includes:
  - PTS 757 (Induction for operational personnel)
  - HLTFA201B (Provide basic emergency life support) – refresher training every three (3) years
  - HLTCPR201B (Perform CPR) – refresher training every 12 months
  - Construction Safety Awareness Card

For more on this, see field instruction 5.24 (Network Authority Card (NAC)).

- Those who work in remote locations may require HLTFA302B (Provide first aid in remote situation) – refresher training every three (3) years.
Risk assessments must include any hazards and controls that may arise from the presence of non-authorised persons.

Permitting processes must be observed. Non-authorised persons required to be in the work area covered by a permit must have an exemption from OTX Network Authorisations.

Line workers actively working on the network must have currency of training in pole top rescue (PTR) and Emergency descent device training (EDD).

Visitors entering a Western Power construction site must:

- obtain permission to enter the site from the person in charge
- complete a site induction
- read and sign on to the risk assessment
- If visitors do not hold a NAC, they must always be under the immediate supervision of a person who has a NAC.
- Persons with special arrangements (who have an exemption when within network access or related work areas) – A written application is to be sent to the team leader of OTX Network Authorisations, stating access required, scope, purpose, conditions, duration and person’s qualifications.
- Visitors must wear clothing and PPE appropriate to the task and location, as directed by their supervisor.

**Note:**
If accessing a substation, field instruction 9.2 (Substation entry authority requirements) must be followed.

**References**

- Work Practice Manual:
  - field instruction 3.1 (Clothing and personal protective equipment requirements)
  - field instruction 5.24 (Network Authority Card (NAC))
  - field instruction 9.2 (Substation entry requirements)
5.18 Dealing with unexploded ordnance on the worksite (e.g. small arms ammunition and explosives)

Purpose

This field instruction outlines the requirements that must be followed when an object has been found on the worksite which resembles unexploded ordnance (UXO) – including small arms ammunition (SAA) and explosive ordnance waste (EOW). UXO can be found on or below the soil surface.

Identification

- UXO consists of the following:
  - ammunition and SAA
  - explosives or pyrotechnics such as artillery shells, mortar bombs, flares, TNT, gelignite and grenades – typically of military origin
- SAA is either:
  - blank – normally made of plastic but sometimes brass, does not contain a projectile and has a crimped end (see Figure 1)
  - live – made of brass, has an obvious projectile in the end and is commonly known as a bullet (see Figure 2)

- EOW is waste material such as packaging, fragmentation or casings of munitions that has been fired or used. EOW should not be handled unless it is
essential to do so and there is no other alternative. It may contain harmful chemicals and must only be handled under the following conditions:
  o it is certain that the item is an EOW
  o it is unavoidably necessary to shift or move the EOW

Caution

- In most cases in Western Australia, UXO that is found will most likely be of the type designed to kill or maim. UXO must be treated with extreme caution as it can explode in the following circumstances:
  o movement/vibration (e.g. when handling or transporting by vehicle)
  o wilful tampering (e.g. by a souvenir collector attempting to separate the components of the UXO)
  o mechanical disturbance (e.g. when ploughing, digging or cultivating)
  o increase in temperature (e.g. bushfires)

Instructions

The following actions must be followed when UXO or suspected UXO is found.

- Do not touch the item.
- If possible:
  o place a recognisable marker near the UXO (but at a safe distance) so that it can be located later
  o take a digital photograph of the UXO
- Notify everyone within a 50 metre radius of the UXO to:
  o stop work immediately
  o move at least 50 metres from the UXO and remain there until notified that they can move away
- Notify the onsite person in charge of the UXO and provide the following details:
  o the location of the UXO
  o a description of the shape, colour, material and approximate dimensions of the item (gathered without physically touching the item)
  o any markings on the item (again, identified without physically touching the item)
the location and description of the marker used to indicate the UXO’s position

- The onsite person in charge must:
  - ensure that all people have withdrawn at least 50 metres away from the UXO
  - isolate the 50 metre area around the UXO so that movement into the area is prevented
  - call the police using the 000 emergency hotline
  - arrange for someone to stay onsite until the relevant authority arrives
  - notify the formal leader in charge of the worksite

- Work is **not** to recommence within the immediate area of the UXO until:
  - it has been dealt with by police or defence personnel
  - the onsite person in charge has been notified that it is safe to re-enter the area

**Area details**

Detailed maps indicating the areas that are most likely to contain UXO can be found on SPIDAw...[link to SPIDAw...]

**References**

- WP Safety and Health Bulletin – WWII Mortar shell located during excavation (12 August 2011) DM# 8526350
- Department of Defence website www.defence.gov.au/uxo
- FESA UXO Services 600-01-01 'Warning concerning unexploded ordnance (UXO)' DM# 8526338
5.19 Planned interruptions (multi-customer outage)

Purpose

This instruction describes what operational teams must do when planning a supply interruption (planned outage) to more than one customer, and is based on ‘Identification and notification of customers for planned interruptions' (DM# 8224570) and ‘Planned interruption field check work instruction' (DM# 10047380).

Note:

This instruction does not apply to single customer interruptions or network faults. For more on single customer interruptions, see field instruction 5.25 (Minor planned interruptions (single customer outage)) in this manual.

Scope

This instruction must be used when supply to sections of the network affecting more than one customer will be interrupted, and is applicable to:

- Distribution Network Access Request (DNAR) requestors when submitting a DNAR for planned or potential supply interruptions to the high voltage (HV) and low voltage (LV) network. For more on this, see ‘DNAR User Instructions’ (DM# 2319398).
- operational teams when planning, scoping and performing a planned supply interruption

Definitions

**Affected**

Customers whose supplies will be interrupted or the supply area that will be interrupted.

**Business day**

Monday – Friday, excluding public holidays.

**DNAR**

Distribution Network Access Request.
Life support equipment (LSE) customer
A customer whose supply address is registered as having life support equipment on the premises, and requires notification in terms of section 7.7(2)(c) of the Code of Conduct for the Supply of Electricity to Small Use Customers – 2010 (WA) and Network Quality and Reliability of Supply Code 2005 WA.

Peer review
The endorsement, by an independent Level 0 DNAR authorised person, using ‘LSE Planned Interruption Checklist - Planning, Scoping and DNAR’ (DM# 9425367), confirming that all the items have been completed correctly and recorded correctly in the DNAR.

Proximity area
The supply area that may be interrupted due to the planned interruption (i.e. in proximity to the planned interruption area).

Proximity LSE customers
LSE customers in the proximity area that may have their supply interrupted due to the planned interruption.

Sensitive customers
This includes:
- LSE customers
- utilities (e.g. Department of Main Roads, Water Corporation)
- essential services (e.g. traffic lights)
- sensitive customers (e.g. hospitals)

Training and authorisation
A current Level 0 DNAR Authorisation issued by NOCC is required for anyone to:
- submit a DNAR for any planned interruption
- do a peer review
Instructions

Interruption scoping and planning

A DNAR is required for all planned interruptions. For guidance on completion of a DNAR see 'DNAR User Instructions' (DM# 2319398).

When requesting a planned interruption involving both the HV and LV network, only an HV DNAR is required. For more on this, see 'Work instructions for the scheduling of planned outages (customer)' (DM# 7675018).

The DNAR Requestor

The DNAR Requestor must ensure that the following tasks are completed before a DNAR is submitted.

1. When determining the best time for an outage, apply the guidelines provided in 'Work instructions for the scheduling of planned outages (customer)' (DM# 7675018).
2. Identify all affected customers (LSE customers and non-LSE customers) in the planned interruption area.
3. Conduct proximity check to identify all LSE customers in the proximity area in accordance with section 6 (Conducting a proximity check) of 'Identification and notification of customers for planned interruptions' (DM# 8224570).
4. If no LSE customers are identified as affected or in the proximity area, the DNAR Requestor must:
   a. identify the closest LSE customer outside the proximity area
   b. submit a Geoview Map showing the LSE customer to the Evidence Retention Team (ERT)
   c. record the LSE customer’s name and address in the DNAR ‘Outside proximity’ field
5. Identify any other sensitive customers affected by the planned interruption. For more information on this process see ‘Identification and notification of customers for planned interruption’, section 7 (The process for identifying and notifying other sensitive customers) (DM# 8224570).
6. Complete or arrange for the field check to be carried out and ensure that a ‘Planned interruption process field check checklist’ (DM# 10315045) is completed.
**Note:**

If the field check establishes that the network is different from the map captured in Geoview, the DNAR Requestor must ensure that the person conducting the field check notifies: [data.corrections.spida.amp@westernpower.com.au](mailto:data.corrections.spida.amp@westernpower.com.au).

7. Enter all Affected LSE customers in the planned interruption area into the 'Life Support Equipment Customers' field in the DNAR.

8. Enter all of the Proximity LSE customers into the ‘LSE Proximity’ field in the DNAR. These Proximity LSE customers must be notified of the planned interruption.


**Peer reviewer**

1. Review the checklist against the DNAR and the evidence to ensure that all requirements have been met.

2. Sign off on the checklist.
## DNAR Requestor submission summary

<table>
<thead>
<tr>
<th>Item</th>
<th>Submit no later than:</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNAR (online form)</td>
<td>10 business days before the planned interruption</td>
</tr>
</tbody>
</table>

### Evidence
Submit all evidence to ERT via email at: evidence.retention@westernpower.com.au

- ‘Planned Interruption Process – Planning, Scoping & DNAR checklist’ (DM# 9425367)
- Geoview map with planned interruption area highlighted and isolation points confirmed.
- Geoview map with the closest LSE customer outside of the proximity area identified (if required).

The following evidence is obtained via field crew:

- Copy of completed notification card with relevant information in relation to DNAR (NetExpress stock number 87068171).
- Copy of completed ‘Planned interruption process – Life support equipment customer contact confirmation’ (DM# 9610351) for any LSE affected and LSE customers in proximity.
- Card map with specific locations marked and ticked off as notified, DNAR number and date notified (see ‘Customer notification and acknowledgement’ below).
Customer notification and acknowledgement

Letter notification by Customer Assist

**Note:**
To ensure that Customer Assist is able to notify customers in time, DNAR must be submitted at least **10 business days** before planned interruptions, including where notification is being completed by card drop.

Field crew card drop notification

If the notification is through field crews completing a card drop, both field crews and Customer Assist will simultaneously attempt to obtain acknowledgement from LSE customers in the planned interruption area and any proximity LSE customers.

**Field crew**

Field crews performing the card drop must complete the following **at least six business days before the planned interruption** is due to take place:

- Card drop all customers in the planned interruption area, including LSE customers, as well as Proximity LSE customers.
  - Ensure that the planned interruption notification card is left at the customer’s address.
  - While completing the card drop, door knock all registered LSE supply addresses in the planned interruption area and proximity area to obtain a verbal or written acknowledgement of receipt of the card from the account holder and:
    - ask for the account holder by name. If the account holder is a company, trust or other legal entity, the field crew must ask for a representative.
    - record this attempt, including where field crews were unable to obtain an acknowledgement, on the ‘Planned interruption process – Life support equipment customer contact confirmation’ (DM# 9610351)

- Supply the DNAR Requestor with the following evidence:
  - copy of the completed hand card
  - printed carding map with DNAR reference and date of carding (see Figure 1 (Example of completed card map) below.)
  - evidence of any attempts to obtain acknowledgements
Preventing / Managing delays and overruns

Customer expectations with regards to the timing and duration of any planned interruptions must be effectively managed. This includes factors such as:

- accurate estimation of interruptions – interruptions must be planned accurately so that customers are able to plan appropriately
- temperature impact – if the temperature on the day of the interruption is significantly higher than the forecast, field crews must take account of this when managing affected LSE customers. Hot weather can put some LSE customers at greater risk.
- notification of delays – as soon as the field crew becomes aware that a planned interruption may overrun, the field crew must call Customer Assist on 9218 5470 to provide a revised completion time and a reason for the delay
- managing LSE customers – if the planned interruption overruns the field crew must advise the LSE customers. Customer Assist can assist with this process if required.
New LSE customer identified after DNAR submitted

Planned interruption area

If any new LSE customers are identified in the planned interruption area, ERT will confirm if the supply address received notification of the planned interruption.

If the supply address:

- **did not** receive notification and there is insufficient time to provide notice, the minor planned interruption must be cancelled
- **did** receive notification:
  1. ERT will notify Customer Assist, Switching Operator, Team Leader and the DNAR Requestor
  2. Customer Assist will attempt to confirm receipt of notification with the newly identified LSE customer
  3. on the day of the planned interruption, the field crew must door knock the LSE customer’s registered supply address to ensure that the customer is aware of the planned interruption

Proximity area

If any new LSE customer is identified in the proximity area:

1. ERT will notify the DNAR Requestor of the new LSE customer
2. the DNAR Requestor must conduct a field check to confirm if the new LSE customer will be affected by the planned interruption

If the new LSE customer:

- **cannot** be excluded from the planned interruption area, the steps outlined in the ‘Planned interruption area’ section (above) must be followed
- **can** be excluded from the planned interruption area, the DNAR Requestor must submit adequate evidence to the ERT
Cancellation / Rescheduling requirements

If a planned interruption must be cancelled or rescheduled for any reason, including on the day of the interruption, the following must be done.

- Notify NOCC, ERT and Customer Assist.
- Notify the following in person or via Customer Assist phone call:
  - Affected LSE customers
  - Proximity LSE customers
- Notify other sensitive customers by phone or mail.
- The DNAR Requestor must update the DNAR to reflect that the interruption has been cancelled, re-scoped or rescheduled.
- Restart the planned interruption scheduling and approvals process.

On the day of the interruption

The Switching Operator (SO) or site leader must have a complete list of all Affected LSE customers. This list must be included as part of the job pack and include any additional Affected LSE customers that have been identified after the DNAR was submitted.

1. The SO must complete a network confirmation. If there are any changes to the network connectivity or switching program that:
   - impact additional customers, the site leader / SO must cancel the planned interruption and notify NOCC as well as Customer Assist (9218 5470)
   - do not impact additional customers then the planned interruption can go ahead. Send all changes and mark-ups on the map to Data Corrections via email (data.corrections.spida.amp@western.powercom.au).

2. Door-knock Affected LSE customers (not Proximity LSE customers) to ensure they are aware of the planned interruption. If the LSE customer is not at home, the field crew must leave a notification card (stock no: 18842549) at the front door advising the LSE customer that the planned interruption is occurring.

3. If it is found that a previously unknown LSE customer may be affected or an LSE customer has not received adequate notification, the planned interruption must be cancelled (see ‘Cancellation / Rescheduling requirements’ above).

4. The field crews must ensure that all LSE customers who had requested generators receive them.
5. After completing the field check, the SO or site leader must call NOCC to confirm final checks. NOCC will ask whether the field check has been conducted and if all LSE customers have been notified in accordance with this procedure.

6. Once approvals are received from NOCC, the SO may commence the switching program.

7. Include checklists and, if relevant, evidence of network confirmation in the work package documentation (not to be sent to ERT).

**IMPORTANT**

If it is found **during the interruption** that a previously unknown LSE customer may be affected or has not received adequate notification then the person who makes the discovery must:

1. make sure that the LSE customer is safe from harm. Consider the option of providing an alternative source of supply.
2. notify their formal leader

The following must also be notified:

- NOCC
- Manager Risk & Compliance (9326 4535)
- ERT ([evidence.retention@westernpower.com.au](mailto:evidence.retention@westernpower.com.au)) – provide details of the discovery and what actions have been taken
## Summary of dates

The table below shows the minimum number of business days before the planned interruption date by which certain actions must be completed.

<table>
<thead>
<tr>
<th>Business days</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>DNAR Requestor notifies utilities, essential services and other sensitive load customers of planned interruption.</td>
</tr>
<tr>
<td>10</td>
<td>DNAR Requestor submits DNAR to NOCC.</td>
</tr>
<tr>
<td>10</td>
<td>DNAR Requestor requests Customer Assist to notify of planned interruption.</td>
</tr>
</tbody>
</table>
| 6             | • Field crew completes card drop to all customers, LSE customers and proximity LSE customers (not excluded by the field check).  
• Obtain acknowledgements from notified LSE customer account holders (in person). Use ‘Planned interruption process – Life support equipment customer contact confirmation’ (DM# 9610351).  
• Send the following evidence to ERT:  
  o checklists  
  o Geoview maps  
  o copy of hand card  
  o carding map (fill in DNAR reference number and carding date)  
  o evidence of attempt to gain acknowledgement |
| 1             | ERT sends SMS to notify DNAR Requestor, Switching Operator and Team Leader to advise if the interruption is approved or declined. |
| 0             | • Final field check by SO.  
• Door-knock LSE customers and warn per list.  
• Ensure that generators are provided as requested. |
References

- Transmission Substation Work Practice Manual, field instruction 5.25 (Minor Planned Interruptions (single customer outage)
- DNAR user instructions (DM# 2319398)
- Identification and notification of customers for planned interruptions (DM# 8224570)
- Planned interruption field check work instruction (DM# 10047380)
- Planned interruption process field check checklist (DM# 10315045)
- Planned Interruption Process – Planning, Scoping & DNAR checklist (DM# 9425367)
- Planned interruption process – Life support equipment customer contact confirmation (DM# 9610351)
- Work instructions for the scheduling of planned outages (customer) (DM# 7675018)
- Code of Conduct for the supply of electricity to small use customers 2010 (WA), section 7.7(2)(d)
- Network Quality and Reliability of Supply Code 2005
5.20 Dangerous and explosive goods safety

Purpose
This instruction outlines safe methods for handling, storing, transporting and disposing of dangerous and explosive goods.

Overview

- Dangerous and explosive goods include, but are not limited to:
  - compressed oxygen or other gases
  - explosives
  - flammable liquids, i.e. petrol and other fuels
  - toxic and infectious substances including organochlorine pesticides, arsenic trioxide and chlorpyrifos
  - corrosive substances such as caustic soda and hydrochloric acid
  - miscellaneous dangerous goods and articles including PCBs and asbestos
  - mineral insulating oil (for example, transformer oil).

- The relevant material safety data sheet (MSDS) for each dangerous or explosive goods must be read before it is handled, stored, transported or disposed of.

- An emergency manifest is to be stored in a weatherproof cylinder at the main entrance of all depots and worksites where dangerous and explosive goods are stored.

- The emergency manifest is to be accessible to emergency services personnel, and to include:
  - A list of the dangerous, explosive and hazardous goods stored at the depot or worksite (along with accompanying dangerous and hazardous goods codes).
  - Maximum quantities stored.
  - A map of the site (with symbols) identifying the stored goods and their locations, at the depot or worksite.
Instructions

Prerequisites

- Complete an appropriate training course before transporting dangerous and/or explosive goods.
- When working with dangerous and/or explosive goods, refer to ChemAlert or the MSDS for the required personal protective equipment, safe handling information and precautionary advice. Also refer to Field instruction 3.1 (Clothing and personal protective equipment requirements).
- A Dangerous Goods Bulk Licence is required to transport dangerous goods in bulk.
- The transporting vehicle must be:
  - licensed to transport dangerous goods in bulk (licences are issued for a period of 3 years – check currency
  - fitted with devices to secure the container(s).

Packing and storage of dangerous goods

- Make sure all packages and containers are clearly marked.
- Check all dangerous and/or explosive goods are packaged and stored in accordance with the requirements in the MSDS.
- Ensure all storage areas in environmentally sensitive areas are bunded.

Transporting dangerous goods

- Follow guidance notes for the Risk Categories 1, 2, and 3 in the document, Dangerous Goods Safety Guidance Note X01/10 – Transport of explosives on roads and at mines (Department of Mines and Petroleum).
- Ensure all transported dangerous and explosive goods are packed in a manner suitable for their safe haulage (and within the limits stated in the MSDS).
• Always carry shipping documentation when the aggregate quantity of the dangerous or explosive goods in the load is 25%, or more, of the placard load limit for the goods.

• The transporting vehicle must display appropriate signage when transporting dangerous goods in bulk, packaged dangerous goods and/or explosive goods.

• When transporting dangerous goods in bulk, make sure the emergency information panel relating to the goods is readable and clearly marked.

**Disposal of dangerous goods**

• Disposal of dangerous and explosive goods must be in accordance with the manufacturer’s recommendations.
References

- Western Power Environmental procedure for dangerous and explosive goods
- Dangerous Goods Safety Guidance Note – Transport of explosives on roads and at mines – April 2012
- Australian Dangerous Goods Code - ADG7 – October 2011
- Western Australian legislation;
- Dangerous Goods Safety Act 2004
- Dangerous Goods Safety (Explosives) Regulations 2007
- Dangerous Goods Safety (General) Regulations 2007
- Dangerous Goods Safety (Road and Rail Transport of Non-Explosives) Regulations 2007
- Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007
5.21 Use of pesticides and herbicides

Purpose

This instruction outlines the requirements when using pesticides and herbicides on or near the Western Power network.

Licensing

Certain pesticides and herbicides require that their application be carried out only by a licensed individual.

Instructions

• Follow label and material safety data sheet (MSDS) directions to identify proper safety equipment, handling and application for the pesticides and herbicides and note any health concerns.

• As appropriate, or as recommended on the label, wear the following personal protective equipment when handling, mixing, or applying pesticides and herbicides. Refer to Field instruction 3.1 (Clothing and protective personal equipment requirements) Level 0 requirements:
  • long-sleeved shirt and full-length trousers or long-sleeved coveralls
  • non-canvas or non-porous shoes or boots
  • safety glasses or face shield
  • neoprene gloves.

• Ensure respiratory protection is based upon MSDS, exposure assessment, and work practices.

• Ensure applicators adhere to the following guidelines for the caring of personal protective equipment:
  After each day’s use:
  • Launder reusable clothing.
  • Do not launder contaminated clothing together with normal household clothing.
  • Discard disposable clothing.
  • Do not handle contaminated clothing with unprotected hands.
- Wash reusable personal protective equipment with detergent and clean water.
- Dry the equipment in a clean, dry place.
- After eight (8) hours of use, or more frequently if the odour of the pesticide and herbicide can be detected while wearing the item, replace pesticide respirator cartridges.

- For several scheduled applications at different locations in a single day, disposable clothing may be reused, providing the garment is in reasonably good condition (that is, not soiled, saturated, or torn areas).

- To minimise or eliminate potential personal exposure to pesticides and herbicides through inhalation, ingestion, and/or skin absorption:
  - Never eat, drink, or smoke when handling pesticides and herbicides.
  - Remove all jewellery before handling pesticides and herbicides.
  - Wash hands with soap and water after handling, mixing or applying pesticides and herbicides.

- If an accidental exposure occurs:
  - Follow the first aid guidelines given on the manufacturer's label and/or MSDS.
  - Contact a local safety and health professional and call the Poisons Information Centre on 13 11 26.

**References**

- Guidance Note for the Assessment of Health Risks Arising from Hazardous Substances in the Workplace [NOHSC:3017(1994)]
5.22 Network incident evidence collection

Purpose

This work practice outlines how to collect evidence at the site of a network incident.

A network incident is an incident involving, caused or contributed to by assets that form part of, or support, the Western Power Network.

Note:

This work practice aligns with bushfire investigation protocols that have been agreed to between Western Power and the Western Australian agencies listed below. The agreement is documented in Western Australian Bushfire Investigation Protocol for Possible Electricity Network-related Bushfire Incidents 2012 (DM#10381667).

- Department of Environment Regulation (DER)
- Department of Fire and Emergency Services (DFES)
- EnergySafety
- Police Arson Squad
- WorkSafe

If one of these agencies takes control of a site, they are referred to as the ‘Incident Control Authority’.

Scope

This work practice applies to personnel attending the site of a network incident, who must:

- ensure site safety and security
- collect and retain evidence
- notify relevant Western Power parties.

Instructions

- Upon arrival at the site of a network incident:
  1. Determine if an Incident Control Authority has been established. If so, follow their instructions.
2. If no Incident Control Authority has been established, or when cleared by them to do so, assess the incident.

3. Inform Network Operations of your findings and follow their instructions.

4. After Network Operations has given the authority to continue with the restoration of the network:
   ○ make site safe and secure
   ○ ensure isolations have been undertaken prior to any works being carried out
   ○ extinguish any fires on or near the pole.

- If a threat to life or property exists due to the loss of power, supply restoration may be undertaken with permission from Network Operations. However, care must be taken to minimise evidence disturbance.

- Where the preservation of an incident site is required, Western Power personnel might have to arrange alternative supply to minimise the extent and duration of customers affected.

**Collecting evidence**

When restoring the network, use the PowerOn Fusion mobile application to guide your actions.

### Important

- Physical evidence of all failed assets must be retained for all network incidents where it is suspected that the asset failure resulted in an electric shock, property damage, fire, explosion, or injury of persons and livestock. For all other incidents, see Table 1 below.

- Clear, detailed and high resolution (minimum 5 megapixels (MP)) photos of broken or damaged sections and/or assets must be taken and uploaded. Special attention must be given to detail that supports your assessment of the incident’s root cause. Photos must show:
  ○ close-ups of failures and/or damage, showing the broken conductor ends (side views), accessories and pole failures as outlined in *Taking a Photo for Evidence Collection Process* (DM# 9616885)
  ○ clear consequences of the failure (e.g. bushfires, damaged equipment, dead animals).
Evidence tags must:
1. have all relevant sections completed using a permanent marker
2. be placed in the evidence information tag holder
3. attached to all pieces of physical evidence (see Figures 1–3).

Photographs of the failed asset must be of the undisturbed damage and possible cause, as well as the position in relation to the line and surroundings.

On the camera, switch on the date and time display functions, if available.

Add comments (e.g. suspected probable causes, extent of damage, vehicle and driver, witness details of overhead or underground contacts) within the PowerOn Fusion’s Trouble Call System (TCS) ‘Resource Comment’ field (if authorised), or otherwise in a notebook.

Complete required incident investigation forms electronically, whenever possible.

**Poles – to be temporarily reused for emergency repair**

- Complete an evidence tag.
- Place the evidence tag against the pole to be reused and photograph the text on the evidence tag against the pole.
- Place the evidence tag in an evidence tag information holder and attach it to the pole to be reused.
- Complete the information and actions according to the PowerOn Fusion mobile application, as far as possible.
- Leave evidence onsite safe and secure for follow-up crew to return it to the depot as one batch.

**Poles – to be replaced**

- Spray a stripe (approximately 25mm wide by 250mm long) to the upper side of the fallen pole and at the corresponding point on the other sides of the break (if possible) as described in Figure 1, below.
- Photograph orientation of the failure in relation to the conductor.
- Recover samples from the failed pole as described in Table 1, below, taking care to preserve the evidence in its as found condition.
- Complete evidence tags for every separate piece of evidence to be retained.
• Place the evidence tags against the evidence samples and photograph text of the evidence tags against the samples.

• Recover, where possible, the pole pick ID label and place in the pole evidence information tag holder.

• When replacing failed wooden poles, do not reuse the existing pole pick ID numbered label. The pole pick ID label must be retained as part of evidence retention (in the evidence information tag holder).

• The pole disc must be retained within the pole sample.

• Danger plates (carrying the rural pole number or circuit identification) may be reused on the replacement pole.

• Place the evidence tags in evidence information tag holders and attach it to the individual evidence pieces.

• Complete the information and actions according to the PowerOn Fusion mobile application.

• Transport recovered evidence samples from the failure incident to the depot’s designated evidence retention area.

• Place the evidence on hardwood pallets ready for despatch to the Evidence Retention Centre (ERC).

Figure 1: Pole evidence retention sample
Other failed network assets (e.g. oil-filled assets, conductors, insulators, accessories, stays, cable, joints) – to be replaced

- Recover sample of the failed assets as described in Table 1 below taking care to preserve the evidence in its ‘as found’ condition.
- Complete evidence tags for every separate piece of evidence to be retained.
- Place the evidence tags against the evidence samples and photograph text of the evidence tags against the samples.
- Place the evidence tags in evidence tag information holders and attach it to the individual pieces of evidence.
- Complete the information and actions according to the PowerOn Fusion mobile application.
- Transport recovered evidence samples from the incident site to the depot’s designated evidence retention area.

**Note:**

All oil-filled assets (e.g. transformers, RMUs, reclosers) must be placed in the depot’s designated oil spill recovery area and will not be transported to the ERC. These must be dealt with according to work practice 11.1 (Leaking oil-filled electrical equipment) in this manual.

- Place all other physical evidence on hardwood pallets ready for transport to the ERC. Small items must be bagged or placed in a strong cardboard box. Evidence does not need to be tied down.
Table 1: Evidence to recover at site of network incident

<table>
<thead>
<tr>
<th>Failure</th>
<th>Evidence to recover</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Physical</td>
<td>Photographic</td>
</tr>
<tr>
<td>Pole failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>At base (from ground level to 500mm above)</td>
<td>Stump and 500mm above break.</td>
<td></td>
</tr>
<tr>
<td>In reinforcing</td>
<td>Reinforcing, stump and 500mm above break.</td>
<td></td>
</tr>
<tr>
<td>Just above reinforcing</td>
<td>500mm above and below break.</td>
<td></td>
</tr>
<tr>
<td>In pole body (from 2m above ground level but below pole top)</td>
<td>500mm above and below break.</td>
<td></td>
</tr>
<tr>
<td>At pole top</td>
<td>Pole top and 500mm below break.</td>
<td></td>
</tr>
<tr>
<td>At stay bolt</td>
<td>500mm above and below break.</td>
<td></td>
</tr>
<tr>
<td>Failure</td>
<td>Evidence to recover</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td><strong>Physical</strong></td>
<td><strong>Photographic</strong></td>
</tr>
<tr>
<td>Pole burnt</td>
<td>Pole top and 500mm below burn.</td>
<td></td>
</tr>
<tr>
<td>At kingbolt or breastplate</td>
<td>Pole top and 500mm below burn.</td>
<td></td>
</tr>
<tr>
<td>At RE insulator</td>
<td>Pole top and 500mm below burn.</td>
<td></td>
</tr>
<tr>
<td>On body (from 2m above ground level but below pole top)</td>
<td>500mm above and below burn.</td>
<td>Burnt sections.</td>
</tr>
<tr>
<td>At base (from ground level to 500mm above)</td>
<td>Stump and 500mm above burn.</td>
<td></td>
</tr>
<tr>
<td>Cross-arm failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broke</td>
<td>Complete X-arm and accessories.</td>
<td>Broken sections.</td>
</tr>
<tr>
<td>Burnt at insulator</td>
<td>Complete X-arm, insulators, and accessories.</td>
<td></td>
</tr>
<tr>
<td>Burnt at breastplate</td>
<td>Complete X-arm, insulators, breastplate, and accessories.</td>
<td>Burnt sections.</td>
</tr>
<tr>
<td>Burnt at kingbolt</td>
<td>Complete X-arm, insulators, kingbolt, and accessories.</td>
<td></td>
</tr>
<tr>
<td>Failure</td>
<td>Evidence to recover</td>
<td>Notes</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Stay failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broke</td>
<td>Eye-bolt, wire and accessories.</td>
<td>Failed section, ground anchor and, if possible, the element that caused the external force, showing contact point. Only if root cause of failure is unclear and was not caused by external force (e.g. vehicle, animal).</td>
</tr>
<tr>
<td>Insulator failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failed mechanically (e.g. broke)</td>
<td>Individual insulator and accessories (e.g. tie, armour rod, pin, nut and washers).</td>
<td>Complete X-arm, riser bracket, insulators and accessories and, if possible, the element that caused the external force, showing contact point. Only if root cause of insulator failure is unclear and was not caused by external force (e.g. fauna, vegetation, mechanical, lightning).</td>
</tr>
<tr>
<td>Failed electrically (e.g. flashover, tracking)</td>
<td>Complete X-arm or riser bracket, insulators and accessories.</td>
<td>Complete X-arm, riser bracket, insulators and accessories. Must be retained. Take care not to remove deposits on, or add contaminants to, the insulator. Place insulator in plastic bag.</td>
</tr>
</tbody>
</table>
## Mains and overhead service conductor failure

<table>
<thead>
<tr>
<th>Failure</th>
<th>Evidence to recover</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conductor broke</strong></td>
<td>Max 1.5m each side of the break.</td>
<td>Broken sections</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only if not damaged by external force and when not repairable with a single joint.</td>
</tr>
<tr>
<td><strong>Conductor low</strong></td>
<td>Removed portion of conductor, max 1.5m.</td>
<td>Pre and post-tensioning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only if cut for tensioning.</td>
</tr>
<tr>
<td><strong>Conductor defective (e.g. bird caging, broken strands)</strong></td>
<td>Max 1.5m each side of defect.</td>
<td>Defective section</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only if not damaged by external force and when not repairable with a single joint.</td>
</tr>
<tr>
<td><strong>Conductor clashed</strong></td>
<td>Max 1.5m each side of clash.</td>
<td>Pre and post-repair</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Only if not repairable with a single joint.</td>
</tr>
<tr>
<td>Failure</td>
<td>Evidence to recover</td>
<td>Notes</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>---------------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overhead mains accessory failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tap</td>
<td>Removed accessories.</td>
<td></td>
</tr>
<tr>
<td>Insulator tie</td>
<td>Failed accessories.</td>
<td></td>
</tr>
<tr>
<td>Armour rod</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection clamp</td>
<td></td>
<td>Only if root cause of failure is unclear.</td>
</tr>
<tr>
<td>Inline joint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line termination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration damper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spreader</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overhead service conductor accessory failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection clamp at mains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tap wire</td>
<td>Removed accessories.</td>
<td></td>
</tr>
<tr>
<td>Mains service fuse box</td>
<td>Failed accessories.</td>
<td></td>
</tr>
<tr>
<td>Tension clamp</td>
<td></td>
<td>Only if root cause of failure is unclear.</td>
</tr>
<tr>
<td>Mains connection box</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attachment bracket</td>
<td>—</td>
<td>Do not remove from site as these are customer-owned.</td>
</tr>
<tr>
<td>Consumer pole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meter box</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Failure Evidence to recover

<table>
<thead>
<tr>
<th>Failure</th>
<th>Evidence to recover</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Physical</strong></td>
<td><strong>Photographic</strong></td>
</tr>
<tr>
<td>Underground cable failure</td>
<td>Removed cable, max 1m both sides of failure</td>
<td>Pre and post-repair, showing detail of failure, cable depths and verge position</td>
</tr>
<tr>
<td>Cable</td>
<td>Removed joint and cable, max 500mm each side of joint</td>
<td></td>
</tr>
<tr>
<td>Joint</td>
<td>Removed termination and cable, max 1m</td>
<td></td>
</tr>
<tr>
<td>Termination</td>
<td>Removed pillar</td>
<td>Pre and post-repair, showing detail of failure and verge position</td>
</tr>
<tr>
<td>LV pillar failure</td>
<td>Removed pillar</td>
<td></td>
</tr>
<tr>
<td>URD and mini-URD pillars</td>
<td>Removed pillar</td>
<td>Pre and post-repair, showing detail of failure and verge position</td>
</tr>
</tbody>
</table>

### Storing evidence

#### Photographic evidence
- Group the entire set of photos related to an incident in their original state into one folder. Ensure that each folder label includes the PowerOn Fusion TCS incident number as a minimum.
- Upload the photographic evidence folder into the appropriate directory within the ‘T:\Evidence Collection\...’ network drive.

#### Physical evidence
- Place tagged physical evidence on hardwood pallets in the depot’s designated evidence retention area.
  - The physical evidence will be strapped and moved to a central ERC by a transport contractor.
Notify the transport contractor if evidence is not removed within fifteen working days.

**Note:**

For removal of poles embedded in the ground, see work practice 6.17 (Removing embedded poles from the ground) in this manual.

![Evidence tag](image)

**Figure 2: Evidence tag**  
(Reorder number 87222421)

![Evidence information tag holder](image)

**Figure 3: Evidence information tag holder**  
(Stock code CZ5013)
Further investigation

If, in your opinion, it is in Western Power’s interest to have assets investigated or tested in greater detail:

1. ensure that the evidence is retained and made available for transfer to the ERC
2. email the following to the Asset Performance-Asset Related External Enquiries mailbox (apssr@westernpower.com.au):
   - Your name.
   - Your contact details.
   - TCS incident number.
   - Evidence tag numbers.
   - A short description of your interest in or motivation for the investigation.

References

- Evidence Collection, Retention, Custody and Disposal (DM# 1763363v14).
- Failed Asset Chain of Custody Record (DM# 13180772v1).
- Failed Pole Report Form (DM# 2292347v16).
- Failed Wood Pole Investigation Procedure (DM# 7835149v12).
- Returning wood pole evidence to the Evidence Retention Centre – Pallet loading work instruction (DM# 9726228v2).
- SOP 100 (NWI 001) Incident Notification Procedure (DM# 1315787v25).
- Taking a Photo for Evidence Collection Process (DM# 9616885v1).
- Western Australian Bushfire Investigation Protocol for Possible Electricity Network-related Bushfire Incidents 2012 (DM# 10381667v1).
- Work Practice Manual:
  - work practice 6.17 (Removing embedded poles from the ground)
  - work practice 11.1 (Leaking oil-filled electrical equipment)
  - Appendix 2 (Standard forms).
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5.23 Single phase overhead transformer internal tap change

Purpose

This instruction describes the minimum requirements for performing an internal tap change. This involves changing the internal high voltage (HV) links for raising and/or lowering the low voltage (LV) output on single phase overhead transformers on a single wire earth return overhead system.

Scope

This instruction is applicable:

- to all Network Total Workforce (NTW) employees and contractors
- when it can be confirmed that the single phase transformer to be worked on is Polychlorinated Biphenyl (PCB) free

Note:

All pole mounted single phase transformers manufactured after 1980 are PCB free and this will be stated on the transformer name plate.

Check the name plate for the date of manufacture. If the date cannot be confirmed then the transformer must be changed to a new transformer of a similar size.

Safety

- Before starting work, all team members must do an onsite risk assessment. This includes checking the condition of the pole and the transformer to confirm that the equipment is fit for purpose.
- When working on the connections to, or windings of, a transformer the transformer must be:
  - isolated from all sources of supply
  - proven de-energised
  - earthed according to the Electrical System Safety Rules (ESSR) 12.7 (Transformers)
- When working on the internal tap changer of the transformer use latex gloves (WP stock code UB0156) and goggles (WP stock code QE0071).
Do not encroach any minimum approach distances (MADs). For more on this, see field instruction 2.8 (Minimum approach distances) in this manual.

**Training and authorisation**

Only NTW employees and contractors that hold the following may perform this task:

- Certificate III (or equivalent) as a linesperson for the electrical supply industry
- current Network Authority Card

**Instructions**

1. Confirm that the weather is suitable for the task, dry windless conditions are ideal.
2. Check the load and no load voltages of the transformer’s LV output and assess the voltage range that requires changing.
3. De-energise the transformer and isolate it from all sources of supply according to the switching program.
4. Apply the program earths according to the switching program.
5. An Electrical Access Permit (EAP) must be issued and accepted by the recipient in charge before work can commence.
6. Everyone in the working party must sign on to the EAP.
7. Place a working earth as close as possible to the worksite.
8. Check the transformer name plate to confirm that the date of manufacture is after 1980 and that the transformer is PCB free (see the note in Scope).
9. Remove the transformer lid, taking care not to damage the gasket.

**Note:**

While the lid is off, make sure that the inside of the transformer is kept free of moisture and foreign bodies.

10. Change the internal spade connection so that the tap that will give the desired LV output.
11. Replace and secure the transformer lid with an appropriate gasket glue where necessary.
12. The Recipient in Charge must confirm, before relinquishing the EAP, that:
   • all staff have signed off the EAP
   • the working earth has been removed

13. All program earths must be removed according to the switching program.

14. The Switching Operator must energise the transformer.

15. Check the LV output to confirm the correct voltage has been achieved and that the consumer’s supply has been restored.

**Transformer name plate**

See Figure 1, below.

- Tap one will give the lowest LV output.
- Tap five will give the highest LV output.
- Each tap move will change the LV output by approximately 6 V. For example, moving the tap from 1 to 3 will increase the LV voltage by approximately 12 V.
Figure 1: Transformer name plate

References

- Work Practice Manual, field instruction 2.8 (Minimum approach distances)
- Electrical System Safety Rules, 12.7 (Transformers)
- Technical Note: Isolation and Earthing (DM# 7505582)
5.24 Network Authority Card (NAC)

**Purpose**

This work practice gives an overview of the rules and procedures for applying for and holding a Network Authority Card (NAC).

In the constant pursuit of zero harm for the entire Network Total Workforce (i.e. Western Power employees, contractors and alliance partners) and the general public, Western Power has formalised the minimum competencies and skill sets required to work on or near the Western Power Network.

**Scope**

This work practice applies to anyone working on a Western Power construction site, as defined in *WA Occupational Safety and Health Regulations 1996*.

**Note**

Anyone working for Western Power on a Western Power construction site must hold a current NAC.

**About the NAC**

The NAC was developed to help Western Power meet its legal responsibility and duty of care to ensure that individuals employed, and any contracted companies, are qualified and competent to carry out their responsibilities in a safe and compliant manner.

The NAC:

- is mandatory for the Network Total Workforce (NTW)
- is issued by Western Power as evidence of a person’s authority to work on or near a Western Power construction site
- provides written and photographic identification that a person has completed the Western Power Operational Induction.

All Authorised Persons carrying out work should carry their Western Power approved Worker Authorisation (i.e. NAC) on site to be presented on request. If a Worker is unable to produce his/her NAC upon request, he / she may be required to produce the card for sighting within 48 hours. For more on this see *Worker Authorisation Standard* (DM# 8214717).
Training requirements

All NAC applicants must have completed the following courses.

- **Induction for Operational Personnel**
  
  Provided by Western Power’s in-house training department, Power Training Services WA (PTS), this course can be booked online at pts-training.com.au.

- **Provide Basic Emergency life support** (HLTAID002 Provide Basic Emergency life support) or **Provide First Aid** (HLTAID003 Provide First Aid). These courses must be renewed every three years.
  
  Both courses contain the unit, **Provide Cardiopulmonary Resuscitation** (HLTAID001 Provide cardiopulmonary resuscitation), which must be renewed every 12 months.

- **Construction Induction Card** (CPCCOHS1001A) (Blue/White card)
  
  This is obtained by completing an online course provided by Worksafe WA. For more on this, visit http://www.commerce.wa.gov.au/worksafe/who-needs-undertake-construction-induction-training

Western Power also requires that during the previous 12 months, all personnel, where it is relevant to the work, must have received appropriate instruction in approved procedures for release and rescue from live electrical apparatus.

**Note**

The authorisation process, rules and requirements are the same for all workers. By granting authorisation, Western Power makes the worker and the approved Service Provider accountable. Work carried out by an Authorised Person is subject to review and assessment by Western Power.

Network Authorisation aims to ensure that any work performed on or near Western Power’s Network is carried out by suitably qualified licensed workers and in accordance with the appropriate standards and rules applicable at the time.

**Personnel not requiring a Worker Authorisation**

Personnel who do not require a Worker Authorisation must be escorted on Western Power construction sites by an Authorised Person and includes:

- personnel accessing the construction site in a non-operational capacity and staying outside of the Danger Zone of any electrical apparatus
- personnel accessing the construction site in an operational capacity with a current exemption approval from the Authorising Body.

While not requiring authorisation, the above does not remove the requirement for the persons to be appropriately trained, competent and licensed to carry out Authorised Work.

The following table is indicative of authorisation requirements and can be used as a guide when access to a construction site or a substation is required.

**Table 1: Construction site authorisation requirements**

<table>
<thead>
<tr>
<th>Type of worker</th>
<th>Authorisation requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Western Power construction site (non-substation)</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Operational Worker | • NAC; or  
• Exemption with Immediate supervision. |
| Non-Operational Worker or Visitor – as above or | • Outside danger zone – NAC; or direct supervision  
• Inside danger zone – NAC or immediate supervision |
| **Western Power substation (other than pad-mounted distribution substations)** | |
| Operational Worker | • NAC + substation entry; or  
• NAC + immediate supervision; or  
• Exemption + Immediate supervision + site induction; |
| Non-Operational Worker and/or Visitor – as above or | • Outside danger zone plus 10m allowance for inadvertent movement of any tools, equipment etc. – direct supervision + site induction  
• Inside danger zone plus 10m allowance for inadvertent movement of any tools, equipment etc. – immediate supervision + site induction |

Exemption approval may be sought as outlined in ‘Appendix C – Worker Authorisation – Guidance on Inclusions and Exclusions’ in *Worker Authorisation Standard* (DM# 8214717).
Instructions

**New application**

1. Complete the *Worker Authorisation Application Form* (DM# 8190052). The form must be signed by both applicant and their Service Provider’s details (e.g. worker’s employer). This form is also available on Western Power’s website: westernpower.com.au/network-contractors.html

2. Scan the application and email it, along with the supporting documentation listed below, to ptsadmin@pts-training.com.au

Supporting documentation:

- Evidence of current qualification and licence for each category of authorisation being applied for.
- Proof of identity, e.g. drivers licence, passport or birth certificate.
- Portrait photo in JPEG format.
- Evidence that the following NAC minimum requirements have been met:
  - Induction for Operational Personnel.
  - Provide Basic Emergency Life Support or Provided First Aid. Provide Cardiopulmonary Resuscitation may need to be included if previous is more than 12 months old.
  - Construction Induction Card.

For more on this, see the *Training requirements* section, above.

**New authorisation**

1. Complete the *Worker Authorisation Application Form* (DM# 8190052). The form must be signed by both applicant and their manager or formal leader. This form is also available on Western Power’s website: westernpower.com.au/network-contractors.html

2. Scan the application and email it, along with evidence of current qualification and licence for each category of authorisation being applied for, to: ptsadmin@pts-training.com.au

The Authorising Body will:

- Notify the applicant and his/her employer (where applicable) in writing of the outcome of the application.
If Worker Authorisation is granted, issue to the Worker an authorisation letter to allow commencement of work pending the arrival of the NAC.

**Authorisation updates and maintenance**

- Periodic refresher training or competency assessments are required for the renewal of specific authorisations.
- Application for refresher training and assessment should be made a minimum of four weeks in advance of any expiry dates.
- The card holder must provide satisfactory evidence of having attended and completed the training, along with any associated assessment, before Network Authorisations will issue an update.
- Authorisation may be suspended if the authorisation is not renewed on or before the due date.
- For any change to the following details, notify Network Authorisations at ptsadmin@pts-training.com.au:
  - Address.
  - Contact details.
  - Employer details.
  - Licence status.
  - Employment status.
  - Any other information/issue which may be relevant to, or affect, Western Power’s authorisation records.

**Exemptions**

A Service Provider seeking an exemption from the Worker Authorisation requirements under the *Workers Authorisation Standard* must apply in writing to the Authorisation Body.

- A Service Provider must provide the following in writing to the Authorising Body:
  - Name.
  - Title.
  - Location of work.
  - Authorisation type.
Reason for seeking an exemption.

Period required for the exemption.

The Authorising Body has the right to refuse any request for exemption.

The Authorising Body has the right to suspend or cancel any exemption at any time without notice.

Applicant

Supply the following information to Network Authorisations at ptsadmin@pts-training.com.au:

- Name.
- Title.
- Location of work.
- Exemption type.
- Reason for seeking an exemption.
- Period required for exemption.

Network Authorisations team

1. Network Authorisations Compliance Officer assesses the application for exemption. If there are any issues with the application, the Compliance Officer must communicate with the applicant in writing (email only) to obtain a resolution.

2. If the exemption is granted, the Compliance Officer must email the exemption to the applicant and, if necessary, their employer.

3. When working under an exemption, see Table 1, above, for the level of supervision required.

Suspension and reinstatement

Network Authorisation may be restricted or suspended (flagged). For more on this, see 14. Suspension and Reinstatement’ in Worker Authorisation Standard (DM# 8214717).

Appeals

Workers and/or Service Providers may appeal a decision by the Authorising Body to refuse, suspend or cancel a Worker Authorisation. Where an appeal is lodged,
the decision will be reviewed and assessed by the Appeals Committee, separate to the Authorising Body.

Appeals must be submitted in writing to the Authorising Body within 10 working days of the date of notification of refusal or suspension and must state the grounds for appeal.

The timeframes and process for dealing with any appeal will be determined by the Appeals Committee reviewing the appeal and will be communicated to the Worker or Service Provider making the appeal within 10 working days of receiving the appeal.

The Authorised Person will also be advised of the right to be represented by his/her union during the appeal.

For more on this see, *Worker Authorisation Standard* (DM# 8214717).

**References**

- Worker Authorisation Application Form (DM# 8190052v3A). 4 Mar 2015.
- Worker Authorisation Standard (DM# 8214717v5). 29 Apr 2015.

**Further reading**

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5.25 Minor planned interruptions (single customer outage)

Purpose

This instruction describes what operational teams must do when planning a supply interruption (planned outage) to a single customer, and is based on the Minor Planned Interruptions Procedure (DM# 9678276).

Note:

This instruction does not apply to interruptions affecting multiple customers or network faults. For more on interruptions affecting multiple customers, see field instruction 5.19 (Planned customer interruptions (affecting multiple customers)) in this manual.

Scope

This instruction must be used when supply will be interrupted to only one customer, in situations such as:

- overhead service connections (twistie program)
- overhead to underground conversions where only a single customer is affected
- live pole replacements (high voltage (HV) or low voltage (LV)) with services attached
- live LV cross-arm replacements
- live pillar replacements
- single customer / sole use transformers outages (not customer requested) where only a single customer is affected

This instruction is applicable to:

- Distribution Network Access Request (DNAR) requestors when submitting a DNAR for a minor planned or potential supply interruption. For more on this see (DNAR User Instructions (DM# 2319398)).
- operational teams when planning, scoping and performing a planned supply interruption
Definitions

Affected
Customers whose supply will be interrupted or the supply area that will be interrupted.

Business day
Monday – Friday, excluding public holidays.

DNAR
Distribution Network Access Request

Life support equipment (LSE) customer
A customer whose supply address is registered as having life support equipment on the premises, and requires notification in terms of section 7.7(2)(c) of the Code of Conduct for the Supply of Electricity to Small Use Customers – 2010 (WA) and Network Quality and Reliability of Supply Code 2005 WA.

Proximity area
The supply area that may be interrupted due to the planned interruption (i.e. in proximity to the planned outage area).

Proximity LSE customer (notifiable)
An LSE customer whose premises is in close proximity to the minor planned interruption area, is attached to a pole or pillar where work is being carried out, and their supply is not intended to be affected.

Proximity LSE customer (non-notifiable)
An LSE customer whose premises is in close proximity to the minor planned interruption area, is not attached to a pole or pillar where work is being carried out and their supply is not intended to be affected.

IMPORTANT
If in any doubt as to whether a Proximity LSE customer may be affected, treat them as notifiable.

Training and authorisation
A current Level 0 DNAR Authorisation issued by NOCC is required for anyone to submit a DNAR for any planned interruption.
Instructions

Interruption scoping and planning

A DNAR is required for all planned interruptions. For guidance on completion of a DNAR see ‘DNAR User Instructions’ (DM# 2319398)

When requesting a planned interruption involving both the HV and LV network, only an HV DNAR is required. For more on this, see ‘Work instructions for the scheduling of planned outages (customer)’ (DM# 7675018).

The DNAR Requestor

The DNAR Requestor must ensure that the following tasks are completed before a DNAR is submitted.

1. When determining the best time for an outage, apply the guidelines provided in ‘Work instructions for the scheduling of planned outages (customer)’ (DM# 7675018).

2. Identify if there are any of the following LSE customers, according to section 6 (Conducting a proximity check) of ‘Identification and notification of customers for planned interruptions’ (DM# 8224570). For an example, see Figure 1 (Example of proximity area check) and Figure 2 (Example of notifiable vs non-notifiable customers) below.
   - Affected LSE customer (i.e. in the minor interruption area)
   - Proximity LSE customer (notifiable)

Figure 1: Example of proximity area check
3. If no LSE customers are identified as affected or in the proximity area, the DNAR Requestor must:
   - identify the closest LSE customer outside the proximity area
   - submit a Geoview map showing the LSE customer to the Evidence Retention Team (ERT)
   - record the LSE customer’s name and address in the DNAR ‘Outside proximity’ field

4. Complete or arrange for the field check to be carried out to determine if the work qualifies as a ‘minor planned interruption’ as described in ‘Scope’. This includes confirming that no Proximity LSE customers will be affected by visiting the relevant LSE customer’s premises.

**Note:**

If the field check establishes that the network is different from the map captured in Geoview, the DNAR Requestor must ensure that the person conducting the field check notifies data.corrections.spida.amp@westernpower.com.au.
5. LSE customers that will be affected must be listed in the ‘Life Support Equipment Customers’ field in the DNAR.

6. Enter all of the Proximity LSE customers (notifiable) into the ‘LSE Proximity’ field in the DNAR. These Proximity LSE customers (notifiable) must be notified of the planned interruption.

**Multiple date outages**

When a date range is selected in the ‘Date and Time’ section of the DNAR (e.g. Planned Start Date: 18/02/2013; Planned Completion Date: 20/02/2013) and the minor planned interruption has identified any of the following LSE customers listed below, the DNAR Requestor must record each one in the ‘Job Description’ section of the DNAR (e.g. LSE Fred Smith 19/02/2013).

- Affected LSE customer
- Proximity LSE customer (notifiable)
- Proximity LSE customer who could not be excluded through the field check

**Note:**

For minor planned interruptions (single customer), the DNAR Requestor is **not** required to seek an independent peer review of the DNAR, evidence or checklist.
### DNAR Requestor submission summary

<table>
<thead>
<tr>
<th>Item</th>
<th>Submit no later than:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DNAR</strong> (online form)</td>
<td></td>
</tr>
<tr>
<td><strong>Evidence</strong></td>
<td></td>
</tr>
<tr>
<td>Submit all evidence to ERT via email at:</td>
<td></td>
</tr>
<tr>
<td><a href="mailto:evidence.retention@westernpower.com.au">evidence.retention@westernpower.com.au</a></td>
<td></td>
</tr>
<tr>
<td>• ‘Minor Planned Interruption Checklist – Planning,</td>
<td></td>
</tr>
<tr>
<td>Scoping &amp; DNAR’ (DM# 9707686)</td>
<td></td>
</tr>
<tr>
<td>• Geoview map with planned interruption area highlighted and</td>
<td></td>
</tr>
<tr>
<td>isolation points confirmed.</td>
<td></td>
</tr>
<tr>
<td>• Geoview map with the closest LSE customer outside of the</td>
<td></td>
</tr>
<tr>
<td>proximity area identified (if required).</td>
<td></td>
</tr>
<tr>
<td>The following evidence is obtained by the field crew:</td>
<td>five business days before the planned</td>
</tr>
<tr>
<td>• Card map with specific locations marked and ticked off as</td>
<td>interruption</td>
</tr>
<tr>
<td>notified, DNAR number and date notified (see Figure 3 (Example of</td>
<td></td>
</tr>
<tr>
<td>completed card drop) in ‘Customer notification and</td>
<td></td>
</tr>
<tr>
<td>acknowledgement’ below).</td>
<td></td>
</tr>
<tr>
<td>• Copy of completed notification card with relevant information</td>
<td></td>
</tr>
<tr>
<td>in relation to DNAR (NetExpress stock number 87068171).</td>
<td></td>
</tr>
<tr>
<td>• Copy of completed ‘Planned interruption process – Life support</td>
<td></td>
</tr>
<tr>
<td>equipment customer contact confirmation’ (DM# 9610351) for any</td>
<td></td>
</tr>
<tr>
<td>Affected LSE customers and Proximity LSE customers (notifiable).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Customer notification and acknowledgement

Note:

Customer Assist:

- **will not** notify any customers by mail for minor planned interruptions
- **will** attempt to confirm that LSE customers have been notified (see ‘Customer Assist (verbal acknowledgement)’ subsection below)

Field crew

Field crews performing the card drop must complete the following **at least five business days before the planned interruption** is due to take place:

- Card drop all customers, both LSE customers and non-LSE customers.
  - Ensure that the planned interruption notification card is left at the customer’s address.
  - While completing the card drop, door knock all Affected LSE customers and Proximity LSE customers (notifiable) to obtain a verbal or written acknowledgement of receipt of the card from the account holder and:
    - ask for the account holder by name. If the account holder is a company, trust or other legal entity, the field crew must ask for a representative.
    - record this attempt, including where field crews were unable to obtain an acknowledgement, on the ‘Customer Contact Confirmation Form’ (DM# 9610351)
- Submit evidence of the card drop to DNAR Requestor / ERT. (See ‘Field crew collection summary’ below).
Field crew evidence collection summary

The following evidence is collected by the field crew and returned to the DNAR Requestor. Alternatively, if agreed with the DNAR Requestor, the field crew may submit this evidence to ERT directly via email at: evidence.retention@westernpower.com.au

<table>
<thead>
<tr>
<th>Item</th>
<th>Submit no later than:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence</td>
<td></td>
</tr>
<tr>
<td>• Copy of completed notification card with relevant information in relation to DNAR (NetExpress stock number 87068171).</td>
<td>five business days before the planned interruption</td>
</tr>
<tr>
<td>• Card map with specific locations marked and ticked off as notified, DNAR number and date notified (see ‘Figure 3 (Example of completed card drop) below).</td>
<td></td>
</tr>
<tr>
<td>• ‘Customer Contact Confirmation Form’ (DM# 9610351) for any LSE affected and Proximity LSE customer (notifiable).</td>
<td></td>
</tr>
</tbody>
</table>

Customer Assist (verbal acknowledgement)

Customer Assist will attempt to try and obtain a verbal acknowledgement from each of the LSE customers listed below. These attempts are in addition to the field crews’ attempts as outlined above.

- A affected LSE customer
- Proximity LSE customer (notifiable)
- Proximity LSE customer who could not be excluded through the field check
Preventing / Managing delays and overruns

Customer expectations with regards to the timing and duration of any planned interruptions must be effectively managed. This includes factors such as:

- accurate estimation of interruptions – interruptions must be planned accurately so that customers are able to plan appropriately
- temperature impact – if the temperature on the day of the interruption is significantly higher than the forecast, field crews must take account of this when managing affected LSE customers. Hot weather can put some LSE customers at greater risk.
- notification of delays – as soon as the field crew becomes aware that a planned interruption may overrun, the field crew must call Customer Assist on 9218 5470 to provide a revised completion time and a reason for the delay
- managing LSE customers – if the planned interruption overruns the field crew must advise the LSE customers. Customer Assist can assist with this process if required.
New LSE customer identified after DNAR submitted

Minor planned interruption area

If any new LSE customers are identified in the minor planned interruption area, ERT will confirm if the supply address received notification of the planned interruption.

If the supply address:

- **did not** receive notification and there is insufficient time to provide notice, the minor planned interruption **must** be cancelled.
- **did** receive notification:
  1. ERT will notify DNAR Requestor, Switching Operator, Team Leader and Customer Assist of the new LSE customer.
  2. Customer Assist will attempt to confirm receipt of notification with the newly identified LSE customer.
  3. On the day of the minor planned interruption the field crew must door knock the new LSE customer’s registered supply address to ensure that the customer is aware of the minor planned interruption.

Proximity area

If any new LSE customers are identified in the proximity area:

1. ERT will notify the DNAR Requestor of the new Proximity LSE customer
2. the DNAR Requestor must conduct a field check to confirm if the new LSE customer will be affected by the planned interruption

If the new LSE customer:

- **cannot** be excluded from the planned interruption area, the steps outlined above in the ‘Minor planned interruption area’ section (above) must be followed
- **can** be excluded from the planned interruption area, the DNAR Requestor must submit adequate evidence to the ERT

Cancellation / Rescheduling requirements

If a minor planned interruption must be cancelled or rescheduled for any reason, including on the day of the interruption, the following must be done.

- Notify NOCC, ERT and Customer Assist.
• Notify the following in person or via Customer Assist phone call:
  o Affected LSE customers
  o Proximity LSE customers (notifiable)
• Notify other sensitive customers by phone or mail.
• The DNAR Requestor **must** update the DNAR to reflect that the interruption has been cancelled, rescope or rescheduled
• Restart the minor planned interruption scheduling and approvals process.

**On the day of the interruption**

The Switching Operator (SO) or site leader must have a complete list of all Affected LSE customers. This list must be included as part of the job pack and include any additional Affected LSE customers that have been identified after the DNAR was submitted.

1. The SO must complete a network confirmation. If there are any changes to the network connectivity or switching program that:
   • **impact** additional customers, the site leader / SO must cancel the minor planned interruption and notify NOCC as well as Customer Assist (9218 5470)
   • **do not impact** additional customers, the minor planned interruption can go ahead. Send all changes and mark-ups on the map to Data Corrections via email (data.corrections.spida.amp@western.power.com.au).

2. Door-knock Affected LSE customers and Proximity LSE customers (notifiable) to ensure that they are aware of the minor planned interruption. If the LSE customer is not at home, the field crew must leave a notification card (stock no: 18842549) at the front door advising the LSE customer that the planned interruption is occurring.

3. If it is found that a previously unknown LSE customer may be affected or an LSE customer has not received adequate notification, the minor planned interruption must be cancelled (see ‘Cancellation / Rescheduling requirements’ above).

4. The field crews must ensure that all LSE customers who requested generators receive them.
5. After completing the field check, the SO or site leader must call NOCC to confirm final checks. NOCC will ask whether the field check has been conducted and if all LSE customers have been notified in accordance with this procedure.

6. Once approvals are received from NOCC, the SO may commence the switching program.

7. Include checklists and, if relevant, evidence of network confirmation in the work package documentation (not to be sent to ERT).

**IMPORTANT**

If it is found **during the interruption** that a previously unknown LSE customer may be affected or has not received adequate notification then the person who makes the discovery must:

1. make sure that the LSE customer is safe from harm. Consider the option of providing an alternative source of supply.
2. notify their formal leader

The following must also be notified:

- NOCC
- Manager Risk & Compliance (9326 4535)
- ERT ([evidence.retention@westernpower.com.au](mailto:evidence.retention@westernpower.com.au)) – provide details of the discovery and what actions have been taken
Summary of dates

The table below shows the minimum number of business days before the planned interruption date by which certain actions must be completed.

<table>
<thead>
<tr>
<th>Business days</th>
<th>Action</th>
</tr>
</thead>
</table>
| 5             | • DNAR Requestor submits DNAR to NOCC.  
                • Field crew completes card drop to all customers including Affected LSE customers and Proximity LSE customers (notifiable).  
                • Obtain acknowledgements from notified LSE customer account holders (in person). Use ‘Planned interruption process – Life support equipment customer contact confirmation’ (DM# 9610351)  
                • Send the following evidence to ERT:  
                  o checklists  
                  o Geoview maps  
                  o copy of hand card  
                  o carding map (fill in DNAR reference number and carding date)  
                  o evidence of attempt to gain acknowledgement |
| 1             | ERT sends SMS to notify DNAR Requestor, Switching Operator and Team Leader to advise if the interruption is approved or declined. |
| 0             | • Final field check by SO.  
                • Door-knock LSE customers and warn per list.  
                • Ensure generators provided as requested. |
References

- DNAR user instructions (DM# 2319398)
- Identification and notification of customers for Planned Interruptions (DM# 8224570)
- Minor Planned Interruption Checklist – Planning, Scoping & DNAR (DM# 9707686)
- Minor Planned Interruptions Procedure (DM# 9678276)
- Code of Conduct for the Supply of Electricity to Small Use Customers 2012 (WA)
- Network Quality and Reliability of Supply Code 2005
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5.26 Load restraint on vehicles

Purpose

This work practice outlines the minimum requirements for restraining loads being transported on vehicles used by the Network Total Workforce (NTW).

Scope

This work practice applies when transporting equipment such as cable drums, transformers, wooden pole sections and small items on the load-carrying platform of vehicles (e.g. truck flatbed, trailer). This work practice has been developed to be in line with Load Restraint Guide – Guidelines and Performance Standards for the Safe Carriage of Loads on Road Vehicles (see the References section, below).

Instructions

• Before commencing work:
  o conduct a risk assessment. The risk assessment must include:
    — risks associated with restraining devices (refer to manufacturer's instructions)
    — risk of damage to items being tied incorrectly
    — ensuring that the centre of mass of the load is over the centre-line of the vehicle
    — the total weight, shape, length and height of the load that is to be transported
    — the route and type of road Consider the travel speed, corners, roundabouts, hills, rough surfaces and the camber of roads.
    — weather conditions
    — determining the appropriate load restraint method
    — control measures to minimise any risk during the attachment of restraints
  o ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements. For more on this, see section 3 (Personal protective equipment) in this manual.
o conduct a job briefing. For more on this, see work practice 2.28 (Job briefing process) in this manual.

The job briefing must be based on the principle that loads being transported on a vehicle must be loaded and restrained in a manner that will avoid causing injury to personnel/public and damage to property.

- Loads must be restrained on the vehicle to prevent any movement during transport. This can be achieved by ensuring that:
  - the size of the load-bearing platform (e.g. flatbed) and load-bearing capacity of the truck is appropriate to transport the load
  - the stability of the vehicle and load is maintained when accelerating/braking, turning corners, roundabouts, hills, chambers and rough roads
  - small items are transported in an enclosed container that is permanently attached to the vehicle or temporarily attached to the flatbed of the vehicle (i.e. restrained to the vehicle’s load attachment points with chains or straps)
  - large items are restrained from moving horizontally or vertically. For more on this, see the Large load restraint methods section below.

- For details on transporting specific types of loads, see the following work practices in this manual:
  - 5.6 (Transformers and metering units – handling and transport)
  - 5.7 (Transformers – return and refurbishment)
  - 5.11 (Transporting gas cylinders in a vehicle)
  - 5.16 (Removing embedded poles from the ground for test purposes)
  - 5.20 (Dangerous and explosive goods safety)
  - 11.1 (Leaking oil-filled electrical equipment)

Large load restraint methods

Cable drums – without a cradle

Restrain the cable drum using chains and wedges at both ends of the drum, as outlined below (see Figures 1 and 2, below).

- Rest wedges on a rubber mat to increase the friction between the wedges and the load-carrying surface.
- Position wedges at both ends of the drum.
• Secure the wedges together by wrapping a strap around them and tension them so that they sit snugly against the drum.

• Thread appropriately rated steel chains through the centre hole of the drum and restrain both ends of each chain to the vehicle’s load attachment points.

• Tension the chains with devices suitably rated for the load.

![Figure 1: Cable drum without a cradle – rear view](image1)

![Figure 2: Cable drum without a cradle – side view](image2)

Cable drums – in a cradle

• Rest the cradle on a rubber mat to increase the friction between the cradle and the flatbed.

• Attach the cradle to the vehicle’s load attachment points with appropriately rated steel chains (see Figures 3 and 4, below).

• Tension the chains with devices suitably rated for the load.

• Fix the cable drum in the middle of the cradle shaft and so that the cable drum is unable to rotate.

• Fix the shaft so that it is unable to rotate or move.
New power transformers – up to 865 kg

- Rest the transformer on a rubber mat (see Figures 5 and 6, below).
- Attach the transformer by its lifting lugs to the vehicle’s load attachment points using suitably rated steel chains.
- Tension the straps or chains with devices suitably rated for the load.

New power transformers – from 950 kg to 1800 kg

- Rest the transformer on a rubber mat (see Figures 7 and 8, below).
- Attach the by its restraining lugs to the vehicle’s load attachment points using suitably rated steel chains.
- Tension the chains with devices suitably rated for the load.
Current and voltage transformers – without a crate

- Rest the transformer on a rubber mat.
- Attach the transformer by its restraining/lifting lugs to the vehicle’s load attachment points using suitably rated steel chains.
- Tension the chains with devices suitably rated for the load.

Current and voltage transformers – in a crate

- Attach the transformer’s crate to the vehicle’s load attachment points by passing appropriately rated straps/chains through the gaps of the crate from one side to the other.
- Position rubber mats between the strap/chain and the timber slats of the crate to prevent damage (see Figure 9, below).
- Tension the straps/chains with devices suitably rated for the load.
Pole sections

- Lay square/rectangular cross-sectioned support timbers across the vehicle’s flatbed so that when the pole sections are loaded:
  - one support timber will be under each end of the longest pole section
  - one support timber will be under the middle of the longest pole section
  - the support timbers do not protrude beyond the edge

See Figures 10 to 12, below.

Figure 10: Pole resting on support timbers

- Each pole section must be resting on at least two support timbers, or resting on top of a pole section that is resting on at least two support timbers. For pole sections longer than two metres, use three or more support timbers.
- Place the pole sections onto the support timbers starting from one side of the flatbed of the vehicle.
- Load the heaviest section of the pole close to the headboard of the flatbed.
- Use at least two appropriately rated webbing ratchet straps to restrain pole sections. For pole sections longer than two metres, use three or more webbing ratchet-straps.
- Place ratchet-straps at approximately equal distances along the length of the load.
References

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 5.6 (Transformers and metering units – handling and transport)
  - work practice 5.7 (Transformers – return and refurbishment)
  - work practice 5.11 (Transporting gas cylinders in a vehicle)
  - work practice 5.16 (Removing embedded poles from the ground for test purposes)
  - work practice 5.20 (Dangerous and explosive goods safety)
  - work practice 11.1 (Leaking oil-filled electrical equipment)

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6.1 LV overhead work

Purpose

This work practice outlines the minimum requirements for working on low voltage (LV) overhead electrical apparatus.

Authorisation

Personnel carrying out LV overhead work must:

- possess a current Network Authority Card (NAC) with current authorisation to perform the work tasks
- have a ‘Low voltage overhead and underground’ (LOU) switching authorisation if required to perform LV switching activities.

Instructions

- Planned interruptions must follow the requirements set out in the following work practices in this manual:
  - 5.19 (Planned interruptions (multi customer outage))
  - 5.25 (Minor planned interruptions – single customer).
- If the LV network is to be interconnected, reference must be made to work practice 6.22 (Interconnecting LV overhead networks) in this manual.

Before commencing work:

- a risk assessment and job briefing must be conducted. For more on this, see work practice 2.28 (Job briefing process) in this manual.
- all personnel must comply with the minimum personal protective equipment (PPE) requirements for the task. For more on this, see section 3 (Personal protective equipment) in this manual.

Work on energised LV overhead apparatus

- Applicable LV live work procedures must be followed.
- Personnel must wear rated insulated gloves with outer protectors. For more on this, see section 3 (Personal protective equipment) in this manual.
Work on de-energised LV overhead apparatus

- De-energised LV apparatus that is not short-circuited must be treated as energised. This means that:
  - no shorting leads are applied
  - an Electrical Access Permit (EAP) cannot be issued.
- Applicable tags must be applied at any switching points that have changed status for the purpose of this work. For more on this, see work practice 2.15 (Network tags) in this manual.
- Applicable LV live work procedures must be followed.
- Personnel must wear rated insulated gloves with outer protectors. For more on this, see section 3 (Personal protective equipment) in this manual.

Work on de-energised and short circuited LV overhead apparatus

- De-energised and short-circuited LV overhead apparatus must:
  - be short-circuited using approved shorting equipment. For more on this, see work practice 2.10 (Use and management of portable overhead earthing / short circuiting equipment) in this manual.
  - be worked on under an EAP
  - have ‘Do not operate’ danger tags attached at points of isolation and on shorting equipment.
- Where pole-mounted LV disconnectors are used as points of isolation:
  - fitting of barriers is optional
  - fit a high visibility pole wrap with the red side visible and a ‘Do Not Operate’ danger tag to the pole (see Figure 1, below).

![Figure 1: High visibility pole wrap (stock code CZ5014)](image)
• For more information on pole wraps, refer to work practice 2.15 (Network tags) in this manual.

• Include all isolation points and the location of pole wraps and tags in the relevant switching program.

• Before installing LV shorting leads, ensure that the apparatus is proved de-energised using an approved tester.

**Important**

• **Do not** use a proximity tester to test de-energised LV apparatus. Only use an approved tester. For more on this, see work practice 5.4 (Instruments – testing and calibration) in this manual.

• Due to line capacitors holding a charge after isolation, each line capacitor must be discharged to earth before fitting any LV shorting leads.

• Shorting leads must be applied between the point of work and all sources of LV supply, including street light circuits in the work area.

• Shorting leads must be installed as close as possible to the worksite and must be clearly visible from the worksite.

• ‘Do not operate’ danger tags must be attached to shorting leads.

• Isolate street light circuits within the work area at the street light control box by removing the fuses and fitting a ‘Do Not Operate’ danger tag.

**Out-of-use LV**

The Operating Authority may declare electrical apparatus out-of-use if a section of conductor is removed to create a gap of at least 150mm from each source of electrical supply (fuses, links, switches or disconnectors are not regarded as a length of conductor). For more on this see section ‘12.1 Electrical apparatus and conductors declared out of use’ in the ESSR.

**References**


• Work Practice Manual:
  o work practice 2.10 (Use and management of portable overhead earthing / short circuiting equipment)
  o work practice 2.15 (Network tags)
○ work practice 2.28 (Job briefing process)
○ section 3 (Personal protective equipment)
○ work practice 5.4 (Instruments – testing and calibration)
○ work practice 5.19 (Planned interruptions (multi-customer outage))
○ work practice 5.25 (Minor planned interruptions (single customer outage))
○ work practice 6.22 (Interconnecting LV overhead networks).
6.2 Poles – assessment and support before climbing or changing load

Purpose

This work practice outlines the requirements for assessing and supporting poles prior to climbing or altering the load on the Western Power poles, redundant poles and consumer poles. This is done to prevent pole failure during a task that involves changing or altering the load on a pole.

Instructions

Western Power poles

The steps in this section are presented in the order that they must be completed:

1. Western Power pole data collection during pre-job planning
2. Worksite assessment of Western Power network poles
3. Supporting poles (if required)

1. Western Power pole data collection during pre-job planning

Pre-job planning should include as much data as possible about the pole or poles to help determine the conditions before going to the worksite. This information will help the workers decide the minimum requirements for pole support.

Use Western Power data systems, including SPIDAweb, to gather the information, listed below, on the existing work pole and adjacent poles.

- Age
- Type
- kN rating
- Equipment on the pole
- Current defects
- Current serviceability index (SI) calculation
- Photos

Include relevant information on the risk assessment.
2. Worksite assessment of Western Power network poles

On arrival at the worksite, before work commences, the work team must thoroughly assess the pole and any existing supports. This includes using the data collected during the pre-job planning stage and other factors found onsite.

Inspect the pole to be worked on and the poles either side to determine if the poles need to be supported.

All relevant information gathered must be included on the risk assessment, including:

- any pre-job planning information provided in the scope of work
- condition of the pole
- type of work to be undertaken (i.e. under an Electrical Access Permit (EAP) or by using live work methods)
- hardware
- stays
- reinforcement
- condition of the aerial conductors
- period that the pole was last inspected (see Table 1, below)

**Note:**

If excavating near to or around the foundations of any pole for purposes other than pole assessment, a risk assessment must be conducted to determine what additional supports are required to prevent the pole becoming unstable.

**Inspection test periods and plug colours**

The colour of the treatment hole plugs change mid-year on a four-year testing cycle. There will be two different colours used in the year that the colours change over. See Table 1 below for the plug colours used since 1994.
Table 1: Inspection plug colours

<table>
<thead>
<tr>
<th>Year cycle</th>
<th>Plug colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994 to June 1998</td>
<td>Black</td>
</tr>
<tr>
<td>July 1998 to June 2002</td>
<td>Grey</td>
</tr>
<tr>
<td>July 2002 to June 2006</td>
<td>White</td>
</tr>
<tr>
<td>July 2006 to June 2010</td>
<td>Brown</td>
</tr>
<tr>
<td>July 2010 to June 2014</td>
<td>Green</td>
</tr>
<tr>
<td>July 2014 to June 2018</td>
<td>Blue</td>
</tr>
<tr>
<td>QA inspectors*</td>
<td>Red</td>
</tr>
</tbody>
</table>

* There will only ever be one red Quality Assurance (QA) inspector’s plug per pole. All other inspection plugs indicate the period that the inspection was completed.

Pole manufacture disc details

The details on the pole manufacture disc provide some basic information, as shown in Figures 1 and 2, below.

![Figure 1: Old series pole disc](image)

**KO**: Treatment Plant Identification
**X**: Denotes pole treated with

**BA**: Timber species
**11**: Length in metres
**6**: Rating in Kilonewtons

**Charge or Batch Number**: 486 B
**Month and Year of Treatment or Inspection**: 10 86
Condemned poles and poles to be reinforced

Poles may have signs or markings on them which identify them as condemned or requiring reinforcement. Both conditions must be inspected and included in pre-job planning and the onsite risk assessment.

Condemned poles

Condemned poles can be identified by the following:

- painted red band
- two white painted bands
- sign displaying two horizontal white bands with a grey centre (see Figure 3, below).

Do not excavate around condemned poles unless the pole has been or is supported, as the pole may become unstable.

Condemned poles should be replaced. If the pole cannot be replaced at the time, it must be supported as described in step 3 Supporting poles (if required) and Table 2, below. The associated hazard and control measures must be recorded on the risk assessment.
Poles that require reinforcing

Poles to be reinforced or require additional reinforcing are identified by the following:

- painted white slash
- sign that consists of one white band (see Figure 4, below).

Do not excavate around poles that require reinforcing unless the pole has been or is supported, as the pole may become unstable.

These poles must be supported as described in step 3. Supporting poles (if required) and Table 2, below.

Pole assessment

Look for the following signs of damage and decay relevant to the material that the pole and supports are made of. Additional supports must be fitted if signs of damage, age and decay are identified as listed below.
Concrete poles

Above and below ground line, check for:
- external signs of failure (e.g. cracks in concrete)
- swelling of concrete (e.g. cracks and rusted reinforcement steel are visible)
- damage caused by impact from a vehicle

**Note:**

If no concrete is evident around the base of the pole, excavate the earth from around the pole to a depth of 300 mm and assess for the signs above.

Steel poles

Above and below ground line, check for:
- flaking rust
- rust holes in pole wall
- distortion of the pole wall
- pole not vertical due to impact
- loose or heavily rusted footing bolts

A minimum of 80% good steel is required for the pole to pass the assessment.

**Note:**

If no concrete is evident around the base of the pole, excavate the earth from around the pole to a depth of 300 mm and assess for the signs above.

Wood poles

Above the ground line, check for:
- wood rot
- insect activity
- external damage
- large cracks or splitting
- signs of burning or lightning strikes

If the pole is reinforced, the reinforcement must have a minimum of 80% good steel for it to be used as a support.
Below ground line, check for:

- If the pole is reinforced, dig down 300 mm and check the reinforcement for flaking rust or corrosion. A minimum of 80% good steel is required to be used as a support.
- If the pole is not reinforced, dig down 300 mm and check the pole for:
  - wood rot
  - termite damage
  - large cracks or splitting
- Untreated pole:
  - less than five years old – the pole must be supported only if it fails the assessment
  - older than five years – Pole must be supported (check any existing supports and add additional supports where required)
- Treated pole:
  - less than ten years old – the pole must be supported only if it fails the assessment
  - older than ten years – Pole must be supported (check any existing supports and add additional supports where required)

Existing supports

Check existing supports for the items listed below.

- Stays:
  - Stay wire strands and preform wraps broken or badly rusted
  - Stay rod and fitting broken or rusted
  - Dig down 300 mm and check the stay rod for flaking rust corrosion. A minimum of 80% good steel is required to be used as a support.
- Approved steel reinforcement (see Figure 5 for example):
  - Flaking rust or excessive signs of corrosion
  - Damaged or loose nail fittings
- Legacy steel reinforcing (e.g. H-irons and angle-irons)
  - Flaking rust or excessive signs of corrosion (see Figure 6, below)
  - Damaged or loose fittings
Pole and reinforcement have been inspected as part of the recent pole inspection program and an SI calculation carried out (green inspection plug or more recent)

The requirement for additional reinforcement has been identified (e.g. white band on pole)

- Overhead lines:
  - Condition of conductors
  - Condition of binding and dead end wraps
  - Condition of supporting insulators
  - Broken or damaged fittings

**Note:**

The following must not be used as overhead supports:

- Service cores
- Copper conductor sizes of 7/16 or smaller

---

**Figure 5: UAM nail**

**Figure 6: Excessive corrosion on H irons**
3. Supporting poles (if required)

Four-way pole support utilising existing aerial supports

Existing aerial conductors and stay wires that have passed the site inspection can be utilised as pole supports. The pole must be supported four ways with the supports at approximately 90° to each other.

**Note:**

Aerial service cores to houses must not to be considered or used as a pole support or stay.

Where additional supports are required, poles can be supported by utilising temporary and permanent mechanical supports. Table 2, below, outlines the approved Western Power network pole supports.

**Table 2: Approved Western Power network temporary and permanent mechanical pole supports**

<table>
<thead>
<tr>
<th>Supports</th>
<th>Pole type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicle-mounted 10 tonne crane</strong></td>
<td>All distribution poles</td>
</tr>
<tr>
<td>Fit slings or chains and take up slack so that the pole cannot overbalance or fall.</td>
<td></td>
</tr>
<tr>
<td><strong>Vehicle-mounted pole holder</strong></td>
<td>Distribution poles:</td>
</tr>
<tr>
<td>(i.e. Kevrek with pole grab)</td>
<td>• without a transformer</td>
</tr>
<tr>
<td></td>
<td>• maximum height of 11 m</td>
</tr>
<tr>
<td><strong>Temporary stays</strong></td>
<td>All distribution poles</td>
</tr>
<tr>
<td>Minimum of three temporary stays, which must be:</td>
<td></td>
</tr>
<tr>
<td>• evenly spaced around the pole with minimum gauge 19/2.00</td>
<td></td>
</tr>
<tr>
<td>• securely attached above the pole point of balance</td>
<td></td>
</tr>
<tr>
<td>• anchored to one of the following:</td>
<td></td>
</tr>
<tr>
<td>o concrete blocks on the ground</td>
<td></td>
</tr>
<tr>
<td>o screw anchors</td>
<td></td>
</tr>
</tbody>
</table>
Supports | Pole type
--- | ---
**Temporary pole support device**
One to four supports, depending on pole integrity, type and condition of existing supports. For more on this, see work practice 6.3 (Poles - temporary support device) in this manual. | All wooden distribution poles

**Approved Permanent steel reinforcing**
Subject to passing site inspection | All wooden poles

**Legacy steel reinforcing**
- Subject to passing site inspection
- Within SI inspection (green or more recent plug) | All wooden distribution poles

**Legacy steel reinforcing**
- Minimum of 3 H-irons
- Subject to passing site inspection | All wooden transmission poles

**Minimum 10 tonne crane with pole grab** | All wooden transmission poles

**Redundant poles (Western Power poles only)**
Poles that are no longer part of the network must be:
- removed from the ground in accordance with work practice 6.17 (Removing embedded poles from the ground) in this manual
- made safe:
  - condemned poles – before leaving the worksite
  - all other poles – within one month

All poles must be recovered from the work site within three months of the pole being removed from the ground.

**Consumer poles**

Consumer poles (also known as customer poles) must now all comply with the same requirements in *Technical Specification - Consumer Service Steel Pole* (DM# 12194142). Prior to the establishment of these requirements, different types
of consumer poles were used on customer properties. Consumer poles are not the property of Western Power and so they are not routinely inspected or maintained by Western Power. Due to this, the risk of pole failure is high.

When working on or carrying out work that affects a consumer pole that does not meet the requirements, the pole must be replaced as outlined in work practice 8.5 (Overhead service cables – installation and replacement) in this manual. Poles which do not meet the requirements include:

- 150 mm x 150 mm wooden poles
- steel pipe tripod poles
- poles that require relocation due to cross boundary or water feature
- poles in a defective state

New consumer poles must meet and be installed in accordance with Technical Specification - Consumer Service Steel Pole (DM# 12194142).

**Supporting consumer poles**

**Altering the load on consumer poles**

- Assess the consumer pole for deterioration above and below ground level as outlined in the Consumer pole assessment prior to altering the load section, below.

- Do not change or alter the load on consumer poles that do not meet the current requirements, as the risk of failure is high. For example, the following must not have their load altered:
  - 150 mm x 150 mm wooden poles
  - steel pipe tripod poles

- If the pole is assessed and is considered safe with no structural defects:
  1. the risk assessment must be updated to confirm that the pole:
     - has been assessed
     - has no defects
     - is safe and stable
  2. a drop zone must be:
     - established around the consumer pole before altering the load on the pole
3. the consumer pole can then have its load altered without the pole being supported

- If the pole cannot be assessed below ground level or is determined to be unsafe, then the pole must be supported by one of the methods in Table 3.

**Consumer pole assessment prior to altering the load**

Look for the following signs of damage depending on what material the pole is made of. If any of the items listed below are identified, the pole must be supported or changed. For more information, see Tables 2 and 3 in work practice 8.5 (Overhead service cables – installation and replacement) in this manual.

- **Steel poles**
  - Flaking rust
  - Rust holes in pole wall
  - Distortion of the pole wall
  - Pole not vertical

**Note**

If no concrete is evident around the base of a steel pole, excavate the earth from around the pole to a depth of 300 mm and assess for the signs mentioned above.

- **Wood poles**
  - Above the ground line:
    - wood rot (by performing a visual inspection and hammer sound test)
    - insect activity
    - termite damage
    - external damage
    - cracks and splitting
    - signs of burning or lightning strikes
  - Below ground line, dig down 300 mm and check pole for:
    - wood rot (by performing a visual inspection and hammer sound test)
    - termite damage
    - insect activity
Climbing consumer poles

Consumer poles can be climbed on the initial installation once the concrete has cured (this takes approximately three days). After the initial installation, consumer poles must be accessed by one of the following methods:

- EWP
- self-supporting ladder
- scaffolding

If the above three methods cannot be used – a ladder may be used, but only if:

- the pole meets the consumer pole requirements
- the pole is supported by one of the methods in Table 3, below
- the risk assessment has been updated to include:
  - the reasons why the normal methods could not be used
  - pole condition and suitability of the temporary supports and any associated anchors

Table 3: Approved consumer pole supports

<table>
<thead>
<tr>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicle-mounted crane</strong></td>
</tr>
<tr>
<td>• Fit slings or chains and take up slack above the point of balance or</td>
</tr>
<tr>
<td>• Use a pole grab so that the pole cannot overbalance or fall.</td>
</tr>
<tr>
<td><strong>Vehicle-mounted pole holder</strong> (i.e. Kevrek with pole grab)</td>
</tr>
<tr>
<td><strong>Temporary stays</strong></td>
</tr>
<tr>
<td>Minimum of three temporary stays, which must be:</td>
</tr>
<tr>
<td>• evenly spaced around the pole</td>
</tr>
<tr>
<td>• securely attached above the pole point of balance</td>
</tr>
<tr>
<td>• securely anchored using screw anchors or concrete blocks</td>
</tr>
</tbody>
</table>
References

- Work Practice Manual, work practices:
  - 2.3 (Height safety). Rev 5, Apr 2014.
  - 6.17 (Removing embedded poles from the ground). Rev 3, Jul 2014.
- Technical Specification - Consumer Service Steel Pole (DM# 12194142)

Further reading

- Bundled Pole Inspection Operational Instructions (DM# 9406005)
- AS 3000:2007 Electrical installations (known as the Australian/New Zealand Wiring Rules), Appendix D (Minimum sizes of posts, poles and struts for aerial line conductors)
### Purpose

This work practice outlines the requirements for assessing the need for and installing a temporary pole support device prior to climbing or altering the load on a pole. This is done in order to prevent pole failure while carrying out work that involves altering the load on the pole.

This device can also be used to support temporary and broken poles prior to them being replaced.

### Scope

This work practice applies to the installation of temporary pole support devices:

- when deemed necessary according to the assessment outlined in work practice 6.2 (Poles – assessment and support before climbing or changing load) in this manual
- where a pole is broken or damaged and pending its replacement.

The temporary support device is only intended as a short-term temporary solution and should never be considered as a long-term fix.

### Equipment

Prior to installing a temporary pole support, check all components of the support device for any damage or defects. Tag any defective items out-of-service and seek a replacement.

The temporary pole support components include:

- self-levelling support beam head plate with worm drive (see Figure 1)
- securing chain for head plate
- self-levelling footplate (see Figure 2)
- securing chain for footplate
- footplate securing ground anchor pins (600mm)
- rated Wagners beam.
Instructions

Before commencing work:

- conduct a risk assessment and job briefing. For more on this, see:
  - the *Risk assessment* section, below
  - work practice 2.28 (Job briefing process) in this manual.
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual).

When temporary pole support devices are left in place then the worksite will need to be made safe using an approved fence or barrier. These must be checked weekly to ensure the condition of the supports and the effectiveness of the barrier or fencing. For more on this, see the *Fencing and barriers for temporary pole supports* section, below.

Risk assessment

If the temporary supports are to be left unattended, the risk assessment must include the following:

- Can they be used as a climbing aid?
- Will they become a hazard to public safety?
- What is the public access and proximity to schools and parks?
- Is vehicle access required due to driveways and roads?
- Are they visible to farm livestock and plant, e.g. harvesters?
- Are the ground conditions suitable where the supports are to be installed?

If the above risk factors or any other risks identified during the site risk assessment cannot be controlled, alternative pole support methods must be used as outlined in work practice 6.2 (Poles – assessment and support before climbing or changing load) in this manual.

Use of temporary pole support devices – timeframes

When used to support a damaged pole, every effort must be made to replace the damaged pole within five working days of the temporary support being installed. When temporary supports are left in place, the worksite must be:

- made safe using an approved fence or barrier. For more on this, see work practice 2.21 (Traffic management) in this manual.
• monitored weekly to ensure that the fence, barrier and temporary support remains effective.

Where weather or land conditions restrict access and so prevent replacement of the pole within five working days then temporary supports may only be left in place for a maximum of one month. An approved reinforcing nail must be fitted as a temporary fix if the pole cannot be replaced within one month of the temporary supports being fitted.

**Assessment and selection of temporary support device**

An assessment of the pole and its supports must be carried out in accordance with work practice 6.2 (Poles – assessment and support before climbing or changing load) in this manual.

The temporary pole support device must not to be used on poles that show signs of damage above the level of the temporary support device.

**Partially supported poles**

Where the pole is supported two ways by the overhead conductors, e.g. in-line intermediate or in-line strain, fit two temporary supports at 90° to the line.

Where the pole is supported three ways by the overhead conductors and a back stay (angle pole), install one temporary pole support opposite the stay, bisecting the inner angle.

**Condemned poles or poles that require reinforcing**

Fit two to four temporary supports. The amount and the position of the temporary supports required will be dependent on the integrity and position of the existing supports on the pole.

If there is any doubt regarding the integrity of any of the existing pole supports, then additional temporary pole supports must be installed in parallel to provide reinforcement.

**Temporary or broken poles that are not embedded in the ground**

Fit four temporary supports at 90° from each other.

Every effort must be made to embed temporary or broken poles in the ground at least 300mm. Always ensure minimum ground clearances of conductors are maintained as outlined in work practice 6.8 (Conductor clearances) in this manual.
Every effort must be made to replace the damaged pole within five working days of
the temporary supports being fitted.

**Installing temporary pole supports**

The following steps outline how to erect temporary pole supports.

1. Place each support against the pole at approximately a 45° angle to the pole. This angle may be reduced or increased slightly to allow for terrain and obstacles such as fences, however the supports need to be installed as near to 45° as possible.

2. At the top of each support, wrap the securing chain around the pole using a stick and secure in the head plate.

3. Tighten the securing chains by using a stick and rotating the worm drive to tighten each chain firmly to the pole (see Figure 1, below).

![Figure 1: Tightening chain against pole on a temporary pole support](image)

4. At ground level, if required, insert a coach bolt opposite each support beam at approximately 300mm above ground level or where good wood is found. This is to prevent the footplate securing chain from slipping down onto rotten wood.

5. Lock chains into the restraining mechanism on the support footplate (see Figure 2, below).
6. Wrap the securing chain one complete turn around the base of the pole at approximately 300mm above ground level, ensuring that it is tightened against good wood (see Figure 3, below) and then return to the same footplate. Place chain in the second footplate chain retainer. These securing chains prevent the footplate from sliding outwards.

7. Ensure that the chain is as tight possible when connecting to the footplate.
8. Before installing ground anchor pins, visually inspect the immediate area for underground assets and check Dial Before You Dig (DBYD) plans, if required.

9. Fit at least two 600mm ground anchor pins at an angle of approximately 45° through the footplate in the holes provided to ensure that the foot plate does not move. Where possible, the pins should cross each other in the ground to provide greater resistance and stability.

- If the ground conditions are poor, longer or additional ground anchor pins can be added to secure the footplate. Always check DBYD plans prior to installing longer pins.
- Where ground conditions are very soft, install vehicle pads (the type that have holes in them) under the footplate to increase the surface area of the foot.

**Fencing and barriers for temporary pole supports**

If it is deemed necessary to leave temporary pole supports on site for extended periods (maximum of one month), erect an approved temporary fence or barrier to prevent entry. For more on this, see work practice 2.21 (Traffic management) in this manual. The type of fencing or barrier will need to be selected based on the level of risk (e.g. if the support can be used as a climbing aid). While the temporary pole supports, barriers or fencing are in place they must be checked weekly to ensure the condition of the supports and the effectiveness of the barrier or fencing.

**References**

- Work Practice Manual:
  - work practice 2.21 (Traffic management). Rev 2, Mar 13
  - section 3 (Personal protective equipment)
  - work practice 6.2 (Poles – assessment and support before climbing or changing load). Rev 13, May 15
  - work practice 6.8 (Conductor clearances). Rev 4, May 15
6.4 Reinforcing of wood poles

Purpose

This work practice outlines the minimum requirements for reinforcing wood poles on Western Power’s overhead electrical network.

Scope

This work practice is applicable to all Network Total Workforce (NTW) teams who are required to conduct wood pole reinforcing.

This work practice covers the following:

- Wood distribution poles, voltages up to and including 33kV.
- Wood transmission poles, voltages from 66kV up to and including 132kV.

Training and authorisation

Anyone working on or near Western Power assets must be trained and authorised for the task.

All personnel conducting pole reinforcing work must:

- possess a valid Network Authority Card (NAC)
- have been trained and deemed competent to perform the task
- be competent in the use of all tools and equipment associated with this work.

They must also have completed the following Power Training Services WA training courses:

- Working safely near Western Power’s operational assets.
- Power system familiarisation for non-technical people.

Crane operators, used to support poles, must possess:

- a valid NAC
- a current high risk licence for the size and type of crane being used.

Note:

A Recipient in Charge (RIC) must be onsite when a Vicinity Authority (VA) is required to carry out the task.
Safety

- A risk assessment must be performed prior to the commencement of work. For more on this see work practice 2.28 (Job briefing process) in this manual. The following risks must be considered as part of the risk assessment:
  - Underground services.
  - Drop zone.
  - Clearances to live conductors of apparatus (danger zone). For more on this see section 6.1 ‘Danger zone’ in the *Electrical System Safety Rules*.
  - Condition of pole, conductors and pole attachments.
  - Public access to the worksite.
  - Traffic.
  - Weather conditions and wind speed.
  - Use of motorised tools and equipment.
  - Fire Danger Rating for the day.

- All pole reinforcing work must be cancelled when a Total Fire Ban has been issued for the area where the reinforcing is to take place.

- Do not carry out reinforcing when wind speeds are 45km/h or greater.

- If a pole and/or any of its attachments are identified as unsafe and pose a risk to public safety then follow these steps:
  1. Secure the area to ensure public safety.
  2. Contact Western Power on 13 13 51.
  3. Remain onsite to ensure public safety until the site can be handed over to a Western Power representative.

- Any damage or defects identified during the risk assessment must be recorded and reported. The installation of the reinforcing must not go ahead unless deemed safe to continue. If in any doubt, do not proceed.

- Welding, angle grinders and other spark producing tools are not permitted for this work. Reciprocating saws or other non-spark producing tools must be used for tasks such as removing legacy steel work.

- If an incident occurs that results in any of the following, then the worker(s) must notify Western Power immediately:
  - Fault or damage to Western Power assets.
  - Damage to customer property.
o An incident that results in an injury to a worker, workers compensation claim or public liability claim

Permits

When an Electrical Access Permit (EAP) or VA is issued all personnel involved with the task must have signed and be in agreement with the permit, prior to any work commencing.

Electrical Access Permit

The overhead supply, or supplies, must be isolated, earthed and an EAP issued if the pre-job planning or the risk assessment identifies conditions such as:

- possible failure of energised electrical equipment on the pole
- where the danger zone will be breached
- older style cast iron cable terminations, as shown in Figure 1.

![Figure 1: Older style cast iron cable termination box](image)

Vicinity Authority

A VA permit is mandatory in the following situations:

- All transmission poles (voltages of 66kV to 132kV).
- A distribution pole when it has an energised HV underground cable termination attached.
- Where a distribution pole has between 30mm and 50mm good wood at ground level and is not supported using an approved support method, as described in Table 1.
Safety observer

The person-in-charge must assign a competent safety observer at the worksite if there is a risk of breaching the danger zone when installing the pole reinforcing. The safety observer may be a team member who is not needed for the current task. They must:

- be specifically instructed in their duties when assigned to the job
- be positioned with an unobstructed view of the distances between any part of a person, tool, plant and/or equipment and any energised conductors or apparatus
- must have the means to alert the working party of a hazardous situation, such as a whistle.

For more on this see work practice 2.2 (Safety observer role) in this manual.

Instructions

There are currently only two types of wood pole reinforcement approved for use on Western Power’s network:

- UAM nail (see Figure 2).
- Osmo Truss reinforcing system (see Figure 3).

These instructions outline the required actions that must be taken before and during the installation of wood pole reinforcing.

- The pole that is to be reinforced must have been inspected using the Mobile Inspector (MI) package and deemed suitable for reinforcing against the Serviceability Index (SI) prior to reinforcing.
- Poles must be supported prior to installing the reinforcing in the following situations:
  - Installing a UAM nail.
  - Using the tractor hammer unit to install reinforcing.
  - The good wood reading from the MI and SI reports is between 50mm and 30mm at ground level and a VA has not been issued.
  - The good wood reading from the MI and SI reports is below 30mm at ground level.
  - The pole has attachments such as transformers, reclosers, load-break switches, etc.
Existing reinforcing is to be removed prior to installing the new reinforcing.

If unsure about the structural integrity of the pole following the site risk assessment.

- If the pole requires supporting, it must be supported prior to commencing the pole reinforcing using an approved support method, as described in Table 1.
  - Supporting methods must not interfere with any attachments on the pole (e.g. transformers, signage, lights, cables and services).

- If vegetation is to be cleared to gain access to the pole, before and after photos must be taken and stored for future reference, if required. For more on this refer to Supply and installation of wood pole reinforcing systems (DM# 10750705).

- Pothole by hand to a depth of 700mm down the side of the pole, where the reinforcing steel is to be installed, to ensure that there are no underground assets.

- The installation of the reinforcing system must never impact on existing services and cables above or below the ground line. Services and cables must:
  - be located by hand digging prior to commencing reinforcement. For more on this, see work practice 7.2 (Excavation work) in this manual.
  - never be manipulated or subjected to impact or other forces as this could result in internal or external damage
  - be adequately protected from damage during the reinforcement process.

- Where possible the reinforcing is to be installed on the opposite side of the pole to any underground service/cable.

- The reinforcing system must not cause any additional impediments to users of public thoroughfares.

- The reinforcing system must not have any sharp edges and/or angular structures which could cause injury to members of the public.

- Any damage caused to the galvanising during the installation process must be repaired using a suitable cold galvanising zinc paint. For more on this see the relevant Standard in the reference section below.

- Once the reinforcing system has been installed, the surrounding area must be reinstated in line with the requirements of the local government authority, Main Roads WA or private landowner.
Installers must attach an approved identification plate to each reinforced pole immediately upon completion. The information plate must include:
  - type and strength of reinforcing installed
  - date of installation
  - pole ID number.

Each reinforcing steel must be clearly marked (visible after installation) with its load rating and identification number.

On completion of the reinforcing check the pole and attachments for any signs of damage that may have resulted from vibration during the reinforcing process. Any damage must be reported to Western Power.

Figure 2: UAM nail  Figure 3: Osmo Truss Reinforcing System
Table 1: Approved Western Power pole support methods during reinforcing

<table>
<thead>
<tr>
<th>Supports</th>
<th>Pole type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicle-mounted 10 tonne crane</strong>&lt;br&gt;Fit slings or chains and take up slack so that the pole cannot overbalance or fall.</td>
<td>All distribution poles</td>
</tr>
<tr>
<td><strong>Vehicle-mounted pole holder</strong>&lt;br&gt;(i.e. Kevrek with pole grab)</td>
<td>Distribution poles:&lt;br&gt;- without a transformer&lt;br&gt;- maximum height of 11m.</td>
</tr>
<tr>
<td><strong>Minimum 10 tonnes crane with pole grab</strong></td>
<td>Transmission wooden poles</td>
</tr>
<tr>
<td><strong>Temporary stays</strong>&lt;br&gt;Minimum of three temporary stays, which must be:&lt;br&gt;- evenly spaced around the pole with minimum gauge 19/2.00&lt;br&gt;- securely attached above the pole point of balance&lt;br&gt;- anchored to one of the following:&lt;br&gt;  o concrete blocks on the ground&lt;br&gt;  o screw anchors.</td>
<td>All distribution poles</td>
</tr>
<tr>
<td><strong>Existing aerial supports</strong>&lt;br&gt;- 3-way support:&lt;br&gt;  o With maximum main line internal conductor angle of 150° and&lt;br&gt;  o a stay or 3rd conductor bisecting the external main line conductor angle.&lt;br&gt;- 4-way support:&lt;br&gt;  o conductors and/or stay(s) at 90° to each other.</td>
<td>Example 3-way support:&lt;br&gt;All distribution poles</td>
</tr>
</tbody>
</table>

*See requirements detailed in ‘Inspecting existing supports’ in this work practice.*
Note:
The use of pole pikes are not permitted as a means of pole support within Western Power.

Inspecting existing supports
Existing supports can only be used as a method of pole support if they pass a site inspection. Existing supports must be checked prior to starting work for the items listed below:

Stays
- Stay wire strands and preform wraps broken or badly rusted.
- Stay rod and fitting broken or rusted.
- Dig down 300mm and check the stay rod for flaking rust corrosion. A minimum of 80% good steel is required to be used as a support.

Overhead lines at the pole and in adjacent bays
- Condition of conductors.
- Condition of binding and dead end wraps.
- Condition of supporting insulators.
- Broken or damaged fittings.

Note:
The following must not be used as overhead supports:
- Service cores.
- Copper conductor sizes of 7/16 or smaller.
References

- AS/NZS 3750.9:2009 Paints for steel structures – Organic zinc-rich primer
- AS/NZS 3750.15:1998 Paints for steel structures – Inorganic zinc silicate paint
- Electrical System Safety Rules, section 6.1 'Danger zone’ (DM# 9199327)
- Work Practice Manual, work practices:
  - 2.2 (Safety observer role)
  - 2.28 (Job briefing process)
  - 7.2 (Excavation work)

Further reading

- Change of UAM reinforcement criteria for distribution wood poles – Internal memo (DM# 9327230v1), 8 May 2012
- Review of capacity and augmentation of distribution wood pole reinforcement methods (DM# 9926272v1), 3 February 2015
- Supply and installation of wood pole reinforcing systems – Technical Specification (DM# 10750705v1), 9 March 2015
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6.5 Extinguishing burning wooden poles

Purpose

This instruction:

• outlines the minimum requirements applicable to any person working on behalf of Western Power who is authorised to extinguish a pole or pole hardware fire
• excludes any scrub or bush fire control requirements
• describes the safe work systems necessary for extinguishing a wood pole fire caused by electrical leakage across the insulators
• only provides the key safety requirements relevant to wood pole fires and does not attempt to replicate any detailed work practices contained in training documents.

Note:

Pole base fires may be treated in a similar manner.

Instructions

• Isolate supply in co-ordination with SOCC or NOCC before attempting to extinguish a pole or pole hardware fire. Prove the supply is de-energised.

• Unless there are mitigating circumstances do not commence to extinguish a pole or pole hardware fire until a job risk assessment is completed and team members attend a job briefing.

• Risks may include:
  • inadequate escape routes
  • danger from falling objects
  • conductor breaking under tension
  • smoke and radiant heat
  • dry scrub or vegetation within the safety perimeter of the pole
• rough terrain or dense vegetation
• strong wind
• close proximity to traffic
• team member’s medical condition
• fatigue.

• Fire fighting can be both physically and mentally demanding; therefore, the team must work within their limits.

• At the worksite, the decision to extinguish a pole or pole hardware fire must be well considered with regard to:
  • the intensity of the fire
  • the availability of fire fighting equipment
  • the skill of the employee(s) to extinguish the fire.

• Assess the condition of the pole at the location of the fire to ensure that during the activity of extinguishing the fire the integrity of the pole will still support the conductors and hardware.

• The decision to fight the fire or leave the worksite must be made immediately.

• Before fighting a pole or pole hardware fire, ensure fire fighting equipment is suitable for the task and that the operator’s safety is not compromised.

• Do not attempt to extinguish a pole or pole hardware fire without an adequate number of support employees at the worksite.

• Pole top fires must only be extinguished from the ground or from an elevated work platform (EWP) operated in compliance with Field instruction 2.6 (Elevated work platform safety) in this manual.

• Consider the use of safety worksite barriers or a competent safety observer who has been specifically instructed in the recognition of relevant workplace hazards.
• If required, establish a restricted access area to prevent encroachment into an at-risk position.

• If practicable, fight the fire from an upwind position.

• After the worksite is made safe:
  • clean the EWP insulated boom
  • if required, arrange the disposal of CCA poles or treated pole sections.

Training

• The team leader must not send an employee to a pole or pole hardware fire if they are not trained or do not have the equipment to fight the fire.

FESA

• If the site is under the authority of FESA or other recognised fire control authorities then contact the Fire Incident Controller.

• This instruction may be overridden by any reasonable instruction given by a FESA Incident Controller.

• Utilise FESA fire fighters to extinguish the fire.

Communications

• Inform NOCC before commencing to fight a pole or pole hardware fire and arrange to isolate supply.

• Notify FESA, CALM or the Bush Fire Brigade, if there is a risk of the fire escalating and igniting scrub or foliage surrounding the pole perimeter safe area. Comply with any operational or safety instructions.

• If communications cannot be maintained then evacuate to a safe area.

• When in doubt, seek clarification.
Personal protective equipment

- Refer to Field instruction 3.1 (Clothing and personal protective equipment requirements).
- Wear additional protective equipment and clothing appropriate for the pole or pole hardware fire situation.
- Wear a face shield designed to protect from radiant heat or sparks.
- Wear a P2 respirator if smoke or CCA contaminants are identified as a potential risk.
- After extinguishing the pole or pole hardware fire, inspect personal protective equipment, clothing and EWP for burn damage.
6.6  Poles – carrying on stabilisers

Purpose
This work practice outlines the minimum requirements for the practice of carrying poles on the stabilisers of mobile plant – in particular, crane borers. This work practice does not address the requirements for worksite traffic management.

Scope
This work practice applies when poles are transported onsite by plant, and not as part of the pole delivery process.

Introduction
Poles have in the past been carried on the stabilisers of Western Power crane borers without any guidance. Poor work methods and lack of understanding of the hazards of this practice have resulted in personal injury, and have led to the creation of this work practice.

The practice of applying loads of undetermined quantity to plant stabilisers requires clarification as to the limits of the plant concerned and the method adopted. This work practice has been created in consultation with Fleet Services Engineering, and with reference to statutory requirements.

Steps to determine what plant is suitable

- Poles must only be carried on trucks fitted with pole carrying cradles.
- The pole carrying cradles must be approved and installed by Fleet Services (see Figures 1 and 2).
- The pole carrying cradles must have a safe working load (SWL) indicated on them. This will be affixed to the pole carrying cradle or found in the trucks manual, issued with the truck by Fleet Services.
- Below is a list of some of the trucks fitted with pole carrying cradles.
  - the following Band Hydraulic Brake (BHB) models:
    - 8/12
    - 8/13
    - 10/15
    - 10/19
Pacific model 10/19 and Ozzy model 10/15 crane borers. These are rated in maximum tonnes, with both stabilisers out and ground supports down.

**Note:**

Carrying poles on BHB Models 7/11, 8/13; ASI 7/11 and Pacific 8 tonne crane borers with paddle-type stabilisers is prohibited.

- Check for stabiliser controls. They must be available on the opposite side to the stabilisers or cradles. Same side controls cannot be used.
- Contact Fleet Services with truck type and model details for their check on front and rear axle loadings. Pole weight must be provided.

**Worksite requirements**

Poles are permitted to be carried on stabilisers that are fitted with pole carrying cradles, when:

- it occurs within a controlled area of a traffic management plan, including the crossing of roads when carried out within the controlled area of a traffic management plan
- it occurs off public roadways, e.g. paddocks and reserves

**Work methods for carrying poles**

- Where stabiliser controls are on both sides of the crane, controls can only be operated on the opposite side to where the poles are carried.
- An observer must be used to assist the plant operator to position the pole and stabilisers prior to travel.
- Poles must be adequately restrained onto the stabiliser beams to prevent pole movement while travelling.
- The weight of the pole must be determined, before it is placed into the pole carrying cradles, so that the SWL of the pole carrying cradles is not breached.
- Maximum travel speed to be less than 6 km/h when carrying a pole.

**Important**

The maximum rating of 5 tonnes is no longer applicable as the pole cradles have a SWL that is much less than 5 tonnes. The SWL of each vehicle fitted with pole carrying cradles must be checked before use.
Key site controls

- Pole weights assessed and within SWLs of plant and vehicle.
- Stabilisers operated on opposite side to poles.
- Poles only carried on approved plant.
- Poles only carried in controlled areas.
- Poles restrained from moving.

Figure 1: Out and down type stabiliser

Figure 2: Pole carrying cradles
6.7  Erecting poles through live LV conductors

Purpose

This work practice outlines the minimum requirements that must be adhered to when erecting poles through live low voltage (LV) conductors.

Instructions

• Before commencing work:
  o conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual).

  **Note:**
  A VA is not required or applicable to LV (see Electrical System Safety Rules (ESSR), section 11.3).

  o ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
  o designate a competent safety observer who has been specifically instructed in the recognition of relevant workplace hazards (see work practice 2.2 (Safety observer role))

• Where spreaders are installed anywhere in the two bays adjacent to where work is being carried out, inspect the conductors at the spreader for signs of defects. Where defects are evident, use standard conductor repair techniques to ensure that the conductor does not de-strand or break.

• Cover all LV conductors that are adjacent to the pole with rated insulated covers.

• If it is necessary to temporarily support or spread live LV conductors at the pole top, use the following approved method:
  o Spread the LV conductors separately using non-conductive ropes.
  o Use either the Western Power approved temporary conductor support and extensions or a Western Power approved full width temporary crossarm (ensuring that the conductors are trapped in the applicable method).
Note:
Do not use roofing nails or similar items to temporarily support LV conductors.

- Use a 2,100 mm (minimum) crossarm to support the LV conductors on poles.
- Use insulating covers on crossarms to ensure insulation with live LV conductors in the case of inadvertent contact.

References

- Work Practice Manual:
  - work practice 2.2 (Safety observer role)
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
- Electrical System Safety Rules (ESSR)
6.8 Conductor clearances

Purpose

This work practice outlines the minimum clearances that must be maintained between conductors and:

- the ground
- waterways
- rail or communication lines
- other conductors

Instructions

Wherever possible, the minimum clearances in Tables 1, 2 and 3 (below) must be maintained during work and after work is completed. This applies to both permanent work and temporary repairs.

- The highest priority must be given to reinstating conductors to the minimum heights outlined in Tables 1, 2 and 3 (below) as soon as possible.

- If possible, ensure that all failed poles or towers are permanently repaired the same day that they are discovered. If permanent repairs cannot be made, undertake temporary repairs using one or more of the following methods:
  - Re-erect existing poles and support them using one of the following:
    - a temporary support device, as outlined in work practice 6.3 (Poles – temporary support device) in this manual
    - temporary steel reinforcing, as outlined in work practice 6.2 (Poles – assessment and support before climbing or changing load) in this manual
  - Erect temporary portable poles.
  - Install a new pole or tower as close as possible to the failed pole or tower.
  - Remove damaged conductors from the structure and terminate to allow undamaged conductors to be energised.

Where it is not possible to maintain minimum clearances, conductors can be temporarily positioned lower for short periods, provided that:

- access to the area is controlled, continually monitored and restricted to trained and authorised crew performing the task
• vehicles (including water craft) and unauthorised persons must not be able to accidentally enter the area while the conductor is in a lowered state
• risks associated with the lowered conductors must be included in the risk assessment and job briefing
• low voltage (LV) conductors and service cables are kept a minimum distance from the ground during LV live work:
  o insulated service conductors – 2.7 m
  o bare conductors – 3 m
• high voltage (HV) conductors are kept a minimum distance from the ground during HV live work:
  o distribution conductors (i.e. up to and including 33 kV), including single wire earth return (SWER) return wires – 3 m
  o transmission conductors (i.e. above 33 kV) – 6 m
• all conductors must be returned to, or above, the minimum clearances shown in Tables 1, 2 and 3 (below) once work is complete

Important

Do not energise the powerlines if the clearances in Tables 1, 2 and 3 (below) cannot be maintained after temporary repairs have been made.
Note:

- The clearances in Tables 1 and 2 (below) are based on the minimum permissible clearances and are all intentionally 0.3 m less than the design clearances in *Distribution Overhead Line Design Manual – Clearances*. The design clearances are 0.3 m more to allow for small changes or errors in pole depth, tensions or finished ground level.
- Clearances over waterways are taken from the high water mark, i.e. high tide.
- ‘Readily accessible to the ocean’ is defined as navigable water within 20 km (water route length) of the open ocean, at least 2.5 m deep and not obstructed by any bridge or structure with a 12 m or less clearance from the high water mark.
- ‘Navigable water’ is defined as water having a depth of at least 450 mm and where it can be reasonably expected that a ship, boat or barge could gain access either by being launched off a transport vehicle or by passing along the waterway. This includes rivers, lakes, inlets and any other inland waterway as well as non-permanent waterways that may flow at a depth of 450 mm or more from time to time.
### Table 1: Minimum ground-to-conductor and water-to-conductor clearances

<table>
<thead>
<tr>
<th>Clearance (m)</th>
<th>Insulated service conductors</th>
<th>Bare or insulated conductor or cables less than 1,000 V (incl. earth wire)</th>
<th>Bare or covered conductor 1,000 V, up to and including 33 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over waterways not readily accessible to the ocean</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Over waterways readily accessible to the ocean</td>
<td>30.0</td>
<td>30.0</td>
<td>30.0</td>
</tr>
<tr>
<td>Over the centre of a road</td>
<td>5.5</td>
<td>5.5</td>
<td>6.7</td>
</tr>
<tr>
<td>Over any other part of a road</td>
<td>4.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over a footway or land which is likely to be used by vehicles</td>
<td>3.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elsewhere (for example, point of attachment at a house)</td>
<td>2.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over waterways not readily accessible to the ocean</td>
<td>15.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over waterways readily accessible to the ocean</td>
<td>30.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over the carriageway of a road</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over land other than the carriageway of a road</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over land that is not traversable by vehicles</td>
<td>4.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over waterways not readily accessible to the ocean</td>
<td>15.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over waterways readily accessible to the ocean</td>
<td>30.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over the carriageway of a road</td>
<td>6.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over land other than the carriageway of a road</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over land that is not traversable by vehicles</td>
<td>4.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Minimum ground-to-conductor and water-to-conductor clearances for all other conductors

<table>
<thead>
<tr>
<th>All other conductors</th>
<th>Clearance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insulated conductor without earthed screen, greater than 1,000 V</strong></td>
<td></td>
</tr>
<tr>
<td>Over waterways not readily accessible to the ocean</td>
<td>15.0</td>
</tr>
<tr>
<td>Over waterways readily accessible to the ocean</td>
<td>30.0</td>
</tr>
<tr>
<td>Over the carriageway of a road</td>
<td>6.0</td>
</tr>
<tr>
<td>Over land other than the carriageway of a road</td>
<td>5.5</td>
</tr>
<tr>
<td>Over land that is not traversable by vehicles</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>Bare or covered conductor above 33 kV, up to and including 132 kV</strong></td>
<td></td>
</tr>
<tr>
<td>Over waterways not readily accessible to the ocean</td>
<td>16.0</td>
</tr>
<tr>
<td>Over waterways readily accessible to the ocean</td>
<td>30.0</td>
</tr>
<tr>
<td>Over the carriageway of a road</td>
<td>6.7</td>
</tr>
<tr>
<td>Over land other than the carriageway of a road</td>
<td>6.7</td>
</tr>
<tr>
<td>Over land that is not traversable by vehicles</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Bare or covered conductor above 132 kV, up to and including 220 kV</strong></td>
<td></td>
</tr>
<tr>
<td>Over waterways not readily accessible to the ocean</td>
<td>17.0</td>
</tr>
<tr>
<td>Over waterways readily accessible to the ocean</td>
<td>30.0</td>
</tr>
<tr>
<td>Over the carriageway of a road</td>
<td>7.5</td>
</tr>
<tr>
<td>Over land other than the carriageway of a road</td>
<td>7.5</td>
</tr>
<tr>
<td>Over land that is not traversable by vehicles</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Bare or covered conductor above 220 kV, up to and including 330 kV</strong></td>
<td></td>
</tr>
<tr>
<td>Over waterways not readily accessible to the ocean</td>
<td>17.5</td>
</tr>
<tr>
<td>Over waterways readily accessible to the ocean</td>
<td>30.0</td>
</tr>
<tr>
<td>Over the carriageway of a road</td>
<td>8.0</td>
</tr>
<tr>
<td>Over land other than the carriageway of a road</td>
<td>8.0</td>
</tr>
<tr>
<td>Over land that is not traversable by vehicles</td>
<td>6.7</td>
</tr>
</tbody>
</table>
Table 3: Minimum vertical separation (clearances) for Western Power overhead lines from railway communication lines, powerlines and rail heads

<table>
<thead>
<tr>
<th>Nominal voltage</th>
<th>Separation between Western Power powerlines and railway...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>communication lines (m)</td>
</tr>
<tr>
<td>LV (up to 1 kV) including pilot, ABC and street light</td>
<td>1.2</td>
</tr>
<tr>
<td>above 1 kV up to 11 kV and all HV ABC</td>
<td>1.8</td>
</tr>
<tr>
<td>above 11 kV up to 33 kV and Hendrix conductor</td>
<td>2.4</td>
</tr>
<tr>
<td>above 33 kV up to 66 kV</td>
<td>2.4</td>
</tr>
<tr>
<td>above 66 kV up to 132 kV</td>
<td>3.0</td>
</tr>
<tr>
<td>above 132 kV up to 220 kV</td>
<td>4.6</td>
</tr>
<tr>
<td>above 220 kV up to 330 kV</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Note:

General information on vertical separation for unattached and attached crossings can be found in AS/NZS 7000:2010 Overhead line design – Detailed procedures. See Figures 1 and 2 (below).

The content in Tables 1, 2 and 3 (above) is taken from:

- AS 6947:2009 Crossing of waterways by electrical infrastructure
- AS/NZS 7000:2010 Overhead line design – Detailed procedures
- Code of Practice Power Line Crossing of Navigable Waterways in WA
- ENE NENS 04 – 2006 – National Guidelines for Safe Approach Distances to Electrical and Mechanical Apparatus
- IS EN 50341-1:2002 Overhead electrical lines – General requirements
<table>
<thead>
<tr>
<th>Voltage (kV)</th>
<th>Cables</th>
<th>Conductors</th>
<th>Other</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>U ≤ 500</td>
<td>Bare</td>
<td>Bare</td>
<td>No</td>
<td>7.2</td>
</tr>
<tr>
<td>U = 500 - 690</td>
<td>Bare</td>
<td>Bare</td>
<td>No</td>
<td>7.8</td>
</tr>
<tr>
<td>U = 690 - 1220</td>
<td>Bare</td>
<td>Bare</td>
<td>No</td>
<td>8.0</td>
</tr>
<tr>
<td>U = 1220 - 2200</td>
<td>Bare</td>
<td>Bare</td>
<td>No</td>
<td>8.8</td>
</tr>
<tr>
<td>U = 2200 - 3300</td>
<td>Bare</td>
<td>Bare</td>
<td>No</td>
<td>9.0</td>
</tr>
<tr>
<td>U = 3300 - 5500</td>
<td>Bare</td>
<td>Bare</td>
<td>No</td>
<td>9.2</td>
</tr>
</tbody>
</table>

Figure 1: Vertical separation for unattached crossings (in metres)
<table>
<thead>
<tr>
<th>Voltage (kV)</th>
<th>U &lt;= 66</th>
<th>U &gt; 66</th>
<th>U &lt;= 33</th>
<th>U &gt; 33</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>W</td>
<td>E</td>
<td>R</td>
</tr>
<tr>
<td>Bare or covered</td>
<td>2.4</td>
<td>1.8</td>
<td>1.2</td>
<td>0.6</td>
</tr>
<tr>
<td>Insulated</td>
<td>2.4</td>
<td>1.2</td>
<td>0.6</td>
<td>0.2</td>
</tr>
</tbody>
</table>

**NOTES:**
1. The clearances in the table are based on the lower circuit conductors being attached to gantry or post insulators. Additional clearance is required to allow for suspension, operation and maintenance.
2. The clearances in this table may need to be increased to account for 30% approach distances required for construction, operation and maintenance.

Figure 2: Vertical separation for attached crossings (in metres)
References

- Work Practice Manual, work practices:
- Distribution Overhead Line Design Manual – Clearances (DM# 9692585)
- AS 6947:2009 Crossing of waterways by electrical infrastructure
- AS/NZS 7000:2010 Overhead line design – Detailed procedures
- Code of Practice Power Line Crossing of Navigable Waterways in WA
- ENE NENS 04 – 2006 – National Guidelines for Safe Approach Distances to Electrical and Mechanical Apparatus
- IS EN 50341-1:2002 Overhead electrical lines – General requirements
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6.9  **Stringing and tensioning bare overhead conductors**

**Purpose**

This work practice outlines the limits of work when stringing and tensioning (regulating) bare overhead conductors under an Electrical Access Permit (EAP) for distribution line work. Certain activities are not permitted, as described in this work practice.

**Scope**

This work practice covers the following situations:

- Working on existing bare overhead conductors.
- Stringing new bare conductors above or below live bare overhead conductors.
- Tensioning of bare conductors above or below live bare overhead conductors.
- Additional requirements when working with existing 3/2.75 or 7/1.6 steel and 7/16 (7/.064) or smaller copper conductors.

This work practice **does not** apply to:

- the repair of broken or damaged conductors as this is covered by work practice 6.14 (Aerial conductor repair) in this manual
- low voltage (LV) live work methods
- high voltage (HV) live work procedures for glove and barrier (G&B) and distribution insulated stick (DIS).

**Safety**

- The stringing of bare conductors parallel to (above or below) bare live HV or LV overhead conductors is not permitted. In this situation the live conductors must be isolated, proved de-energised, earthed or short circuited and an EAP issued.
- Always treat all conductors as energised until proven otherwise and an EAP is issued.
- Always ensure there is a portable earth (HV) or shorting kit (LV) between the line workers and any potential source of supply, including induced voltages.
- Consider the risk from induced voltages. For more on this, see work practice 2.9 (Induced voltages in isolated conductors/apparatus) in this manual.
• Ensure conductor ground clearances are maintained. See work practice 6.8 (Conductor clearances) in this manual.

• Ensure minimum approach distances (MADs) are maintained from energised conductors and apparatus. For more on this, see work practice 2.8 (Minimum approach distances (MADs)) in this manual.

• MADs to live HV can never be reduced even if HV insulated mats and covers are applied as a precautionary measure.

• Conductors must be controlled at all times.

• All LV insulated covers and mats must comply with AS 4202-1994 Insulating covers for electrical purposes and be visually inspected prior to use.

• Preformed dead-end wraps must not be used instead of come-along clamps when tensioning conductors.

Instructions

Inspection of existing bare overhead conductors and poles

• Prior to commencement of any work on existing bare overhead conductors, conduct an inspection of the conductor, pole and its attachments.

• The conductors and pole either side of the structure to be worked on must also be inspected. If stringing more than one bay, all conductors and poles to be worked on must be inspected. For more on pole inspection, see work practice 6.2 (Poles – assessment and support before climbing or changing load) in this manual.

• The following must be considered when inspecting conductors and attachments for damage and/or signs of weakness:
  ○ Corrosion and deterioration.
  ○ Annealing.
  ○ Signs of conductor clash and burning.
  ○ Damage by lightning.
  ○ Damaged or broken strands.
  ○ Cracked or broken insulators.
  ○ Metal fatigue.
  ○ Conductor creep or slippage.
  ○ Vibration damage at tie wires and armour rods.
  ○ Cracked or broken cross-arms.
Any damaged conductors must be carefully assessed and repaired, using suitable full tension compression joints for the conductor type and tension requirements.

- Dead-end preforms and armour rods are not acceptable repair methods.
- Mid-span splices suitable to the conductor size, type and tension can be used for the following:
  - To repair minor damage.
  - For a full tension repair on some steel conductors, but only when full tension compression joints (the preferred method) are not available as a stock item.

Tensioning bare conductors

Tensioning bare conductors above live HV conductors is not permitted unless using approved glove and barrier (G&B) or distribution insulated stick (DIS) HV live work procedures.

- Conductors must be tensioned:
  - according to relevant sag charts and/or tension calculator (available in Depot Pack)
  - in conjunction with a thermometer, dynamometer or conductor beat charts and a distance wheel or rangefinder.

For more on this, see the *Distribution Overhead Line Design Manual*, section ‘Conductor tensioning for New and Existing Distribution Lines’ (DM# 9692320).

- The final tensioning of the conductors must be carried out using a strap hoist.

- The following control measures can be used to control the risk of contact with energised conductors and/or apparatus:
  - Isolate all or part of the bare live overhead mains and obtain an EAP.
  - Apply insulated covers and mats to the adjacent live LV conductors and/or apparatus.
  - Maintain MADs.
  - Use safety observers.
  - Remove live line taps/clamps or drop out fuses.
  - Remove solid taps to increase MADs.
Stringing of bare conductors

- Stringing of any conductor above or below live HV is not permitted.
- LV tee-offs and conductor crossings (above and below) along the length of the new conductor pull must also be isolated and work carried out under an EAP unless controls can be implemented to mitigate any risk. Controls may include:
  - application of insulated covers and mats to the live conductors and apparatus
  - use of temporary LV cross-arms to increase clearances
  - use of captive rollers
  - use of safety observers
  - use of radios for communication and monitoring
  - installation of gantries
  - installation of scaffold and netting.
- Tensioning of the conductors is not permitted from any structure containing live conductors or apparatus, however back-hanging on a live structure is permitted. See conditions in ‘The back-hanging of bare conductors on live structures’ section, below.
- A swivel mechanism must be used between the winch rope and the come-along clamp.
- When pulling through the new conductor using the existing conductors to a split drum cable winch extra care will need to be taken due to the risk of:
  - existing conductor joints snagging in the rollers during the pull
  - existing conductor joints failing during the pull
  - existing conductors failing due to age and deterioration
  - bird-caging at the split drum due to loss of tension and/or lack of flexibility of the old conductors.

Back-hanging of bare conductors on live structures

- Back-hanging of any conductor above live HV is not permitted.
- When back-hanging below live HV, ensure:
  - MADs are maintained
  - MADs can be maintained when the conductors are pulled up to tension
○ conductors are controlled at all times
○ for HV, there must be a portable earth between the line worker and all possible points of supply (e.g. bottom of the HV fuse holder)
○ for LV, there must be an LV shorting kit between the line worker and all possible points of supply.

- Conductors to be back-hung must have no attachments (e.g. jumpers or live line taps/clamps).
- Back-hanging above bare live LV conductors is not permitted unless the bare live LV conductors and apparatus can be fully insulated and/or covered.

Additional requirements for 3/2.75, 7/1.6 steel and 7/16 (.064) or smaller copper conductors

Assessment

Due to the corrosive nature and reduced tensile strength of these conductors, extra care must be taken when tensioning existing conductors.

1. The following must be done prior to commencing any work that will affect the tension and/or mechanical loading of these conductors:
   - A normal inspection as described in the ‘Inspection of existing bare overhead conductors and poles’ section, above
   - An inspection of the conductor and fittings on the pole to be worked on and for two spans either side.

2. From the inspection, determine the degree of deterioration of the conductor and fittings and establish whether the conductor is safe to work on.

3. If the inspection determines that the conductor could break during the work:
   - do not carry out any work if there are energised conductors or apparatus on the same poles.
   - notify Network Operations
   - arrange for an outage of all energised conductors or apparatus prior to making the repairs.
Tensioning bare 3/2.75, 7/1.6 steel and 7/16 (7/.064) or smaller copper conductors

There is an increased risk of conductor slippage within the come-along clamp when tensioning these smaller size conductors. A come-along clamp with a locking grip mechanism can be used to help reduce this risk, as shown in Figure 1, below.

Figure 1: Come-along clamp with locking grip mechanism and safety latch

References

- Work practice manual, work practices:
  - 2.8 (Minimum approach distances (MADs))
  - 2.9 Induced voltages in isolated conductors/apparatus
  - 6.8 (Conductor clearances)
  - 6.14 (Aerial conductor repair).
6.10 Stringing ABC and pilot cables from a near-empty cable drum

Purpose

This work practice outlines the method for safe stringing and tensioning of aerial bundled conductor (ABC) and pilot cables when a minimum of four turns of cable cannot be maintained on the cable drum during stringing operations.

Instructions

• Before commencing work:
  o conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
  o ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

• During the paying out of the cable, the winching must stop when four turns remain on the cable drum.

• Ensure radio contact is made with the winching operator and the winch is made inoperative; that is, power take-off is disengaged.

• Temporarily attach the cable come-along and cranker to the termination pole at the cable drum end and transfer the cable tension to the pole.

• Release the cable drum brake then detach the end of the cable from the cable drum.

• Attach the correct cable stocking to the end of the cable and secure with Band-It strapping or electrical tape.

• Wrap four turns of a polyester pulling rope (minimum 16 mm) onto the cable drum ensuring that the rope is wrapped in the same direction as the cable; that is, rope is wound on as cable is paid out.

• Attach a swivel and hammerlock to the end of the stocking, connect it to the pulling rope and check all connections.

• Make sure there is enough pulling rope to:
  o reach the termination point at the pole top from the cable drum
  o allow four wraps onto the cable drum
  o allow a further 3–5 metres
Operational work practice standards

- Take up any slack in the cable between the termination pole and the cable drum then engage the brake to the cable drum.
- Make sure the pulling rope is fed onto the cable drum without overlapping, and apply slight tension to reduce slipping.
- Release the tension on the cable at the pole top by removing the come-along and cranker.
- Instruct the operator at the winch to commence winching, and then adjust the cable drum brake to maintain the original ground clearance.

Repeat this process until the desired amount of cable is used, then resume the normal procedures for tensioning and terminating.

References

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
6.11 Stringing optical fibre cable

Purpose

This work practice outlines the minimum requirements for installing and stringing supported and self-supported optical fibre cable to low voltage (LV) neutrals.

Note:

Before installing optical fibre cable, all poles that are used for the purpose of supporting optical fibre cable must be inspected per Western Power’s Bundled Pole Inspection Operational Instructions (DM# 9406005).

Instructions

Before commencing work:

- conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
- A minimum of three personnel are required for this task.
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- ensure that all safe-working clearances are maintained (see work practice 2.8 (Minimum approach distances (MADs)) in this manual).

Stringing optical fibre cable to the neutral conductor or aerial bundled conductor (ABC)

- Position the recovery trailer at one end of the worksite and the winch with pilot rope at the other end of the worksite. If a minimum of four turns of cable cannot be maintained on the cable drum during stringing operations, see work practice 6.10 (Stringing ABC and pilot cables from a near-empty cable drum).
- Attach cable rollers to the LV crossarms, between the neutral and blue conductors.
- Run the pilot rope from the winch trailer over the cable rollers, to the recovery trailer that holds the optical fibre cable drum.
- Attach the pilot rope to the optical fibre cable, using the pulling sock or stocking.
• Use the winch and pilot rope to pull the optical fibre cable over the cable rollers to one metre past the termination point.

• When stringing optical fibre cable:
  o do not apply the braking mechanism of the optical fibre cable drum
  o do not allow the optical fibre cable to chafe on any hardware
  o do not allow the cable to be dragged along the ground.

• At the termination point, attach the optical fibre cable to the neutral conductor using three cable ties set at 50 mm apart.

• Remove the pilot rope and seal the optical fibre cable with an end cap.

• Starting from the termination point, work towards the optical fibre cable drum and fasten the optical fibre cable to the neutral conductor using the cable ties at intervals of no more than one metre.

• Place a protective covering over the optical fibre cable where contact can be made with hardware that may damage the optical fibre cable.

• When reaching the termination point (at the recovery trailer end that holds the optical fibre cable drum), use three cable ties set at 50 mm apart to attach the optical fibre cable to the neutral conductor.

• Cut the optical fibre cable to the required length and seal it with the appropriate end cap.

**Stringing self-supporting optical fibre cable**

• Use self-supporting optical fibre cable where the structure does not provide low voltage conductor support.

• Position the recovery trailer at one end of the worksite and the winch with pilot rope at the other end of the worksite. Install brackets and support clamps to the structures 1.2 metres from the high voltage crossarm.

• Install the termination brackets and associated equipment at both termination points.

• Install cable rollers.
Stringing

The stringing procedure for self-supporting optical fibre cable is the same as for non-supported optical fibre cable but also includes:

- Apply the braking mechanism to the optical fibre cable drum to allow the required clearance from the ground.
- Terminate the optical fibre cable using preformed dead-ends and associated equipment, cut it to the required length and seal it using an end cap.
- At the recovery trailer end, tension the optical fibre cable using the relevant stringing tables.
- Once the required tension is achieved, terminate optical fibre cable using preformed dead-ends and associated equipment, cut to the required length and seal using an end cap.
- Install optical fibre cable in support clamps.

**Note:**

- Ensure that vehicles do not drive over the optical fibre cable as this will damage it.
- Do not exceed the minimum bending radius of the optical fibre cable.

**References**

- Work Practice Manual:
  - work practice 2.8 (Minimum approach distances (MADs))
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 6.10 (Stringing ABC and pilot cables from a near-empty cable drum)
- Bundled Pole Inspection Operational Instruction (DM# 9406005)
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6.12 Backhoe loader with pole planter

Purpose

This work practice outlines the minimum requirements for the installation and removal of a distribution pole using a backhoe loader with pole planter. This work is only permitted under isolated and permitted conditions or for the construction of new overhead lines that are clear of existing live overhead lines.

Figure 1: Transporting a pole using a backhoe with pole planter and cradle

Scope

This work practice is applicable to authorised members of the Network Total Workforce (NTW) who are required to install poles using a backhoe loader with a pole planter attachment on the Western Power distribution network.

The backhoe loader and pole planter are mainly intended for use in rural and semi-rural areas due to its versatility in being able to access areas where conventional methods cannot be used. The backhoe loader is also road legal which allows it to travel between worksites.
Training requirements

Personnel who wish to operate a backhoe with pole planter must complete the Power Training Services WA (PTS) one day course, ‘Use of pole planter and supplementary attachments’. The following prerequisites are required for enrolment in this course:

- Network Authority Card (NAC).
- Unit of competency – RIIMPO319A or RIIMPO319D – Conduct backhoe/loader operations.
- A current ‘Licence To Perform High Risk Work – Class DG (Dogging)’.

Upon completion of this course the trainees will need to successfully complete the following before being permitted to carry out this task unsupervised:

- Eight pole installations under the direct supervision of a trained and approved operator. These installations must be documented and presented to the trainer as evidence.
- Two final pole installations under the observation of the training instructor to confirm competency.

Safety

- This work practice must not be used for the installation of poles on energised high voltage (HV) or low voltage (LV) lines.
- Poles cannot be installed or removed within the first span of the isolation point due to the risk of clashing live conductors.
- A Recipient in Charge (RIC) must be onsite to accept the permit, if required.
- The backhoe with pole planter can only be used on wood poles that meet the following criteria:
  - Maximum pole size 12.5m, 6kN.
  - Maximum pole weight 1,150kg.
  - Maximum pole circumference 1,820mm.
  - Minimum circumference 475mm.
- The pole planter must not be used to remove embedded poles.
- Do not travel with the pole above the cab when gradients are greater than 15° as the backhoe can become unstable.
Always exercise extreme caution when manoeuvring on soft or inconsistent ground and be aware of any pit lids or manhole covers within the worksite.

When picking the pole up from the ground, establish an exclusion zone of 2m around the pole and backhoe.

Only use two-wheel steering when travelling across sloping ground for better stability.

When poles are installed with cross-arms or stay wires attached, they must be secured to ensure they do not move during the installation of the pole.

Prior to the installation or removal of the pole, a risk assessment must be carried out and the following hazards considered:

- Access and egress to the worksite.
- Condition of existing poles, conductors and attachments.
- Environmental factors and conditions (e.g. wet, boggy, fire risk).
- Excavations and underground assets or utilities.
- Proximity of any other lines or utilities.
- Third parties working in the vicinity or within the worksite.

Resources

- This task requires a minimum of two personnel:
  - One person who has successfully completed the PTS training course ‘Use of pole planter and supplementary attachments’.
  - One person to act as an observer to warn against unseen hazards and to assist as a dogman. For more on this, see work practice 2.20 (Dogger – construction site) in this manual.

- An RIC must be present onsite when an Electrical Access Permit is required to carry out the task.

Instructions

Picking up a pole

1. Assess the pole size and weight and decide the best position to clamp the pole, normally as close as possible to the point of balance.

2. Fully open the clamping jaws (see Figure 2) and position the base plate in a horizontal position.
3. Use the machine loader shovel control to manoeuvre the base plate beneath the pole to be picked up.
   ○ When picking up the pole, the pole butt should be on the right hand side of the pole planter. (For the Strimech pole planter as shown in Figure 2. Other makes of pole planter may have a different rotation.)

4. The loader shovel must be at 90° to the pole when picking up, to avoid excessive pole movement at either end of the pole.

5. Manipulate the base plate and roll back so that the pole rests in the throat of the mechanism.

6. Close the clamping jaws on to the pole.

7. Visually confirm that the pole is clamped correctly then apply the clamp safety chains around the pole.

8. Slowly raise the loader arm and rotate into position over the backhoe cab and rest in the pole cradle ready for transport. See steps 3 and 4 in Figure 4.

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**Figure 2: Pole secured in the pole planter**
Transportation of poles

The backhoe with pole planter must not be used to transport poles on public roads unless traffic management has been arranged. Poles should be delivered to a point as near to the installation location as possible.

The preferred transportation method is to carry the pole secured in the pole cradle and pole planter, as illustrated in Figure 1. Although not the preferred method, in certain circumstances the pole can be carried horizontally in front of the backhoe at a height just sufficient to clear the ground. This method should only be used when:

- the terrain is not too rough
- the transportation distance is short
- height restrictions and access issues are a factor.

Pole installation

Prior to excavating the pole hole and installing the new pole, establish a 2m exclusion zone around the backhoe loader, the pole and pole hole. Restrict access to the exclusion zone to personnel who are directly involved with the pole installation only.

1. Prior to the excavation of the pole hole, locate and protect any underground utilities that are present. For more on this, see work practice 7.2 (Excavation and directional drilling) in this manual.

2. The pole hole must be excavated at least 500mm away from any existing poles, to avoid disturbance of the old poles.
   - When excavating, always take care that the excavation does not put the stability of the backhoe at risk.
   - Where possible, excavate the pole hole in line with the existing conductors as this will provide better sideways stability for the new pole.

3. Excavate the pole hole to the correct depth using the back-actor and appropriate bucket.

4. Collect the pole and install into the pole hole so that it sits firmly on the bottom of the hole at the correct depth and position.

5. Backfill the pole hole to at least ⅔ the pole hole depth. When compacting, follow work practice 6.27 (Compacting pole holes) in this manual.
6. Release a small amount of tension on the clamping jaws (enough to allow the pole to rotate) and rotate the new pole (if necessary) for the alignment of the cross-arm and/or attachments.

7. Remove the safety chains, fully open the clamping jaws and remove the backhoe from the new pole.

8. The pole hole can now be backfilled using the back-actor of the backhoe.

Figure 3: Pole installation using a backhoe with pole planter
Figure 4: Pole erection using a backhoe with pole planter

1) Clamp pole and attach safety chains
2) Roll back and lift pole
3) Lift pole to full height and rotate
4) Lower into pole cradle (carrying position)
5) Tilt pole towards hole
6) Plant pole vertically
Removal of old pole and pole butt

The pole planter must not be used to pull embedded poles from the ground. Prior to removal, establish a 2m exclusion zone around the backhoe and the old pole. Restrict access to the exclusion zone to personnel who are directly involved with the pole removal only.

1. Ensure that the old pole is left tied in until supported by the pole planter.
2. Assess the old pole for condition and point of balance prior to attaching the pole planter.
   ○ Above the steel reinforcing, if installed.
3. Install the two safety chains on the pole planter.
4. The old pole is now supported and can be untied.
5. Cut the old pole and remove (above the steel reinforcing if applicable).
6. The old pole butt must be fully exposed using the backhoe back-actor prior to removal from the ground.
   ○ A pole jack may also be used to extract the pole butt, if available. For more on this, see work practice 6.17 (Removing embedded poles from the ground) in this manual.
7. Backfill and compact the old pole hole using the backhoe back-actor.

References

- Work Practice Manual, work practices:
  ○ 2.8 (Minimum approach distances (MADs))
  ○ 2.20 (Dogger – construction site)
  ○ 6.17 (Removing embedded poles from the ground)
  ○ 6.27 (Compacting pole holes)
  ○ 7.2 (Excavation and directional drilling).
6.13 Spreader rods – fitting to live low voltage conductors

Purpose

This instruction outlines the safe fitting and removal of Raychem or PVC low voltage (LV) spreader rods to live LV aerial conductors.

The fitting and removal of spreader rods to live LV conductors can be done either from the ground or using an elevated work platform (EWP).

Safety

- Before commencing work, conduct a risk assessment for the task.
- The risk assessment must also determine the condition of the LV conductors (including pole hardware and at least two adjacent bays where spreader rods are fitted).
- Any damaged conductor identified in the above risk assessment must be repaired before commencement of the spreader rod replacement task.
- Appropriate PPE must be worn. For more on this, see section 3 (Personal protective equipment) in this manual.
- Do not install spreaders when wind velocity is above 30 km/h.
- The installation must be carried out by at least two (2) authorised and appropriately trained people (the installer and the observer).
- Maintain a minimum separation distance of 600 mm between the low and high voltage conductors if both voltages are in the same bay.
- When removing fibreglass spreader rods that show visible signs of deterioration by (gloved) hand, a Class P2 respirator must be worn.
- Wrap all deteriorated fibreglass spreader rods in plastic sheeting after removal.

Note:

Damage caused by spreader rods must be repaired using the appropriate full tension splice or crimp joint.
Instructions

• Only people who have been trained and deemed competent by practical assessment may install LV spreader rods.
• The person in charge must ensure that anyone who installs LV spreader rods is competent to do so.

Tools and equipment for ground installation

To complete the installation, use:

• levelling or stabilising crossbar (rabbit ears)
• three (3) sets of insulated hot sticks (3 x 3 hot sticks)
• all-purpose clamping tool
• 1.5 metre adjustable extension piece (PVC or similar)
• spreader rods
• conductor locking clips
• hook tool

Figures 1 and 2: Tools used from the EWP for fitting and removing spreader rods on live LV conductors

These hand tools are designed for the installation of spring clips to the conductor.
A new Raychem LV spreader consisting of an ethylene vinyl acetate rod and stainless steel clip with plastic inserts has been developed. This new LV spreader replaces the PVC rods currently in use, and is used to prevent damage to conductors. The new Raychem LV spreader is shown in figures 3-5, below.

**Figure 3: As assembled**

**Figure 4: New spreader rod**

**Figure 5: Stainless steel clip with plastic insert**
Preparation

- Ensure that the spreader rods are longer than the conductor spacings.

**Note:**

For combination crossarms (that is, 1,350 mm one end and 2,100 mm the other), the spacing between their centres must be:

- 400 mm to suit the two outside conductors
- 680 mm to suit the two centre conductors

**References**

- Work Practice Manual, Section 3 (Personal protective equipment)
6.14 Aerial conductor repair

Purpose

This work practice outlines the minimum safety requirements for repairing broken aerial conductors and a procedure for long bays where a vehicle winch is required to assist with the repairs.

Scope

This work practice covers the following situations:

- Broken aerial conductors.
- Broken aerial conductors in long bays, where the assistance of a vehicle winch is required to tension the conductor(s).

This work practice does not apply to the following:

- Stringing, tensioning or the back-hanging of bare aerial conductors. For more on this see work practice (6.9 Stringing and tensioning bare overhead conductors) in this manual.
- Low voltage (LV) live work methods.
- High voltage (HV) live work procedures for glove and barrier (G&B) and distribution insulated stick (DIS).

Safety

- Repairs must never be attempted when the conductors are energised. Prior to commencing work the conductors to be repaired must be isolated, proved de-energised, earths or shorting kits applied and an electrical access permit (EAP) issued.
- When using a vehicle winch to pull the broken conductors together ensure the following:
  - The winch must be fitted with a remote control and winch break.
  - Establish an exclusion zone before commencing winching.
  - The vehicle winch operator must be outside of the pulling angle of the winch, as illustrated in Figure 1.
  - Personnel must not work inside the angle of the vehicle winch rope when pulling up the conductor.
Use a winch damper blanket or similar device to prevent whipping and potential injury should the winch rope or other components fail under tension.

- Helically preformed terminations (dead-end wraps) must not be used for tensioning conductors as they are not approved for this purpose by the manufacturer.
- When repairing conductors always check and confirm the damaged conductor size and type to ensure the correct full tension mid-span compression joint or splice is selected and used. Prior to commencing work inspect the aerial conductors, poles and attachments. For more on this see work practice (6.9 Stringing and tensioning bare overhead conductors) in this manual.
- To help prevent come-along clamp conductor slippage a come-along clamp with locking grip mechanism and safety latch can be used when tensioning smaller size conductors. For more on this see work practice (6.9 Stringing and tensioning bare overhead conductors) in this manual.

Instructions for conductor repairs in long bays that require a vehicle winch

During this activity the conductor to be repaired must be controlled at all times, i.e. attached to the vehicle winch or suitable anchor point.

1. Ensure that:
   - all aerial conductors to be repaired are de-energised, earthed and an EAP has been issued.
   - working earths are applied to the line as per work practice 2.10 (Use and management of portable earthing/shorting equipment) in this manual
   - additional requirements to protect workers against the presence of inductive voltages have been taken into account as per work practice 2.9 (Induced voltage) in this manual.

2. Where required, prune or fell vegetation to ensure that there are no obstructions in the work area.

3. Check the condition of the adjacent poles and hardware as per work practice (6.2 Poles – assessment and support before climbing or changing load).

4. Untie the damaged aerial conductor from at least one pole on either side of the break.
• If required, lower the conductor off of the poles on either side of the break.

5. Check the conductor on the next poles down from where they have been untied.
   • If there is a lot of tension on the conductors they will need to be secured to a suitable anchor point (e.g. pole) using come-along clamps and strap hoists. This will prevent the conductor pulling through the ties until the winch can restore the conductor tension.
   • If the conductor has pulled through, secure the conductor (as above) and untie the conductor ties.
     o Make sure the armour rods return to the insulators to ensure correct tension.

6. Check the condition of the full length of conductor either side of the break back to where the conductor is attached to the first pole (that is still under tension). Check for defects, e.g. kinks, burns, unravelling.
   • If a section of conductor needs to be replaced, it must be measured and replaced with exactly the same length and type of conductor that is cut out.
   • If it is suspected that the conductor has failed due to over tensioning, this must be taken into consideration when repairing the conductor.

7. Perform a pre-start check on the winch, including the rope, hook, come-along(s), snatch block, free-spool clutch, break and controller.

8. Attach the correct come-along clamp to each end of the conductor to be repaired and ensure that:
   • there is enough free conductor beyond the come-alongs to complete the repair
   • the conductor is located correctly in the jaws of the come-along clamp
   • the winch pull is as in-line with the existing conductors as possible.

9. Attach the rated snatch block to the come-along clamp on conductor B, as illustrated in Figure 1.
10. Pass the winch rope through the snatch block on Conductor B. Close and secure the snatch block gate.

11. Feed the winch rope through the snatch block and attach the winch hook to the come-along clamp on conductor A.

12. Temporarily secure the loose conductor ends to the winch rope using tape or cable ties to prevent the conductor from dragging on the ground when winching.

13. Ensure that the vehicle is in park/neutral with the hand brake applied (the vehicle engine can be running).

14. Chock the front wheels of the winch vehicle.
   - In soft ground conditions a sand anchor or similar device may be required to secure the winch vehicle prior to tensioning.

15. Place the winch damper blanket or similar device over the winch rope.

16. Appoint an observer to watch the conductors, then commence winching the two ends of the conductor together in a steady controlled manner ensuring clear communication between the observer and winch controller.
   - While the conductor is being pulled up the observer must check that:
     - the conductors remain clear and do not snag on anything
     - the poles are not being pulled out of alignment.

17. The final tensioning of the conductor must be completed using strap hoists which are rated for the task.

Figure 1: Conductor repair setup
• Attach the strap hoists and come-along clamps to the conductor, so that there is sufficient conductor to carry out the repair. If required, attach two strap hoists together.

18. Join the conductors together using one of the following:
   • The correct size full tension mid-span compression joint and dies for the conductor that is being repaired.
   • The correct size full tension helical mid-span splice for the conductor that is being repaired, but only when full tension compression joints (the preferred method) are not available as a stock item.

19. When repairing the aerial conductor ensure the minimum conductor clearances are maintained. For more information see work practice 6.8 ‘(Conductor clearances) in this manual.

20. Once the conductors have been joined together, release and remove the winch rope, strap hoists, snatch block and come-along clamps from the conductor.

References

• Work Practice Manual, work practices:
  o 2.9 (Induced voltages)
  o 2.10 (Use and management of portable overhead earthing/shorting equipment)
  o 6.2 (Poles – assessment and support before climbing or changing load)
  o 6.8 (Conductor clearances)
6.15 Down earth assemblies – maintenance

Purpose
This instruction outlines the minimum requirements for repair and maintenance activities on down earth assemblies on poles and must be read in full.

Scope
This instruction is applicable for work on down earths used in both earth bonding and earth return systems.

Safety requirements
- Conduct a risk assessment with all team members before commencing the task.
- Wear approved worksite personal protective equipment. For more on this, see Field instruction 3.1 (Clothing and personal protective equipment requirements) in this manual.
- Additional PPE such as insulated gloves will be required during certain parts of the task. For more on this, see field instruction 3.2 (Glove protection).
- No part of the body must touch the down earth during connection of the temporary earth jumper.

Instructions

General
Before commencing repair or maintenance work on down earths, the down earth conductors must be bypassed to maintain the system earthing:
- Check HV insulation and conductors on the structure for damage.
- Check for high voltage (HV) on the down earth using an approved proximity tester. If HV is detected, do not begin work on the down earth and report to your formal leader.
- Check that the earth electrode is intact (not corroded or broken off). Replace the earth electrode if necessary.
• Attach a temporary earth jumper (use a portable earth lead) to maintain earth integrity whilst working. The jumper can be connected either:
  o across the gap between the earth electrode at the base of the pole and the down earth
  or
  o from the earth electrode at the base of the pole to the running earth.

The portable earth being used as a temporary earth jumper must be applied in the same way as any other portable earth.

• Attach the ground clamp to the earth electrode.
• Attach the aerial clamp to the earth bond or running earth using an approved insulated hot stick.

Repair/replacement of insulated down earths

Unless there is a running earth to attach the temporary earth jumper, the repair/replacement of insulated down earth is a potentially hazardous task. This is due to the possibility of phase-earth insulation failure at the pole top and also that some down earth insulation must be removed in order to attach the temporary earth jumper. In this situation, the following instructions are applicable:

• Use the risk assessment to identify hazards that may cause the down earth to be energised.
• In addition to PPE requirements, minimum Class 2 rated gloves with approved outers must be worn for the duration of the task.
• Use a HV proximity tester (e.g. Modiewark) to confirm the absence of HV on the down earth.
• Strip the down earth insulation back to expose enough bare conductor to allow the attachment of a temporary earth jumper and the joining ferrule.
• Attach the temporary earth jumper to the earth electrode at the base of the pole first, and then to the exposed down earth conductor.
• The repair/replacement of the down earth may now continue.

Note:

If HV is detected by the proximity tester, the task method must be re-assessed and performed using accepted HV live work methods, or the associated HV network must be isolated and earthed and the work performed under an EAP.
• Connect the new section of down earth using a joining ferrule.
• Terminate the down earth onto the earth electrode.
• Remove temporary bypass jumper.
• Apply heatshrink or coldshrink as applicable to the exposed or pierced section of the down earth and the joining ferrule.
• Reattach the down earth to the pole as per construction details.

Replacement of down earth assemblies

Earth electrodes

Install the new electrode at the planned location at the pole base and test using the appropriate DCWI (Earthing System Resistance Testing – DM# 16447382) and the applicable method for the test set.

• Earth electrodes at the pole base must have an earth resistance of 30 ohms or less, as per Western Power construction standards.
• Connect a temporary earth jumper from the new electrode to the down earth.
• Disconnect the down earth from the old electrode and connect to the new electrode.
• Remove the temporary earth jumper.

Down earth connection to pole top structure

For work at the pole top special attention must be given to the presence of live HV conductors and minimum approach distances to where the work is to be performed. It may be necessary to cover LV conductors to prevent inadvertent contact. Where safe clearances cannot be achieved other methods such as an outage or live work methods must be used.

• Connect the temporary earth jumper, as previously described. (Test for HV first).
• Connect the replacement down earth to the top end of the bond or to the running earth.
• Attach the replacement down earth to the pole using the appropriate cable saddles.
• Connect the down earth to the earth electrode using the approved earth clamp.
• Remove the ‘old’ down earth conductor.
• Remove the temporary bypass jumper.
Operational work practice standards

- Apply heatshrink to the exposed or pierced section of the down earth and the joining ferrule.

Task completion

At the end of the task the following must be done.

- Place the earth pit over the earth electrode and down earth, adjust until the top is flush with the finished ground level then fit the lid.
- Ensure the worksite is left in a clean and safe condition.

References

- Field instruction 3.1 (Clothing and personal protective equipment requirements)
- Field instruction 3.2 (Glove protection)
- Distribution Construction Standards Handbook – References section – drawings R6/1 and R6/2
- DCWI Earthing System Resistance Testing (DM# 1647382)
6.16 Hazard identification warning markers on overhead powerlines from water vessels

Purpose

This instruction outlines the minimum requirements for installation of hazard identification warning markers to overhead distribution lines (up to and including 33 kV) from a water vessel.

Safety requirements

- A minimum of two linepersons and one safety observer are required on the water vessel for the installation of hazard identification markers.
- The safety observer’s role is to warn of the approach of other water vessels representing a hazard, such as boat wash or vessel contact.
- The water vessel must be licensed to carry at least four (4) people.
- The water vessel operator must hold a proficiency in small boat handling certificate as a minimum qualification.
- The vessel operator must conduct a water vessel safety induction before starting work and crew must follow all safety instructions given (including emergency procedures) at all times.
- Do not climb in or out of the water vessel from any raised platform or scaffolding fixed to the vessel.
- Scaffolding erected on a water vessel must be secured to the vessel and reached by a secured or fixed ladder.
- Hot sticks (including fishing line attachment) must be checked and cleaned (using a silicon cleaning cloth) before use.
- Establish effective communication between personnel on the water vessel, the support crew and NOCC.
- All water vessels used for work on overhead powerlines must have a safety barrier with a minimum height of 900 mm erected around the vessel to prevent falling into the water.
• All raised platforms or scaffolding on the vessel must have a solid floor and safety rail at 900 mm high.

**Personal protective equipment (PPE)**

While working from a water vessel, wear the PPE outlined in Field Instruction 3.1 (Clothing and personal protective equipment requirements) and the addition PPE:

• Life jacket (PFD Type 1) or buoyancy vest (PFD Type 2). AS 1512 and 1499.

**Procedure**

Before commencing work, all crew members must carry out an on-site risk assessment including checking the conductor, poles and hardware either side of the bay being worked on.

If any defect of the pole, pole hardware or conductor is found, do not start fitting of hazard identification warning markers until it is repaired.

Prior to installation of hazard identification markers:

• Notify NOCC.
• Disable auto-reclosing devices.
• Issue a vicinity authority.
• Position and stabilise the water vessel beneath overhead conductors (e.g. using anchors).
• Attach the snap clamp applicator to the rising sun of a hot stick, and position the snap clamp with hazard identification warning marker in the snap clamp applicator.
• Extend the fishing line the full length of the hot sticks, thread it through either hole in the base of the snap clamp and return to base of hot sticks.
• Assemble (in the vertical position) the required lengths of hot sticks and raise the hazard identification warning marker to the conductor. A second person may be required to assist in the assembling on the hot sticks.
• Attach hazard identification warning markers to the overhead conductors by positioning them against the underside of the conductor and pulling down on the fishing line to release the snap clamp.
6.17 Removing embedded poles from the ground

Purpose

This work practice outlines the approved methods for removing wood and concrete poles that are embedded in the ground.

Instructions

Before commencing work:
- conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

Methods

Use any of the following methods to pull or remove embedded poles:
- Use a truck-mounted, winch-driven, A-frame type puller that is especially designed for pole pulling.
- Use a specially designed hydraulic pole jack and chain with an approved pole wedge to pull the pole while supporting the pole with a crane.

Note:
- Before using a hydraulic pole jack and chain to remove poles or pole butts that are embedded in the ground, ensure that the base of the hydraulic jack is located on level ground at the base of the pole.
- In all circumstances, the crane must only lift a free load. The crane must not be used to pull the pole in any circumstances, as the full load cannot be determined.

Equipment

- Ensure that the pulling chain:
  - has been inspected and tagged
  - has been checked for stretched links, cracks and deformities before use
  - is a herc-alloy 800 (grade ‘T’ chain)
is used in either a basket sling or choke arrangement

Note:

- When the chain is used in a choke position it must be 20 mm or greater.
- When the chain is used in a basket sling position it must be 16 mm or greater

- The hydraulic pole jack and chain must be used with an anti-slip approved pole wedge and reinforcing protectors.
- Pulling chains must not be tensioned around steel reinforcing steel columns without using an approved pole wedge and reinforcing protectors (as the chain may slip without warning).
- Pole jacks with the pulling chain attached to the base of the cylinder barrel must be modified, in an approved method, so that the pulling chain is placed at the top of the cylinder barrel.

Removing concrete poles

While supporting the pole with a crane, excavate around the pole until the base is completely exposed, then lift the pole clear.

Removing wooden poles

- While supporting the pole with a crane, excavate around the pole until the base is completely exposed, then lift the pole clear.
  or
- While supporting the pole with a crane above the point of balance, cut the pole off above the ground. Then remove the pole butt using one of the methods outlined above (see the Methods section). Ensure that the pole butt is long enough to allow for it to be removed.

References

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
6.18 Inspection of overhead assets from vehicles

Purpose

This work practice outlines the minimum requirements when inspecting overhead assets from a vehicle.

Scope

This work practice only outlines how a driver plans the inspection and uses the vehicle when performing an inspection of overhead assets. It does not outline how to perform the inspection itself.

Note:

The only method of carrying out an inspection from a moving vehicle is to have two or more personnel in the vehicle.

- The driver must only concentrate on driving the vehicle.
- The passengers must:
  - carry out the inspection and allow the driver to concentrate on driving
  - keep within the cab of the vehicle at all times

If there is only one person in the vehicle they must:

- only concentrate on driving
- stop the vehicle and inspect the overhead asset from a stationary position

Training and authorisation

Only Western Power employees and contractors who have undertaken and completed the following courses may carry out inspection of overhead assets from a vehicle. These courses are provided by Power Training Services WA (PTSWA).

- Operate light vehicle
- (If required to drive a vehicle with a vehicle-mounted warning device) – Basic worksite traffic management
- (If required to drive in a four wheel drive vehicle on rough terrain) – Operate, maintain & recover a four wheel drive vehicle
Instructions

Note:
Western Power employees and contractors must ensure that all reasonable care is taken to avoid damage to:
- property
- any existing utility installation
- the environment

Environmental implications
Where inspections involve driving off-road, activities must conform to Western Power’s environmental policy and requirements. For more on this, see section 11 (Environmental) in this manual.

Customer implications
Inspectors of overhead assets must carefully follow Western Power’s policies and requirements for entering private properties. All reasonable attempts to notify the occupier of the property must be made, and all reasonable requests of the occupier must be complied with. For more on this, see work practice 5.10 (Land access-private property) in this manual.

Risk assessment
A risk assessment and job briefing must be performed by the driver and passenger prior to commencing the task. For more on this, see work practice 2.28 (Job briefing process) in this manual.
- The risk assessment must consider the following hazards at a minimum:
  - vehicles and equipment that will be used
  - inspection methods
  - roles of individuals in performing tasks
  - communication plan. For more on this, see the Communications section, below.
  - environmental issues
  - accessing private property
  - traffic management, including:
    - traffic disruption, including public transport
if a vehicle-mounted warning device and ‘Caution’ signs are required. For more on this, see the Vehicle-mounted warning devices and ‘Caution’ signs section, below.

- sight distance to the work vehicle for approaching traffic
- the need for a lookout person – to warn workers on foot (on the roadway) of approaching traffic
  - work vehicle position
  - road conditions
  - weather and other conditions affecting visibility
  - fire precautions where required

- If any hazards cannot be controlled, the work must be rescheduled.

**Vehicles and equipment**

- Use a vehicle that is suitable for the planned works and terrain.
- Ensure that vehicles and associated equipment are inspected, tested, registered and certified to conform to Road Traffic Act 1974 (WA).

**Note:**

Drivers of vehicles carrying out inspection activities, and any passengers, are personally responsible for being aware of and complying with the following laws at all times:

- Road Traffic Act 1974 (WA)
- Road Traffic Code 2000 (WA)
- Occupational Safety and Health Act 1984 (WA)

**Vehicle-mounted warning devices and ‘Caution’ signs**

- A vehicle-mounted warning device consisting of an amber or orange flashing lamp, must be:
  - mounted as high as practicable on an inspection vehicle
  - visible to approaching vehicles from at least 500 m in any direction
  - used when:
    - occupying a hazardous position on a road
    - stationary
    - manoeuvring at a speed not exceeding 20 km/h
Note:

The flashing lamp:

- **must** have an audible or visible indicator mounted within the vehicle to warn the driver that the lamp is operating
- **must not** be fitted directly within the driver’s normal field of vision or be visible in the rear view mirrors

- In conjunction with a vehicle-mounted warning device, a ‘Caution’ sign may be used, but is not mandatory. The ‘Caution’ sign is placed on the rear of a vehicle and may only be displayed when carrying out an inspection. Examples of ‘Caution’ signs are:
  - Caution – slow moving vehicle
  - Caution – frequently stopping vehicle

Communications

- In the event of an emergency, call emergency services or Network Operations Control if required. For more on this, see:
  - Appendix 4 (Emergency contact information)
  - Appendix 5 (Western Power facilities information)

- Personnel may be required to liaise with the following stakeholders (e.g. if there is a bushfire or harvest and vehicle movement ban):
  - local government authorities
  - Department of Parks and Wildlife (DPaW)
  - property owners

References

- Work practice manual:
  - work practice 5.10 (Land access – private property)
  - Appendix 4 (Emergency contact information)

- Road Traffic Act 1974 (WA)
- Road Traffic Code 2000 (WA)
- Occupational Safety and Health Act 1984 (WA)
6.19   Pole top rescue

Purpose
This instruction outlines the minimum requirements for the use and maintenance of pole top rescue kits.
The instruction only provides the key safety requirements relevant to performing a pole top rescue and does not attempt to replicate any requirements detailed in training or other pertinent documents.

Exclusions
This instruction does not apply to work from an elevated work platform.

Instructions
• Confirm the safety observer or any competent person required to perform a pole top rescue is physically capable.
• Attach a sufficient number of pole-top rescue kits when working on, or close to:
  o bare live or de-energised low-voltage aerial conductors or specific situations identified during the job risk assessment process.
  o At the pole top, attach the pole-top rescue kit in the best position for a rescue.
• A competent person conducting a pole top rescue must wear insulating gloves with a protective outer. For more on this, see Field instructions 3.1 (Clothing and personal protective equipment requirements) and 3.2 (Glove protection) in this manual.

Training
Confirm that the safety observer and person(s) working at the pole top on live or de-energised conductors has achieved a pole top rescue competency within a 12-month period. (A refresher training grace period of six (6) weeks applies at the end of the 12-month period).
Pole-top rescue kit inspection

- Before commencing work at the pole top, both the safety observer and person(s) working at the pole top must inspect and confirm the adequacy of the pole-top rescue kit.
- Formally inspect pole-top rescue kits at least six monthly, using the approved checklist. Maintain a record of the inspection.
- Immediately, withdraw from service and install an "Out of Service" warning tag to any pole-top rescue kit component found defective or damaged.

References

- Work Practice Manual, field instructions:
  - 3.1 (Clothing and personal protective equipment requirements)
  - 3.2 (Glove protection)
6.20   Fire hydrant signs on Western Power poles

Purpose

This work practice outlines what to do when work on a Western Power pole may/will result in a fire hydrant sign being disturbed.

While Western Power is not legally required to accept any responsibility for signs that are attached to poles, fire hydrant signs are maintained on Western Power poles as it provides a valuable service to the local community.

Instructions

The onsite person in charge must notify the Department of Fire & Emergency Services (DFES) in the following circumstances:

- Personnel are conducting a pole change and it is not possible to move the sign from the old pole to the new one.
- Personnel are required to move the position of the poles that have fire hydrant signs still attached.

For contact information, see Appendix 4 (Emergency contact information) in this manual.

Note:

These instructions also apply to country areas, where the appropriate local government/shire council bush fire brigade should be contacted.

References

Work Practice Manual, Appendix 4 (Emergency contact information)
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6.21 Helicopter safety

Purpose

This instruction:

- Outlines the safe work systems for persons carrying out work on behalf of Western Power who are required to perform aerial power line inspections or patrols from a helicopter or provide ground support
- Sets out the key safety requirements relevant to aerial power line inspections, patrols or ground support
- Does not attempt to replicate any detailed work practices contained in training documents.

Note:
In response to an unforeseen event, an authorised helicopter pilot acting on behalf of Western Power may override this instruction.

Instructions

- Conduct a pre-flight briefing, including a job risk assessment that includes the plan of operation for the day.
- The method of communication between the aircraft and Western Power ground staff must be established prior to flying, radio being the preferred method. Mobile phone (SMS messaging) or Sat-phone may also be used.
- During the task of aerial patrols Western Power will assume the search and rescue role.
- Wear hard crash-style helmets with integral communication facilities (provided by Western Power) at all times during the flight.
Training and authorisation

Helicopter aerial inspection or patrol crew must have successfully completed:

- **Training course:** Successful completion of Power Training Services training course PTS 210.

- **Rear seat observation:** Completion of one (1) hour in the rear seat of an aircraft while observing an experienced person conducting a power line inspector/patrol observation.

- **Front seat observation:** Completion of two (2) hours in the front seat of the aircraft undertaking power line inspector/patrol observation under the guidance and coaching of the experienced helicopter power line inspector.

- **Solo inspection/patrol:** Successful completion of the three (3) hours of power line inspector/patrol observation training (see items 2 and 3 above) and written approval from both the pilot and experienced observer is required before trainee will be allowed to inspect/patrol solo.

- **Refresher training:** Refresher training for inspection/patrol is required every two (2) years.

- **Re-instatement of approval to inspect/patrol by helicopter:** If an inspector/patrol officer has not undertaken aerial (helicopter) patrol work for a period of two (2) years, they must successfully complete Power Training Services training course PTS 222, but are not required to complete the three (3) hours of aerial observation training.

- **Ground staff:** Any ground staff required to hold Search and Rescue certification must attend the Power Training Services training course PTS 210 excluding the practical flying portion.

- **Observers:** must maintain a log book for recording aerial patrol time and be endorsed by the pilot at completion of the patrol.
6.22  Interconnecting LV overhead networks

Purpose

This work practice outlines how to help prevent back-feeding the overhead high voltage (HV) network through overhead low voltage (LV) network interconnection.

Background

It is Western Power practice to interconnect the overhead LV network in order to maintain customer supply and power quality during maintenance. For more on this, see Electrical System Safety Rules (ESSR), 2012, section ‘11.2.7 Interconnecting LV circuits’.

Such interconnection can result in the paralleling of HV/LV transformers, causing:
- possible feedback onto the HV via the interconnection on the LV network
- increased LV fault-levels.

Authorisation

Personnel performing LV switching must:
- possess a current Network Authority Card (NAC) with current authorisation to perform the work tasks
- have a Low voltage overhead and underground (LOU) authorisation if required to perform LV switching activities.

Instructions

Note:

Where possible, service connection testing should not be performed while the LV overhead network is still interconnected.

- All switching must follow a switching program that has been created and checked by an authorised switching operator (ASO).
- If taking a transformer out of service and using an alternate supply (from another transformer), ensure that the second transformer is sufficiently rated to absorb the increased load.
- Paralleling HV/LV transformers by closing LV normally-open points (NOP) creates the potential for elevated LV fault currents.
• Plan to interconnect the minimum number of transformers.
• Keep the interconnected time as short as possible.
• If the transformers intended to be paralleled cannot absorb the total load, then consider
  ○ the use of an emergency generator
  ○ a planned outage.

**Things to avoid**

Avoid creating situations as shown in Figures 1 and 2, below, when interconnecting the LV network by closing NOP.

• In Figure 1, below, the protection device in the HV circuit is bypassed via the transformers and LV circuit, resulting in:
  ○ the device not tripping for a fault due to the fault current being shared by the LV network
  ○ damage to the LV network
  ○ possible operation of the transformer drop-out fuses for no apparent reason
  ○ the source HV breaker tripping, resulting in complete loss of supply.

![Diagram of protective device in between transformers](image)

**Figure 1: Interconnecting LV with protective device in between transformers**
In Figure 2, below, two HV networks are paralleled through the closed LV NOPs. If one of the source breakers trips:

- the load/fault current of the tripped HV feeder is carried by the healthy HV feeder, back-fed through the LV network
- excessive load could damage the LV network.

**Figure 2: Interconnecting LV with transformer from different feeders**

**LV fused jumpers**

If interconnection will result in either of the situations shown in Figures 1 and 2 above, then LV fused jumpers (stock code CE0056) must be used to bypass the NOPs. See figures 3 and 4 below.
When NOPs are closed, or bypassed using LV fuse jumpers, this creates an ‘abnormal’ situation. An ‘Information’ caution tag must be fitted to the pole using a pole wrap (see Figure 5, below). For more on tags and pole wraps, see work practice 2.15 (Network tags) in this manual.
Using LV fused jumpers

The following steps must be taken when interconnecting the LV using the LV fused jumpers:

1. Include on the Distribution Network Access Request (DNAR) the requirement for LV fused jumpers to be fitted and their location in relation to the location of the transformers on the HV network and the LV interconnection.
2. Check to prove the 160A high rupture capacity (HRC) fuse has not blown, by carrying out a continuity test on the LV fused jumpers.
3. Close the NOP LV disconnecting switch and ensure current is less than 160A.
4. Connect the LV fused jumpers across the LV disconnecting switch using it as a bypass (in parallel).
5. Open the LV disconnecting switch.

**Important**

- If the measured current (step 3 above) is greater than 160A, do not proceed. Call Network Control and arrange for alternative supply.
- If the LV fuse operates (blows) while installed, do not proceed. Call Network Control and request advice to:
  - check the cause of the fuse operation (HV back-feeding or fault on the LV)
  - rectify the cause before restoring supply and replacing fused jumpers.

**Do not attempt to replace or bypass the HRC fuse.**
The following steps must be taken when removing the LV fused jumpers on completion of work:
1. Close the NOP LV disconnecting switch.
2. Remove the LV fused jumpers.
3. Open the NOP LV disconnecting switch.

**LV fused jumpers with blown fuses**
- Sealed units must be replaced using the LV fused jumpers (stock code CE0056) shown in Figure 6, below.

![LV fused jumpers (stock code CE0056)](image)

**Figure 6: LV fused jumpers (stock code CE0056)**

**Note:**
LV fused jumpers must not be confused with boundary bypass jumpers (stock code EE1460).

**References**
- Electrical System Safety Rules (ESSR), 2012, section ‘11.2.7 Interconnecting LV circuits’ (DM# 9199327).
- Work Practice Manual, work practices:
  - 2.15 (Network tags)
  - 6.1 (LV overhead work).
6.23 Stringing transmission conductors over distribution conductors

Purpose

This work practice outlines the minimum requirements for stringing transmission lines over distribution low voltage (LV) and/or high voltage (HV) conductors.

Instructions

Before commencing work:

- conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

Note:
The operator of the cable drum/brake trailer must:

- wear gloves rated at 500 volts along with mechanical outers
- stand on an equipotential mat while operating the equipment

Joint access pole

If transmission and distribution share the same pole then the following points must be followed:

- All new distribution LV must be aerial bundled conductor (ABC) and be installed on the road side of the pole.
- Prior to installing conductors or undertaking repairs, all existing open aerial distribution LV conductors must be either:
  - replaced with LV ABC
  - de-energised and shorted
- String and tension the white/centre phase conductor on transmission crucifix poles so that it is on the opposite side of the pole to the LV ABC. This will allow the maximum clearance between the transmission conductor and distribution LV ABC.
• Erect a barrier around the cable drum/brake trailer to ensure that members of the public do not come into contact with the trailer or conductor.

• If the LV ABC is energised, fit an earthing roller to the transmission conductor that is being installed.

### Transmission conductors crossing bare distribution LV conductors

• Isolate the bare LV conductors by using LV disconnectors (e.g. blades, Krone fuse switch unit (FSU)).

• Test that the LV is isolated and install rated LV shorts. For more on this, see work practice 2.10 (Use and management of portable overhead earthing / shorting equipment) in this manual).

• Permit requirements must be approved by Network Operations Control (NOC) (previously known as SOCC) (see section 7.3.14 in Electrical System Safety Rules (ESSR)).

### Transmission conductors crossing bare distribution HV conductors

• Isolate the bare HV conductors by using rated overhead and underground isolation points.

• Test that the HV is isolated and install rated portable earths. For more on this, see work practice 2.10 (Use and management of portable overhead earthing / shorting equipment) in this manual).

• Permit requirements must be approved by NOC (previously known as SOCC) (see section 7.3.14 in ESSR).

### References

• Work Practice Manual:
  o work practice 2.10 (Use and management of portable overhead earthing/shorting equipment)
  o work practice 2.28 (Job briefing process)
  o section 3 (Personal protective equipment)

• Electrical System Safety Rules (ESSR)
6.24 Pole top switch retaining spring installation

Purpose

This work practice outlines how to install retaining springs to the flexible tails (flexi-tails) and moving insulator bars on old pole top switches.

Scope

Old pole top switches require the installation of a spring (stock code CB 3056), as shown in Figures 1 (Switch that requires retaining springs) and Figure 2 (Retaining spring assembly). The spring is a standard fitting on all new pole top switches.

Figure 1: Switch that requires retaining springs

Figure 2: Retaining spring assembly
Training and authorisation

- Personnel performing any of the tasks described in this work practice must be qualified, competent and authorised Cert. III line workers (or equivalent).
- If performing live work, personnel must be authorised and competent high voltage live line glove and barrier workers (see section 3 (Selection, authorisation and competency) in the High Voltage Live Work Manual).

Instructions

- Prior to commencing work:
  - conduct a risk assessment and job briefing (see 2.28 (Job briefing process) in this manual)
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- Raise relevant permits:
  - EAP (Electrical Access Permit) – required when working on isolated, de-energised and earthed apparatus
  - VA (Vicinity Authority) – required when working on live HV lines or apparatus
- If conductors are isolated and earthed yet there is still the risk of an induced voltage, apply additional safety requirements (outlined in work practice 2.9 (Induced voltages) in this manual). This will prevent the risk of electric shock.
- Use a wire brush to clean the surface of the flexi-tails and the moving insulator bar to enable a good electrical contact.
- Fit the retaining spring to the top of the flexi-tails at the bolted connection of the moving insulator bar (see Figure 2 (Retaining spring assembly)).

References

- Work Practice Manual:
  - 2.9 (Induced voltage)
  - 2.28 (Job briefing process)
  - Section 3 (Personal protective equipment)
- High Voltage Live Work Manual, section 3 (Selection, authorisation and competency)
6.25 Streetlight service remote from mains supply

Purpose

This work practice provides:

• the requirements for the installation and maintenance of streetlight service conductors
• guidance for the removal of streetlight switch wire circuits, associated control gear and the installation of Class II streetlight luminaires with photo-electric (PE) cells
• guidance on the conversion and replacement of the switch wire and neutral conductor

Training and authorisation

Anyone working on or near Western Power assets must be suitably trained and authorised for the task. The necessary qualifications are outlined in Streetlight Switchwire Removal Technical Specification (DM# 8826530). Members of the Network Total Workforce who perform streetlight service conductor installation, maintenance and switch wire removal must also possess a valid Network Authority Card.

Distribution linesperson must be present

In addition to the requirements listed above, each crew performing streetlight switch wire removal and installation work has to include at least one team member who has completed a Certificate III in ESI – Distribution.

Safety

• Before commencing work:
  o conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) and 2.27 (Construction site hazard management forms) in this manual)
  o ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
• All minimum approach distances must be maintained at all times. For more, see work practice 2.8 (Minimum approach distances (MADs)) in this manual.
• All work must be carried out via an insulated elevated work platform (EWP). For more, see work practice 2.6 (Mobile elevated work platform (EWP) safety) in this manual.

• Safety observers must comply with all the requirements of work practice 2.2 (Safety observer role) in this manual.

• All ground clearances must be maintained. For more, see work practice 6.8 (Conductor clearances)

Instructions

Replacing a failed switch wire – under fault conditions only

If a switch wire falls to the ground due to an unplanned event, complete the following steps:

Where there is no LV on the pole:

1. The broken conductor must be correctly isolated.

2. The whole bay of the streetlight/switch wire conductor must be removed and terminated on the structures either side of the break.

3. All redundant streetlight/switch wire conductors must be removed.

4. The bay must be replaced with 6 mm² insulated service wire using existing LV strain clamps. Only one bay length of conductor can be installed, up to a maximum length of 60 m.

5. The streetlight circuit can then be re-energised.

Where there is LV on the pole:

1. The broken conductor must be correctly isolated.

2. The whole bay of the streetlight/switch wire conductor must be removed and terminated on the structures either side of the break.

3. All redundant streetlight/switch wire conductors must be removed.

4. The streetlight circuit can be re-energised up to the break that has been created.

5. All streetlights on the isolated section must be connected to the overhead LV distribution conductors, fused and switched through a PE cell. If required, install new Class II double insulated luminaires.

If a full repair cannot be completed at the time of the incident, this must be reported to the Customer Service Centre on 13 13 51.
Replacement and conversion

Existing switch wires may be replaced or converted with the appropriate configuration.

When replacing the switch wire, the redundant live and neutral switch wires must also be removed. The neutral wire may need to be retained if it is being used to interconnect supply areas.

Aluminium conductors must be used when converting the switch wire and neutral conductors, and be in a serviceable condition. If there are any copper conductors within the run of the circuit, they must be replaced with aluminium conductors.

The replacement configuration depends on one initial factor, which is whether the pole carries any LV conductors.

Poles with LV conductors

1. Before removing the switch wire circuit, the streetlights connected to the circuit must be:
   - connected to the overhead LV distribution conductors
   - fused and switched through a PE cell
   - if required, replaced with a new Class II luminaire (double insulated)
2. The correct isolation of the switch wire circuit must be carried out.
3. All switch wire conductors and associated hardware must be removed.

Poles with no LV conductors

Where the switch wire and neutral wire must be replaced, there are conditions that need to be considered when assessing the replacement configuration requirements: wind region, pole strength, number of bays and streetlights, conductor size and type of streetlight. These conditions are addressed in the following requirements:

Surrounding ground – must be flat and level.

Bay length – is dependent on the wind region:
   - wind region A – maximum 60 m
   - wind region B – maximum 50 m

Pole requirements – are dependent on the type of pole and the wind region.
Cable ground clearance – must be a minimum of 5.8 m.

Cable attachment height – must be a minimum of 7.87 m.

Cable size requirements:

2-core 6 mm² cable only
- Bays allowed – one bay only
- Streetlights per installation – one streetlight only

2-core 16 mm² cable only
- Bays allowed – multiple
- Streetlights per installation – multiple
- Cable length may be a maximum of 800 m

Line deviation limits across multiple bays:
- without a stay – maximum of 5°
- with a stay – maximum of 20°

All replacement configurations must comply with the Distribution Technical Standard – Replacement of Streetlight Switch Wire – Provisions when no LV mains are available (DM# 11285289).

Conversion of existing streetlight conductors

Where there are no LV mains on the pole and there are aluminium switch wires and neutral conductors in a serviceable condition, they may be left in their current position. All pole attachments and goosenecks must also be in a serviceable condition.

The electrical supply to these conductors must be changed from the switch wire control box to be directly connected to the LV mains. Such a conversion is permissible provided that the following conditions are met:
- This solution is only available for aluminium conductors which are in a serviceable condition. All copper conductor is to be replaced.
- All pole attachment equipment must be in a serviceable condition.
- The pole attachment configuration is to remain the same as that which is existing. The current configurations that are applicable are shown in Figure 1.
- The switch wire control box must be removed and the conductors connected directly to the LV mains.
Conductor clearance for the layout shown in Figure 1 (C) must be 380 mm.
Minimum ground clearance of 5.8 m at the lowest point of either phase or neutral conductor, is required.

**References**

- Work Practice Manual:
  - work practice 2.2 (Safety observer role)
  - work practice 2.28 (Job briefing process)
  - work practice 2.6 (Mobile elevated work platform EWP safety)
  - work practice 2.8 (Minimum approach distances)
  - section 3 (Personal protective equipment)
  - work practice 6.8 (Conductor clearances)
- Replacement of Streetlight Switchwire – Provisions when no LV mains are available (DM# 11285289)
- “Streetlight Switchwire Removal” Technical Specification (DM# 8826530)
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6.26 Maintenance work on High Voltage Aerial Bundled Conductor (HV ABC), Hendrix Spacer Cable systems and Covered Conductor Thick (CCT)

Purpose

This instruction outlines the requirements when performing construction and maintenance work on HV ABC and Hendrix Spacer Cable systems (covered high voltage overhead distribution cable systems in the network).

Safety

Maintenance work must only be performed on HV ABC, Hendrix Spacer Cable and CCT in accordance with Western Power training manuals. These overhead systems are cables with an insulation layer, some having semi-conductive layers and/or earthed braids, and so it may not be practical (or even possible) to use working earths for maintenance work compared to a bare wire overhead system.

As a result, when working on a de-energised phase conductor, make sure that:
- program earths are installed at all of the isolation points
  AND
- a phase earth is connected to the messenger wire or catenary wire (HV ABC and Hendrix):
  - in metro areas – via an additional metro earth set phase loop
  - in country areas – via the country three phase SWER earth set

Work on these systems must not proceed unless the messenger or catenary wire is bonded to all phase conductors.

The following switching principles must be carried out during the switching schedule before commencing any maintenance work.

- **Isolate** – ensure that the sections to be worked on are isolated from any source of supply.
- **Verify** – use Western Power approved testing methods and test instruments to ensure that the isolated sections to be worked on are de-energised.
- **Program earths** – use Western Power approved earthing methods and equipment to ensure that program earths are installed at all isolation points (including messenger and/or catenary) to prevent any source of electrical potential (including induction, backfeed or residual current) from energising the isolated section.

  The line route must be patrolled from isolation points to the worksite by the work team before signing onto the work permit.

- **Working earths** – working earths must be installed (including messenger and/or catenary) if there are earth parking facilities inside the isolation area and in view of the worksite.

---

**DANGER**

- HV ABC and Hendrix Spacer Cable systems, although insulated, are not touch safe systems. Maintenance work that will strip or expose the insulated conductors must not be attempted while the system is live.

- The HV ABC system is capacitive in nature and switching programs must set conditions to prevent:
  - injury to personnel due to Ferranti effect
  - damage to equipment
  - loss of power due to ferroresonance

---

**Note:**

For HV live work open aerial with a combination of HV ABC, Hendrix and CCT, see the High Voltage Live Work Manual, field instructions 8.4 (Energising / de-energising and bypassing of conductors and apparatus – glove and barrier method) and 9.3 (Energising / de-energising and bypassing of conductors and apparatus – distribution stick method).
Instructions

HV ABC and Hendrix Spacer Cables

- **System earths (down earth)** – ensure that the catenary or messenger wire is properly connected to the structure’s down earth.

- **Surge arresters** – ensure that the surge arrestors are installed at HV ABC and Hendrix Spacer Cable termination points. (Termination points are exposed parts of the system and installing surge arresters prevents lightning surges from entering and damaging the conductor.)

**HV ABC only**

- **Terminations and joints** – correct terminations or straight joints on new sections must be installed as soon as possible. Repairs using 3M Scotch® semi-conducting tape (#13) and insulating tape (#23) must be considered as temporary only.

- **Tagging** – all joints must be tagged with the Network Authority Card (NAC) number of the joiner for identification purposes. These tags are to be used for analysing failed joints and determining the most appropriate solution for improvement.

- **Cutting** – the whole bundle must be secured before cutting. If this is not done, the conductor may uncoil violently.

- **Cut core** – a cut core must always be secured. Always have the severed core secured to the remaining bundle.

- **Earthing braids** – braids and/or earthing must be correctly attached to the bare catenary wire according to the construction standards drawing. Installing these over the top of any preformed grips is not acceptable.

**Returning HV ABC and Hendrix Spacer Cable back into service**

The Distribution Commissioning Work Instruction (DCWI) for High Voltage Aerial Bundled Conductor and Hendrix Spacer Cables (DM# 3802270) must be used when energising a new section or returning an existing section back into service.
References

- High Voltage Live Work Manual, field instructions:
  - 8.4 (Energising / de-energising and bypassing of conductors and apparatus – glove and barrier method)
  - 9.3 (Energising / de-energising and bypassing of conductors and apparatus – distribution stick method)
- Distribution Commissioning Work Instruction (DCWI) for High Voltage Aerial Bundled Conductor and Hendrix Spacer Cables (DM# 3602270)
6.27 Compacting pole holes

Purpose
This instruction describes the minimum requirements when backfilling and compacting soil around poles.

Scope
This instruction applies to all Network Total Workforce (NTW) employees and contractors who install poles on Western Power's network.

Safety and Training
- Anyone who performs this task must:
  o hold a Network Authority Card (NAC)
  o wear the correct level of personal protective equipment (PPE) for the task. For more on this, see Section 3 (Personal protective equipment) in this manual.
- At the start of this task, a risk assessment and job briefing must be done.
- For more information on safety while compacting pole holes, see Worksafe WA Code of Practice – Excavations 2005.

Instructions
1. When the pole hole has been bored out, assess the spoil for suitability for backfilling. Wet clay, rock and wet sand may not be suitable, so suitable material may have to be brought to the site.
2. Break large pieces of excavated soil down into small pieces to assist with easy backfilling. This helps avoid creation of air pockets around the pole.
3. Position the pole into the hole and backfill with soil in layers no deeper than 150 mm.
   a. Compact each layer of soil with a post hole rammer or hydraulic pole tamper. For more on this, see field instruction 5.13 (Use of a hydraulic pole tamper.)
   b. Repeat until the hole has been filled to the top soil level
4. Finish backfill with top soil to a level of 100–150 mm above existing ground level and compact to allow for soil settlement.

5. Remove any excess soil from site. This reduces the environmental impact of the process.

References

- Work Practice Manual:
  - section 3 (Personal protective equipment)
  - field instruction 5.13 (Use of a hydraulic pole tamper)
6.28 Powerwatch security lighting – wooden and concrete poles

Purpose

This field instruction outlines the minimum requirements when carrying out inspection, maintenance and replacement of Powerwatch security lighting installed on wooden and concrete poles.

Scope

This instruction is applicable to all Network Total Workforce (NTW) personnel who are required to work on class 1 and class 2 Powerwatch security lighting installed on wooden and concrete poles. It also provides the minimum clearances and safety requirements.

This instruction only applies to existing installations, as Powerwatch security lighting is no longer being installed.

Training

Personnel performing carrying out Powerwatch security lighting work on Western Power wooden and concrete poles must be suitably trained and authorised for the task. The minimum requirements are:

- be a licensed electrician or a Certificate III (ESI) distribution linesperson or equivalent
- possession of a valid Network Authority Card
- current – Perform EWP rescue UETTDRRF03B

Safety

All personnel must wear the correct level of personal protective equipment (PPE) for the task that they are doing. For more on this, see section 3 (Personal protective equipment) in this manual.

All work at height must be carried out via an insulated elevated work platform (EWP). For more on this, see field instruction 2.6 (Mobile elevated work platform (EWP) safety) in this manual.

A safety observer must be appointed as described in field instruction 2.2 (Safety observer role).
Instructions

1. A risk assessment must be done before any work commences.
2. Carry out an inspection of the pole to confirm that it is safe to work on. For more on this, see field instruction 6.2 (Poles – inspection and support prior to commencement of work) in this manual.
3. Using a volt meter, test between the neutral and the conductive parts of the Powerwatch unit to confirm a voltage of less than 6 volts.
4. The electric supply to the Powerwatch unit must be identified and isolated. This may be done via the disconnection of the existing wiring from the overhead line.
5. Confirm that the supply has been isolated by proving that the Powerwatch unit is de-energised.
6. Confirm whether the unit is:
   - class 1 – the earth is bonded to the metal housing of the fitting
   - class 2 – double insulated
   Record this information on the Powerwatch Data Sheet (DM# 10443953).

Note:
For all concrete poles and wooden poles with metalwork coming down the pole to the ground, only class 2, double-insulated Powerwatch units are allowed. All existing class 1 installations on these poles must be changed to class 2.

7. Inspect the Powerwatch unit for the following:
   - cracked lens covers
   - leaking seals
   - corrosion
   - signs of damage
8. Remove all covers from the lamp wiring chamber, separate the control gear (where installed) and check the internal wiring for:
   - damaged insulation
   - excessive heat
   - poor connections
9. Remove the lamp (globe) and check the lamp holder for damage, moisture or any exposed connections.

10. If defects are found during the inspection of the Powerwatch (steps 7 to 9 above) then a new lamp (globe) must be installed, following these instructions.

11. The photoelectric (PE) cell must be replaced, and positioned where no other artificial light source can affect it.

**Note:**
If any defects are found on the Powerwatch security light, the light must be completely replaced with a new class 2 unit. Installations must be either all class 1 or all class 2.

12. All existing wiring and the Flowline fuse carrier must be removed and replaced with a special purpose Flowline fuse carrier (GF1802 for wood poles and GF1803 for concrete poles).

13. All new wiring must be:
   - installed in 20 mm² grey, corrugated, flexible conduit
   - installed in a manner that avoids the ingress of water
   - fixed securely to the pole

14. Install cable (EE1379 or EE1380) from low voltage (LV) overhead conductors to the Flowline fuse.

**Note:**
Do not make connections to street lighting switch wire.

15. Install 2.5 mm² (or larger) thermoplastic sheathed cable (TPS) from the Flowline fuse carrier to the floodlight or remote control gear.

16. The wiring and fixing of all Powerwatch security lighting must comply with Technical Requirements for Powerwatch Installations on Wooden and Concrete Poles (DM# 11090515).

17. Before energising the installation, test the installation in accordance with AS/NZS 3760:2010 (In-service safety inspection and testing of electrical equipment, section 2.3.3 (Testing)).

18. An appropriately sized fuse must be installed in the Flowline fuse carrier.

19. Check the Powerwatch unit’s floodlight to ensure that it is operational.
Work Practices

Installation

No new replacement Powerwatch units should be installed on wooden poles where operational equipment is installed on the pole, as they may restrict the ability to safely operate the equipment.

For situations where they are already installed on poles with operational equipment, an assessment must be made to evaluate whether the unit is likely to restrict safe access to operate the equipment. For more on this, see Technical Requirements for Powerwatch Installations on Wooden and Concrete Poles (DM# 11090515). If these requirements cannot be met, contact the Western Power project manager.

Clearances

- Powerwatch security lights must be installed between 5 m and 6 m from the ground.

**Note:**

If the pole is positioned relatively close to a road, the minimum clearance must be at least 5.5 m (or 6 m in the case of high load routes).

- The distance between the bottom crossarm of a pole (or ABC hanger bracket) to the top of the security light must be a minimum of 300 mm. If LV isolators are installed on a crossarm, the minimum distance increases to 800 mm.

- Adequate consideration towards minimising light pollution must be considered when installing or positioning the unit.

References

- Work Practice Manual:
  - field instruction 2.6 (Mobile elevated work platform (EWP) safety)
  - section 3 (Personal protective equipment)
  - field instruction 6.2 (Poles – inspection and support prior to commencement of work)
- Powerwatch Data Sheet (DM# 10443953)
- Technical Requirements for Powerwatch Installations on Wooden and Concrete Poles (DM# 11090515)
- AS/NZS 3760:2010 (In-service safety inspection and testing of electrical equipment, section 2.3.3 (Testing))
6.29 Wood pole pre-stand assessment

Purpose

This instruction outlines the items that must be assessed on a wood pole which has been in store or laid on site for more than six months prior to standing, to confirm that it is fit for use.

Instructions

Before a pole is installed on the network, a number of items must be assessed. If the pole is found to be defective it must not be used.

Perform the assessment in the following order:

1. Perform a sound/hammer test

   This test consists of striking the pole in a series of sharp but moderate blows with a wooden-shafted hammer. The recommended hammer weight is 0.45–0.90 kg. A clear, resonant sound indicates that the pole is fit for use, while a dull rebound and a muffled sound is an indication of a defective pole.

   The recommended method for striking the pole is to lift it on one end, as shown below in Figure 1. The sound/hammer test must be conducted over the total length of the pole at one metre intervals.

   ![Figure 1: Pole positioning to perform the sound/hammer test](image.png)

   If the pole:
   - fails – the pole is defective and no further tests need to be done
   - passes – continue to step 2
2. **Assess other items**

   If the pole passes the sound/hammer test, assess the other items described below. If the pole fails the assessment criteria for any of these other items, the pole is defective and any items still remaining do not need to be assessed.

   Assess the following items, in no particular order.
   - fire retardant paint
   - pole end cap
   - ID tag and barcode
   - checks and splits
   - nail plates (hardwood poles only)
   - damage
   - knots
   - pipe
   - spiral grain

   Instructions on how to assess each item are outlined below.

**Fire retardant paint**

Fire retardant paint must be repaired if any part is damaged during transportation or installation. If the paint does not adhere to the pole, the pole is **defective**; this includes bubbles in the covering.

All pockets and grub holes must be completely covered in fire retardant paint.

**Pole end cap**

The pole end cap must be securely fastened as shown in Figure 2, below. A pole without an end cap is **defective**.
Figure 2: Typical defects in a wood pole
ID tag and barcode

The ID tag (or disc) and barcode must be securely fastened as shown in Figures 3 and 4, below. A loose disc may be secured by placing a screw alongside the disc. A pole without an ID tag or barcode is **defective**.

**Figure 3: ID tag**

**Figure 4: Barcode**
Checks and splits

- A check is a gap (crack) that runs along the length of the pole and:
  - starts at one end of the pole
  - does not go deeper than the centre of the pole
- A barrel check is a check that does not start or finish at the ends of the pole.
- A split is a gap that goes deeper than the centre of the pole, or through the pole.
  
  These checks and splits are shown in Figure 2, above.

The permissible gaps are shown below in Table 1, below. A pole is defective if any checks or splits exceed these values. For example, no splits are permitted in the ground line (GL) critical zone.

Table 1: Allowable defect limits for checks and splits

<table>
<thead>
<tr>
<th></th>
<th>Pole top* (incl. pole top critical zone)</th>
<th>Pole ground line (incl. GL critical zone)</th>
<th>Pole butt end and non-critical areas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hardwood</td>
<td>Pine</td>
<td>Hardwood</td>
</tr>
<tr>
<td>max 15 mm width at the toe of cap</td>
<td>max 10 mm width at the toe of cap</td>
<td>• no splits or checks</td>
<td>• no splits or checks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>max 20 mm width of barrel checks</td>
</tr>
</tbody>
</table>

* Pole top is the area between the top of the pole and the lowest point of attachment of a cross-arm.

Nail plates (hardwood poles only)

For hardwood poles, a nail plate is fixed at the butt of the pole. If the nail plate is broken due to a check or a split, the split must meet the requirements of Table 2. If the nail plate is missing the pole is defective.

Knots

Knots are caused by branches coming out of the tree during growth. Photos of knot types and how to measure their sizes are shown in Figures 5–7.

Note:

When measuring knot width, ensure that the total knot width is measured as indicated by the blue lines in Figures 5–7.
• The permissible width for knots is shown in Table 2, below. A pole is defective when a knot exceeds these values.
• Any unsound (soft or decayed) knots, grub holes, etc. must be drained by cutting away additional wood to avoid pooling of water.

### Table 2: Allowable defect limits for knots

<table>
<thead>
<tr>
<th>Pole top¹ (incl. pole top critical zone)</th>
<th>Ground Line Critical Zone</th>
<th>Pole butt end and non-critical areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardwood</td>
<td>Pine</td>
<td>Hardwood</td>
</tr>
<tr>
<td>Pine</td>
<td></td>
<td>Pine</td>
</tr>
<tr>
<td>• poles with a stay attachment – must not have any knots in the pole top critical zone (same as embedment depth)²</td>
<td>• no unsound (soft / decayed) knots</td>
<td>• no unsound (soft / decayed) knot</td>
</tr>
<tr>
<td>• poles without a stay – not exceeding 20% of pole circumference in any 600 mm length</td>
<td>• not more than 50 mm wide for a single sound knot</td>
<td>• not more than 30 mm for a single sound knot</td>
</tr>
</tbody>
</table>

¹ Pole top is the area between the top of the pole and the lowest point of attachment of a cross-arm.
² If a hardwood pole that is intended to be used as a pole with a stay attachment has knots in the pole top critical zone but is otherwise fit for use, it can still be used as a pole without a stay.

### Example calculation to assess a cluster of knots (hardwood pole)

Near the butt end of the pole are five knots (each is 40 mm diameter) within a 600 mm length. The circumference of the pole at the upper end of the 600 mm length is 1300 mm.

Total knot size = 5 knots x 40 mm each = 200 mm

20% of the pole circumference = 0.2 x 1300 mm = 260 mm

As the total knot size of 200 mm is less than 20% (260 mm) of the pole circumference, this knot concentration is permitted.
Figure 5: Measured width of a sound knot (between red lines)

Figure 6: Drained grub hole (width measured between red lines)
Figure 7: Drained unsound knot (cleared width measured between red lines, total knot width measured between blue lines)
Damage

A pole is **defective** if it has any:

- mechanical damage as shown in Figure 8
- cuts deeper than allowed, as outlined in Table 3

![Figure 8: Mechanical damage to wood pole](image)

**Table 3: Allowable defect limits for damage**

<table>
<thead>
<tr>
<th>Pole top* (incl. pole top critical zone)</th>
<th>Ground line critical zone</th>
<th>Pole butt end and non-critical areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardwood</td>
<td>Pine</td>
<td>Hardwood</td>
</tr>
<tr>
<td>• no cuts or damage deeper than 5 mm, not wider than 100 mm</td>
<td>• no cuts or damage deeper than 10 mm, not wider than 120 mm</td>
<td>• no cuts or damage deeper than 5 mm, not wider than 100 mm</td>
</tr>
</tbody>
</table>

* *Pole top is the area between the top of the pole and the lowest point of attachment of a cross-arm.*
Pipe

A pipe is a void at the centre of the pole (see Figure 2).

Use the following points to assess if a pole with any pipes is **defective**.

- top of the pole – piping is not permitted
- butt of the pole – a pipe of up to a 70 mm diameter may be permitted (see Table 4, below)

**Table 4: Allowable defect limits for pipes**

<table>
<thead>
<tr>
<th>Pole top* (incl. pole top critical zone)</th>
<th>Ground line critical zone</th>
<th>Pole butt end and non-critical areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardwood</td>
<td>Pine</td>
<td>Hardwood</td>
</tr>
<tr>
<td>not permitted</td>
<td>not permitted</td>
<td>not more than 70 mm diameter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>not extending into the critical zone</td>
</tr>
</tbody>
</table>

* Pole top is the area between the top of the pole and the lowest point of attachment of a cross-arm.
Spiral grain

Spiral grain is a twist in the fibre along the vertical plane, as shown in Figure 10, below. Spiral grain may cause the pole to twist while in service, which may cause the clearance requirements between phase conductors to be infringed.

A pole is defective when the spiral grain in any one metre length of the pole exceeds 100 mm (see Figure 11 below).
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6.30 Return wire maintenance when the HV phase conductor is energised

Purpose

This work practice outlines the minimum requirements for maintenance involving the return wire of a high voltage (HV) single or three-phase system when the phase conductor or conductors are energised.

Scope

This work practice applies to the following work on the return wire and its parts:
- Replacing insulators.
- Replacing insulator retaining bolts.
- Replacing ties.
- Fitting armour rods.
- Displacing the return wire to allow for a pole change.
- Working on low voltage (LV) cross-arms where minimum approach distances (MADs) to the return wire cannot be maintained.

This work practice does not apply to:
- work that is carried out under an Electrical Access Permit (EAP).
- the repair of a broken return wire. This is covered in work practice 6.14 (Aerial conductor repair) in this manual.
- the ‘Support-01 Displace and replace return wire’ procedure in:
  - High Voltage Live Work Procedures – Glove and Barrier

About the SWER system return wire

The HV return wire of a single wire earth return (SWER) system carries current, so it is classified as part of the HV circuit. If the return wire becomes broken or disconnected while the phase conductors are energised, the return wire may become energised to the same voltage as the phase conductor.

The return wire runs all the way back to the zone substation and is still classed as the SWER return wire even when it is part of a three-phase backbone feeder.
Hazards are identified and controlled via a risk assessment, a proximity tester and bonding earths. This ensures that personnel are not exposed to any risks even though the phase conductor or conductors remain energised.

**Safety**

- Prior to commencing work:
  - conduct a risk assessment and job briefing. For more on this, see work practice 2.28 (Job briefing process) in this manual.
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements. For more on this, see section 3 (Personal protective equipment) in this manual.
- Wear a minimum of Class 0 (1000V) rated gloves along with protective outers at all times when working on the return wire.
- Earth all operational vehicles within the work area (within six metres of the earth electrode and the pole being worked on). They must be bonded to the same common earth electrode as the bonding earth(s).
- Operational vehicles and plant that are not required to carry out the task must be parked outside of the work area.
- Members of the public must be controlled and kept outside of the work area.
- Always treat the return wire as energised until proven otherwise and the bonding earths are applied.
- Approved HV portable earths must be used as the bonding earths.
- Bonding earth(s) must be recorded on the risk assessment under the hazard controls.
- Maintain awareness at all times of the possibility of step and touch potential.
- When working on the return wire, always ensure MADs are maintained from energised conductors and equipment. For more on MADs, see work practice 2.8 (Minimum approach distances (MADs)) in this manual.
Instructions

Note:

When using the method described in this work practice:

- an electronic Networks Access Request (eNAR) does not need to be submitted
- Network Operations do not need to be informed
- an EAP is not required
- the earth applied to the return wire is a bonding earth. These are not classed as programmed or working earths.
- the bonding earth is used to establish an equipotential zone in which the maintenance/repair work can take place.

1. From a distance of six metres, visually inspect the pole that is to be worked on, and adjacent poles, for:
   - defects on the:
     - phase conductors and return wire
     - down earths and connections
     - pole, insulators and associated hardware.
   - signs of burning at the pole-top and at ground level.

2. Ensure that the proximity tester is operating correctly by testing it on the phase conductor or proving device.

3. If the pole has a down earth:
   a. set the proximity tester to the 240V setting
   b. attach the proximity tester to an insulated stick
   c. position the proximity tester so that it is touching the down earth at ground level. If the tester:
      - operates with the light or buzzer – there is a fault, in which case:
        - work must not continue with the phase conductors energised
        - Network Operations must be notified
        - arrange for an outage of the HV lines before work can proceed.
      - does not operate – continue to step 4.
4. Connect all of the following to a common earth electrode:
   - Portable bonding earth down lead or leads.
   - Any operational vehicles within the work area (within six metres of the pole and the common earth point).

5. Set the proximity tester to the lowest HV setting available on the tester and test the return wire. If the tester:
   - operates with the light or buzzer – there is a fault, in which case:
     - work must not continue with the phase conductors energised
     - Network Operations must be notified
     - arrange for an outage of the HV lines before work can proceed.
   - does not operate – continue to step 6.

6. Prove the proximity tester is operating correctly by testing it on the phase conductor or proving device. If it:
   - does not operate correctly – obtain another proximity tester and return to step 5
   - operates correctly – continue to step 7.

7. Using an rated and tested insulated stick, connect the portable bonding earth(s) to the return wire within two metres of the pole (see Figure 1 and Figure 2, below). Ensure a good connection is made.

   **Note:**

   Work on the return wire is not permitted outside of the bonding earth attachment points.
Figure 1: Return wire with bonding earth attached – single down lead

Figure 2: Return wire with bonding earth attached – two down leads
8. Inspect the return wire at the attachment point on the pole for signs of damage. If damage is identified or suspected:
   a. install come-along clamps either side of the return wire attachment point but inside of the bonding earth attachment points (see Figure 3, below).
   b. attach a strap hoist between the come-along clamps and take up a small amount of tension
   c. the bonding earths will ensure continuity of the return wire while repairs are made.

![Diagram](Figure 3: Set-up for return wire when damage is identified or suspected (not broken)]

9. Carry out the planned work as described in the ‘Scope’ section of this work practice.
   • Make repairs to return wire if identified in step 8.
   • Remove the strap hoist and come-along clamps from the return wire when the repairs are complete.

10. After the planned work is complete and the return wire has been tied in:
    a. use an insulated stick to remove the portable bonding earth(s) from the return wire
    b. clear away and stow all tools and equipment.
References

- High Voltage Live Work Procedures – Glove and Barrier, GB-Support-01 Displace and replace return wire.
- Work Practice Manual:
  - work practice 2.8 (Minimum approach distances (MADs))
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)

Further reading

- Work Practice Manual, work practice 2.9 (Induced voltages in isolated conductors/apparatus).
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6.31 Connections on bare overhead conductors

Purpose
The purpose of this work practice is to outline the minimum requirements for new and replacement permanent connections on high voltage (HV) and low voltage (LV) bare overhead conductors.

Scope
This work practice applies to personnel who are installing connections on overhead conductors. This task involves the following components:

- Copper mains (Cu)
- Aluminium mains (Al)
- Steel conductor, aluminium clad (SC/AC)
- Steel conductor, galvanised (SC/GZ)
- Parallel groove (PG) clamps
- Lugs
- Wire rope stirrup clamps
- Compression joints

For information on service connection clamps, see work practice 8.2 (Replacing service connections on overhead mains) in this manual.

Instructions

Clamps
PG and stirrup clamps are used to form a good electrical connection between two bare overhead conductors.

The following are specific to PG clamps:

- PG clamps are not designed to be used under tension.
- PG clamps must be selected to suit the conductor size and material.
  - The conductor cross-sectional area (in mm²) limits are embossed on the PG clamp.
  - PG clamps used on aluminium conductors are made from aluminium and are held together by high tensile steel galvanised bolts.
Bi-metallic PG clamps are used to join aluminium to copper conductors. This PG clamp has red paint that indicates the side that is to be used for the copper conductor.

PG clamps used on copper conductors are made from brass and have brass bolts to avoid corrosion caused by contact of dissimilar metals.

PG clamps used on SC/GZ and SC/AC conductors are prefilled with a contactpaste to prevent corrosion. These clamps have stainless steel bolts.

**Lugs**

Lugs are used to terminate conductors or cable onto apparatus or equipment using a bolted connection.

- Lugs are not designed to be used under tension.
- Lugs can be divided into the following categories:
  - Compression lugs – used for continuous current carrying e.g. overhead mains.
  - Quick lugs – used for non-continuous current e.g. earthing connections.
- Lug selection is based on:
  - size of conductor or cable
  - conductor/cable material and the materials used in the manufacture of the item or piece of equipment that the lug will be bolted onto (Cu, Al, galvanised, bi-metallic, etc.)

**Application of clamps and lugs**

Ensure that the section of conductor or cable to which the clamp or lug will be applied has been cleaned with a conductor brush.

**Note**

- Use the correct brushes for different conductor types.
- Clean galvanised steel lightly so as to not damage the galvanising layer.
- Conductor must never be scraped clean using a blade or other means.

**Clamps**

- Once clean, conductor contact paste (stock code: PG0002) must be smeared onto the conductor in the area where the clamp will be attached (aluminium begins to oxidize within seconds of being cleaned).
• Apply a bead of conductor contact paste along each groove of the PG clamp or stirrup clamp.

• Attach the clamp to the conductors, tightening by hand while keeping the conductors aligned in the grooves.

• If connecting:
  o copper to aluminium, the aluminium conductor must be above the copper
  o galvanized steel to aluminium, the steel conductor must be above the aluminium

• For bi-metallic PG clamps, ensure that the correct conductor is in the correct groove.

• Tighten the bolts evenly. Use a torque wrench for final tightening – the required torque setting is embossed on the body of the clamp. Do not over-torque as the clamp could crack.

• Check that conductor contact paste has oozed out along the contact surfaces.

• Apply anti-corrosion treatment (see the Anti-corrosion section, below).

Lugs

• Compression lug barrels are pre-filled with jointing compound, so conductor contact paste is not necessary.

• Once the conductor/cable is cleaned, the lug must be crimped onto it as soon as possible to prevent oxidisation.

• When bolting lugs, clean the contact surfaces and apply conductor contact paste. Conductor contact paste should also be applied to the surfaces of the nut, bolt and washers.

• Tighten the bolted connection to the correct torque.

• Apply anti-corrosion treatment (see the Anti-corrosion section, below).

Anti-corrosion

• A coat of non-oxidising grease (ALV-300, stock code: PG0126) must be applied to all exposed parts of the connector or lug.
• Denso tape (stock codes: KT0019 (50mm width), KT0020 (100mm width)) must be applied over the greased clamps in the following “Very heavy pollution areas” as identified in the Distribution Overhead Line Design Manual (Insulators, section 6.2 and Figure 27):
  o within 5 km of the coast in the Perth Metro area and in the South Country area
  o within 20 km of the coast in the North Country area
  o where there is very heavy industrial pollution
  o where existing/old clamps exhibit a significant amount of corrosion

References

• Work Practice Manual, work practice 8.2 (Replacing service connections on overhead mains)
• Distribution Design Catalogue:
  o section 1 – HV 13, HV 24, HA 6
  o section 7 – CN9, CN 10/11, CN 30
  o section 10 – HU 16
• Distribution Construction Standards Handbook, Part 2 – Reference, drawing R8/3
• Distribution Overhead Line Design Manual:
  o Conductors and fittings (DM# 10253633)
  o Insulators, section 6.2 and Figure 27 (DM# 10360196)
6.32 Stringing HV bare conductors above energised LV ABC

Purpose

This work practice outlines the minimum requirements for stringing and tensioning bare high voltage (HV) conductors above energised low voltage (LV) aerial bundled conductor (ABC).

Training and authorisation

Personnel performing HV work for Western Power must:

- have a Network Authority Card (NAC). For more on this, see work practice 5.24 (Network Authority Card (NAC)) in this manual.
and
- be qualified as a Cert. III Lineworker (or equivalent)

Safety

Before commencing work:

- conduct a risk assessment and job briefing. For more on this, see work practice 2.28 (Job briefing process) in this manual.
- appoint a safety observer. For more on this, see:
  - work practice 2.2 (Safety observer role) in this manual
  - the Safety observer section, below
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements. For more on this, see section 3 (Personal protective equipment) in this manual.

Instructions

Before installing or replacing HV conductors on a new or existing LV ABC structure

- All existing bare LV conductors, including tee offs, must be:
  - replaced with ABC
  - de-energised and shorted
• Ensure that all the structures are appropriately designed to install the HV conductors and the associated hardware.

• The following must be inspected for any live bare conductor exposure:
  o insulation piercing connectors (IPCs)
  o ABC compression joints
  o ABC connections into switchable devices

**Important**

If it is identified that the insulation on any ABC conductor is stripped away (i.e. exposing bare conductor), they must be covered with appropriately rated insulated equipment. This is to prevent accidental contact with live conductors in the case of failure.

• All service connections must be inspected. If any of the items listed below are found to be defective, they must be replaced according to work practice 8.5 (Overhead service cables – installation and replacement) in this manual.
  o damaged connections
  o preformed dead ends (twisties), whether damaged or not

• The cable drum/trailer earthing must be earthed according to work practice 2.6 (Mobile elevated work platform (EWP) safety) in this manual.

• The area surrounding the cable drum/trailer must be fenced, to ensure that members of the public are not able to come into contact with the trailer or conductor.

• While operating the cable drum/brake trailer, personnel must:
  o stand on an equipotential mat
  o wear gloves rated at 500 V and approved, wrist-length mechanical protective gloves according to work practice 3.2 (Glove protection) in this manual

• A rolling earth roller, bonded to earth via a rated portable earthing lead, must be fitted to the running blocks used during the installation of the HV conductors. This must be done on the first pole and then every fourth pole. For more on portable earthing leads, see work practice 2.10 (Use and management of portable earthing / short circuiting equipment) in this manual.

• The white/centre phase conductor must be strung and strained on the opposite side of the pole to that of the LV ABC, to allow maximum clearance.
• When stringing HV conductors, the conductor must be controlled with captive rollers.

**Safety observer**

While stringing conductors, the safety observer must:

• track the connection point of the conductor to the drum trailer tow rope while the conductor is being pulled through the captive rollers and alert the team when the tow rope is:
  o out of track
  o approaching angle structures
  o going through a rolling earth roller
  o outside of its safety clearances

• have an appropriate communication device (preferably an ultra high frequency (UHF) handheld radio) to alert the cable drum trailer operators of any hazards

**References**

• Work Practice Manual:
  o work practice 2.2 (Safety observer role)
  o work practice 2.6 (Mobile elevated work platform (EWP) safety)
  o work practice 2.10 (Use and management of portable earthing / short circuiting equipment)
  o work practice 2.28 (Job briefing process)
  o section 3 (Personal protective equipment)
  o work practice 5.24 (Network Authority Card (NAC))
  o work practice 8.5 (Overhead service cables – installation and replacement)
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6.33 Live insulator washing and siliconing

Purpose

The purpose of this work practice is to outline the minimum requirements for spray washing and applying silicone grease to high voltage (HV) line insulation, under live conditions, from an insulated mobile elevated work platform (EWP).

Scope

This work practice is applicable to any members of the Network Total Workforce (NTW) who are required to:

- spray-wash insulators on live HV circuits up to 132 kV
- apply silicone grease to insulators on live HV circuits up to 33 kV

The activities are not classed as live work as there is no intended contact with live apparatus.

Note:

Should a flashover or incident occur, the following actions must be taken:

- Stop work.
- Perform rescue operations immediately.
- Notify the Incident Hotline – 1300 CALL WP (1300 2255 97).
- Any further work must be done under de-energised conditions.

Training and authorisation

- Personnel performing this task must be qualified as Cert. III in ESI - Power Systems - Distribution Overhead or equivalent and have the following authorities on their Network Authority Card (NAC):
  - Overhead line insulator washing
  - High voltage insulator coating
- A Recipient in Charge (RIC) must be onsite to accept the Vicinity Authority (VA) permit that is required to do this task.
Safety

- A VA is required for live washing and siliconing.
- As part of the planning and risk assessment process, refer to the relevant Western Power Safe Work Method Statements (SWMS):
  - Insulator Washing and Siliconing (DM# 10718272)
  - Operate Mobile Plant and Equipment – EWP, Borer, Auger (DM# 10719102)

For more on using SWMS, including how they relate to risk assessments, see work practice 2.27 (Construction site hazard management forms) in this manual.

- Conduct a risk assessment and job briefing. The risk assessment must:
  - reference the VA (team members to sign on to the VA) and confirmation from NOC that the auto-reclose is off
  - record the safety observer(s). For more on this, see work practice 2.2 (Safety observer role) in this manual.
  - include the surrounding environment and the effects of overspray (especially silicone)

For more on risk assessments and job briefings, see work practice 2.28 (Job briefing process) in this manual.

- Communication methods must be established within the team and with NOC (in the case of a flashover/incident).
- Insulated equipment must be within the test expiry date. For more on this, see the Resources section, below.

Precautions

- The following items must not be washed:
  - porcelain surge diverters
  - transformer bushings
  - recloser bushings
  - cast iron pot-heads
  - insulators that have surge arrestors, or any of the items listed above, directly beneath them
Operational work practice standards

- contacts, connections, moving parts as they may be dislodged and the lubricants and anti-corrosion grease may be removed
- insulators that have cracks, chips, deteriorated glazing or other surface defects (record on risk assessment and report to formal leader)

- Polymeric composite line post insulators (stock code IC0086) and polymeric strain (long rod) insulators (stock codes IC0014, IC0018) must not be silicone coated.
- Polymer insulators – wash from a distance to prevent water penetration between the skirts.
- Running disc angle structure – never position any part of the EWP inside the angle of the structure.
- High pressure water – control the water jet carefully to avoid inadvertently:
  - moving jumpers and slack spans, and reducing clearances to the extent of causing a flashover
  - displacing lubricating and anti-corrosion greases
  - causing drop-out fuses to open
  - loosening connections and/or damaging equipment
  - damaging sight glasses
  - flooding breathers

**Note:**
When coatings such as POWERSIL (not silicone grease) are applied, the work must only be performed under an Electrical Access Permit (EAP).

**Resources**

**Personnel**
- At least two personnel are required to perform this task.
- All personnel must meet the training and authorisation requirements.
- One of the team must act as a safety observer.

**Tools and equipment**
- Insulated EWPs. For more on this, see work practice 2.6 (Mobile elevated work platform (EWP) safety) in this manual.
• Washing equipment:
  o pump – operating pressure 5600–14000 kPa
  o water tanks 400 – 1500 L (enough for the task)
  o water – conductivity less than 10 mS/m
  o insulated hoses – non-conductive hose (rated pressure 19250 kPa), electrically tested (see Table 1, below)
  o washing wand – used with swivel head (1.58 mm nozzle) and foot/hand control valve, electrically tested (according to the requirements for insulated wet sticks as shown in Table 1, below)
  o high pressure gun (EWP use only) – operating pressure up to 21000 kPa, washing distance 1.2–3 m

• Conductivity meter
• Anemometer
• Grease pump
• Air compressor
• Drill with helical paddle attachment. See (Figure 1, below).

![Figure 1: Helical paddle attachment](image)

All HV live work insulated equipment must be subjected to an electrical test at regular intervals to ensure that the insulating qualities of the equipment have not been reduced. The equipment must be tested by an approved HV testing provider to the relevant standard, and at intervals not exceeding those set out in Table 1, below. Testing intervals can be shortened depending on use and wear.
Table 1: Testing intervals for HV live work tools

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Testing interval</th>
<th>Reference standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>All insulated sticks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dry</td>
<td>12-monthly</td>
<td>AS 5804.3-2010</td>
</tr>
<tr>
<td>wet</td>
<td>24-monthly</td>
<td>AS 5804.3-2010</td>
</tr>
<tr>
<td>Insulated EWP</td>
<td>6-monthly</td>
<td>AS 5804.2-2010 AS 5804.3-2010</td>
</tr>
<tr>
<td>Insulated EWP’s basket liner</td>
<td>6-monthly</td>
<td>AS 5804.2-2010</td>
</tr>
<tr>
<td>Insulated hose</td>
<td>6-monthly</td>
<td>AS 5804.2-2010</td>
</tr>
</tbody>
</table>

Instructions

Pre-start checks

- Washing unit – ensure that the pump is functioning correctly, pressure hoses are connected, there are no leaks and there is sufficient fuel and oil.
- Water – ensure that conductivity is less than 10 mS/metre.
- Washing wand – ensure that it is clean, in test date, there is no hose damage and the control valve is functioning correctly.
- High pressure gun – ensure that it is clean, there is no hose damage and the correct nozzle is being used.
- Purge the water system – ensure that fresh water from the tank is used for washing (old water in the pipes may have become contaminated).
- Air compressor – ensure that the condenser is drained, there are no leaks and there is sufficient fuel and oil.
- Grease pump – ensure that the filters are clean and it is operating at the correct pressure.
- All hoses – ensure that they are within test date and there are no leaks.
- Silicone spray wand – ensure that it is within test date, the control valve functions correctly, the spray pattern is a fine, fan-shaped mist.
- Check that there is sufficient fuel, water and silicone for the job.
- Record the batch number for the silicone – some batches may be of a poor quality and must be returned.
MADs

The minimum approach distances (MADs) shown in Table 2, below, must be maintained at all times.

Table 2: MADs for insulator washing and siliconing from an insulated EWP

<table>
<thead>
<tr>
<th>Phase-to-phase voltage (kV)</th>
<th>Personnel (mm)</th>
<th>Insulated EWP (mm)</th>
<th>From insulated EWP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Water spray gun (mm)</td>
</tr>
<tr>
<td>&lt; 33</td>
<td>700</td>
<td>700</td>
<td>1200</td>
</tr>
<tr>
<td>33 – 66</td>
<td>1000</td>
<td>1000</td>
<td>1400</td>
</tr>
<tr>
<td>132</td>
<td>1200</td>
<td>1800</td>
<td>1800</td>
</tr>
</tbody>
</table>

For more on MADs, see work practice 2.8 (Minimum approach distances (MADs)) in this manual.

Washing insulators

- Determine wind direction.
- Maintain correct MADs (see Table 2, above).
- Keep hands behind the water skirt on the wand during washing.
- Wash downwind insulators first so that spray blows away from unwashed insulators.

Pin and post insulators (vertical)

- Wash pin and post insulators from bottom to top ensuring that both the bottom and the top of each skirt is washed from both sides. Flush from top down to bottom.
- For transmission post insulators – completely wash one third at a time starting at the bottom. Flush from top down to bottom.

Suspended insulators

- Wash from the conductor end upwards ensuring that both the bottom and the top of each skirt is washed from both sides. Flush from top down to bottom.
• For transmission suspension strings – completely wash one third at a time starting at the bottom (live) end. Flush from top down to bottom.

**Horizontal insulator strings and standoff insulators**

• Wash the lowest insulators on the structure first.
• For distribution voltages (i.e. up to 33 kV), e.g. termination/strain pole – wash all insulators as much as possible and then reposition the EWP and wash the other side of all the insulators. Flush.
• For transmission voltages (i.e. over 33 kV) – wash from the conductor end ensuring that each skirt is washed from both sides (both above and below) the string. Flush end to end, top insulators first.

**Other equipment**

• Drop-out fuse porcelain supports can be washed from the front and sides only as the spray pressure could dislodge the fuse barrels open if sprayed from the back.
• Wash pole-top switches and carry-over pins after the termination insulators have been washed.

**Silicone coating**

• Determine wind direction.
• Allow the insulators to dry after washing (or the silicone will not adhere).
• Maintain correct MADs (see Table 2, above).
• Position the EWP and the EWP bucket upwind to reduce overspray onto the operator and EWP.
• Before applying the silicone to the insulators, the silicone must be stirred to ensure that the density of the silicone is consistent. This must be done as follows:
  • Use the drill and helical paddle attachment and stir for five minutes with the drill on its fastest setting. See Figure 2, below.
Check to ensure that the silicone spray is emitted from the spray gun as a fine
mist in a fan shape.

Ensure that the insulator is coated completely. Several layers may be required
to achieve a coating of adequate and consistent thickness.

Polymeric composite line post insulators (stock code IC0086) and polymeric
strain (long rod) insulators (stock codes IC0014, IC0018) must not be silicone
coated.

Note:
Great care must be taken to minimise silicone overspray. Silicone can cause
slippery surfaces, smearing on windows and vehicle windscreens and hazardous
situations may occur as a result.

References

- Work Practice Manual, work practices:
  - 2.2 (Safety observer role)
  - 2.6 (Mobile elevated work platform (EWP) safety)
  - 2.8 (Minimum approach distances (MADs))
  - 2.27 (Construction site hazard management forms)
  - 2.28 (Job briefing process)

- Safe Work Method Statements (SWMS):
  - Insulator Washing and Siliconing (DM# 10718272)
  - Operate Mobile Plant and Equipment – EWP, Borer, Auger
    (DM# 10719102)
Further reading

- Power Training Services WA (PTSWA) learner guides:
  - Overhead line insulator washing
  - High voltage insulator coating
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6.34 Replace overhead service core at a SWER transformer

Purpose

This work practice outlines the minimum requirements for replacing service cores directly connected to a single wire earth return (SWER) transformer which can be disconnected from the high voltage (HV) energised phase conductor by:

- disconnecting an HV live line tap/clamp (switching)

or

- disconnecting the HV solid tap (parallel groove (PG) clamp) by using Glove and Barrier (G&B) or Distribution Insulated Stick (DIS) HV Live Work Procedures.

Scope

This work practice only applies to service core replacements on SWER transformers connected directly to the HV line via a solid or live line tap/clamp.

This work practice does not apply when the SWER transformer is connected to the HV line through an HV drop-out fuse (DOF) on the same structure. In this situation, the HV DOF can be removed to isolate the SWER transformer, and must be managed by means of an Electrical Access Permit (EAP).

About the SWER system HV return wire

The HV return wire of a SWER system is classified as part of the HV circuit because it carries current. If the SWER return wire becomes broken or disconnected while the phase conductor is energised, the return wire may become energised to the same voltage as the phase conductor.

The service core replacement part of this work practice does not use HV Live Work Procedures or require an EAP. This is because the hazards are identified and controlled via a risk assessment, proximity tester and bonding earth. These controls ensure that personnel are not exposed to any increased risk even though the HV phase conductor remains energised.

The HV return wire runs all the way back to the zone substation and is still classed as the SWER return wire even when it is part of a 3-phase backbone feeder.
Training and authorisation

Personnel performing this task must hold a Certificate III in Electrical Service Industry (ESI) – Distribution.

At a minimum, the work crew must include the following personnel for the disconnection method or procedure used.

Remove and replace HV live line tap/clamp (switching)

<table>
<thead>
<tr>
<th>Personnel requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 HV live worker – G&amp;B or DIS for disconnecting the HV live line tap/clamp under the instruction of the switching operator.</td>
</tr>
<tr>
<td>or</td>
</tr>
<tr>
<td>Switching operator – to perform the disconnection and reconnection of the HV live line tap/clamp if they hold a current XRHVT authorisation.</td>
</tr>
<tr>
<td>1 Switching operator – (level LOU or HOU).</td>
</tr>
<tr>
<td>1 Recipient in Charge (RIC) to accept the Vicinity Authority (VA).</td>
</tr>
<tr>
<td>1 Safety observer to ensure MADs are maintained.</td>
</tr>
</tbody>
</table>

Remove and replace HV solid tap (HV live work)

<table>
<thead>
<tr>
<th>Personnel requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 HV live workers – G&amp;B or DIS for disconnection and reconnection of the HV solid tap under the instruction of the switching officer.</td>
</tr>
<tr>
<td>1 Switching operator (level LOU or HOU).</td>
</tr>
<tr>
<td>1 Recipient in Charge (RIC) to accept the Vicinity Authority (VA).</td>
</tr>
</tbody>
</table>
Safety

• Prior to commencing work, conduct a risk assessment and job briefing. For more on this, see work practice 2.28 (Job briefing process) in this manual.

• Wear a minimum of Class 0 (1,000V) insulated gloves, with protective outers, at all times while carrying out the service core replacement.

• Earth all operational vehicles within the work area (i.e. within six metres of the earth electrode and the pole being worked on). They must be bonded to the same common earth electrode as the bonding earth.

• Operational vehicles and plant that are not required to carry out the task must be parked outside of the work area.

• Members of the public must be controlled and kept outside of the work area.

• Always treat a SWER return wire as energised until proven otherwise and the bonding earths are applied.

• Maintain awareness at all times of the possibility of step and touch potential.

• Extra care should be taken when disconnecting a live line tap/clamp (switching) that is connected directly to the HV conductor (not on a stirrup). This is because the conductor under the live line tap could be damaged, potentially leading to conductor failure when the tap is removed. If damage is suspected, arrange for an EAP to carry out repairs to the conductor and to install a stirrup.

• Approved HV portable earths must be used as the bonding earths.

• Bonding earths must be recorded on the risk assessment under the hazard controls.

• When working on the service replacement, maintain the relevant minimum approach distances (MADs) from energised HV conductors and equipment. For more on MADs, see work practice 2.8 (Minimum approach distances (MADs)) in this manual.
Instructions

Note:

When using the method described in this work practice, the following applies:

- An electronic Network Access Request (eNAR) must be completed.
- An EAP is not required.
- The earth applied to the return wire is a bonding earth. These are not classed as programmed or working earths.
- The bonding earth is used to establish an equipotential zone in which the service core replacement work can take place.

When carrying out this task, ensure the following in accordance with the switching program:

- The auto-reclose function controlling the HV circuit has been disabled.
- A VA has been issued for the disconnection and reconnection of the SWER transformer via an HV live line tap or clamp or HV solid tap. This may include multiple transformers at multiple locations on the same feeder covered by the same auto-recloser.

De-energising the SWER transformer

1. From a distance of six metres, visually inspect the pole that is to be worked on, and adjacent poles, for defects on the:
   - phase conductor and return wire
   - down earths and connections
   - pole, insulators and associated hardware.
   Also check for signs of burning at the pole top and at ground level.

2. Ensure that the proximity tester is operating correctly by testing it on the phase conductor or proving device.

3. If the pole has a down earth:
   a. set the proximity tester to the 240V setting
   b. attach the proximity tester to an insulated stick
   c. position the proximity tester so that it is touching the down earth at ground level. If the tester operates with the light or buzzer then there is a fault, in which case:
work must not continue with the phase conductors energised
Network Operations must be notified
arrange for an outage of the HV line before work can proceed.

If the tester does not operate, prove the proximity tester is operating correctly, then continue to step 4.

4. Isolate customers at the low voltage (LV) customer mains in accordance with SCT form – Service Connection Test (SCT) – Metrel (DM# 4700316).

5. Remove the live line HV tap/clamp or disconnect the HV solid tap on SWER transformer and park the disconnected tap on the SWER return wire.

   • Ensure the parked HV tap will be between the bonding earth attachment points when applied.

6. Connect all of the following to a common earth electrode at ground level:

   • Portable bonding earth down lead or leads.
   • Any operational vehicles within the work area (i.e. within six metres of the pole and common earth point).

7. Set the proximity tester to the lowest HV setting available on the tester and test the SWER return wire. If the tester operates with the light or buzzer there is a fault, in which case:

   • work must not continue with the phase conductor energised
   • Network Operations must be notified
   • arrange for an outage of the HV line before work can proceed.

If the tester does not operate, continue to step 8.

8. Prove the proximity tester is operating correctly by testing it on the phase conductor or proving device.

   • If it is not operating correctly, obtain another proximity tester and return to step 7.

9. Using an insulated stick, connect the portable bonding earth to the SWER return wire within two metres of the pole (see Figure 1).

   • Ensure the parked HV tap is between the bonding earth attachment points.
Perform service core replacement

10. Carry out the planned service core replacement work. For more on this, see work practice 8.5 (Overhead service cables – installation and replacement) in this manual.

11. After the service core replacement is complete, with all connections completed at the transformer’s LV terminals and the mains connection box (MCB), use an insulated stick to remove the portable bonding earth from the SWER return wire.

Re-energise the SWER transformer and complete tests

12. Remove the HV tap from the SWER return wire and restore the HV supply to the transformer in accordance with the switching program.
13. Reconnect customer mains in accordance with SCT form – Service Connection Test (SCT) – Metrel (DM# 4700316).

14. When the SCTs are complete, and all results are within test parameters, move onto the next location and repeat this process from step 1. This is only applicable when multiple locations are covered by one VA.

Upon completion of all service core replacements covered by the VA

- Cancel the VA in accordance with the switching program.
- Restore network to normal condition, including auto-reclose function.
- Confirm with Network Operations that the switching program is complete.

References

- SCT form – Service Connection Test (SCT) – Metrel (DM# 4700316).
- Work Practice Manual, work practices:
  - 2.8 (Minimum approach distances (MADs))
  - 2.28 (Job briefing process)
  - 8.5 (Overhead service cables – installation and replacement).
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7.1 Safety procedures for HV and LV cable work

Purpose

This field instruction outlines the safety procedures required when working with high voltage (HV) and low voltage (LV) cables.

Scope

This field instruction must be used in conjunction with section 7 (Underground work) in this manual.

Safety

- Permits must be established before any work commences (i.e. Electrical Access Permit, Vicinity Authority and Sanction to Test, if applicable).
- Ensure that the safety observer is aware of the emergency procedure where required.
- Use suitable barriers, barricades and warning signs on either side of the cable to prevent access by persons not involved with the testing procedure. If there is any potential risk to the public or staff from exposed live conductors or equipment, a safety observer must be used.
- For SF$_6$ gas insulated switchgear, ensure that the SF$_6$ gas indicator is on the green line or within the operating gas pressure as indicated on the nameplate data.
- If the gas pressure is below the green line or recommended operating pressure, the cable should not be tested while connected to the switchgear with the line side energised.
- If the condition of a live cable is suspected to be damaged, (unless the cable is proved otherwise) then workers must not physically handle the cable, regardless of whether it is HV or LV, screened or unscreened.

Switching isolations

- Test the cable using Western Power approved equipment before work commences.
- Where it is not possible to isolate the cable from other equipment, ensure that surge arresters and voltage transformers are disconnected from the cable.
• LV electrical circuit and equipment must be treated as live (including line neutral) unless proven otherwise. Voltage tests must be carried out between all line phases and between each line phase to line neutral.

• The tester in charge must ensure that drawings are made available to the work team to familiarise themselves with the work area and equipment locations prior to commencing work.

• Cable testers must:
  o confirm the isolation position
  o ensure that earth switches are ‘ON’
  o attach danger labels to all ends of the cable.

Worksite

• Using an approved testing method, positively identify the cable before jointing and ensure that it is marked at both ends.

• Analyse information from system diagrams/plans to ensure that the jointing and terminations of LV underground polymeric cables can be completed in accordance with asset owner requirements.

• Identify and safeguard against any electrical hazards that are present on site, such as:
  o live electrical apparatus
  o induced voltages
  o transfer potentials
  o the potential for faults on adjacent cables and joints
  o capacitive voltages.

• Identify and safeguard against any physical hazards present onsite, such as:
  o mechanical damage to existing cables or joints
  o excavations
  o installing cable

• Fix temporary labels to the transformers and switch fuse units stating the destinations of all cables. (Permanent labels can also be affixed at this time).
Universal pillar

- Connect a cable entering the universal pillar (unless otherwise instructed in drawings) from the:
  - right-hand side (facing the links) to the right-hand side of the bottom busbar
  - left-hand side (facing the links) to the left-hand side of the bottom busbar
- If connecting the cable to the top busbar, connect it to the right-hand side (facing the links) in the approved manner.

If a cable is terminated at only one end and not made off at the other, fit an “Out of Service” warning tag to the terminated end.

Note:

Do not leave the “Out of Service” warning tag on a cable for extended periods. The remote end of the cable should be made-off or terminated as soon as possible (see Appendix 1 (Tags and signs)).

- If laying a cable for connection from a universal pillar, kiosk, or LV unit frame in an existing scheme, the remote end of the cable must not be left on the drum. Instead, ensure that it is:
  - made-off
  - insulated to approved methods
  - placed in a mini pillar with a painted white top
- Where it is not prescribed, possible or practical to install a pillar, ensure that the remote end of the cable is made-off in a suitable joint or shell and located in Western Power’s cable alignment.
- Record the location of the joint or shell (such as distance from closest property boundary) accurately in SPiDAweb.
- Ensure that all cables and pillars are recorded on the master drawings.

Testing and commissioning

- For more information on testing and commissioning, see field instruction 7.7 (Commissioning of high and low voltage cables and apparatus) in this manual.
References

- Work Practice Manual:
  - section 7 (Underground work)
  - Appendix 1 (Tags and signs)
7.2 Excavation and directional drilling

Purpose
This instruction describes the requirements for excavation, including:

- directional drilling
- erecting poles
- laying cables
- any process that displaces soil

Scope
This instruction:

- applies to all excavation and directional drilling
- only provides the key points relevant to Western Power worksites and does not attempt to replicate the WorkSafe WA Code of Practice – Excavations 2005, or any detailed work practices included in any training manuals.

Note:
For more information on working near electrical networks, see 'Working near Electricity – Safe distance and network assets’ (DM# 9157209).

Training
A person performing any of the functions described in this instruction must have the relevant training and competencies. Courses that include ‘PTS’ are available at Western Power’s in-house training provider, Power Training Services (PTS).

Excavation and directional drilling

- Shallow excavating (pot holing, pole inspections, etc.) – Induction for operational personnel (PTS 757)
- All other excavation work, including directional drilling – Lay underground electrical supply cables (PTS 287)
- If required to install trench shoring at a depth greater than 1.5 m – Install trench support (RIICCM210A)
• If there are technical issues involved in a certain excavation, then an appropriately experienced engineer or a competent person acting on their behalf must be onsite.

**Directional drilling only**

• The drilling rig operator must be competent to operate the plant.

**Instructions**

Use the Plan, Pothole, Protect and Proceed method when doing excavation and directional drilling.

**Plan**

• Contact Dial Before You Dig by calling 1100 and request location data for all utilities that may be a foreseeable hazard during excavation work. Should the scope of works change, or plan validity dates expire, submit a new Dial Before You Dig enquiry.

• Contact the property owner if excavating on private property.

• Contact the Western Power nominated representative (e.g. project manager, construction manager) when working in a substation to verify cable locations.

• Check the work plans thoroughly to ensure that they relate to the Dial Before You Dig data. Contact the relevant network owner if the symbols or plans are unclear.

• According to the Dial Before You Dig information, it may be necessary to obtain a Water Corporation ‘Clearance to Work’ permit.

• Observe all exclusion zones around hazardous services such as high pressure mains.

• The works associated with the project may have an impact on local government infrastructure. If this is the case, then they must be contacted and asked about the conditions necessary to allow the works to continue.
• For any environmental issues, liaise with:
  ○ Western Power’s Environmental section:
    environmental@westernpower.com.au
    0419 987 954
  and, where applicable
  ○ local authorities

• Where there is a probability of excavation or drilling work damaging underground utilities or undermining a structure, contact the utility or structure owner and request the implementation of appropriate risk controls.

  **Note:**
  Never assume that the plans you receive from Dial Before You Dig or your project documentation will represent the only underground assets in your excavation area. Underground location plans do not pinpoint the exact location; they only provide information about network presence.

• If required, submit a traffic management plan or use an authorised traffic management contractor.

**Pothole**

• Conduct a risk assessment before commencing work.
• Use PPE per field Instructions 3.1 (Clothing and personal protective equipment requirements) and 3.2 (Glove protection) in this manual.
• Utilise all reasonable techniques for the advance location of existing services in the vicinity of the proposed excavation, such as advanced hand digging, location through the use of metal detectors, ultrasound or otherwise.
• Indicate existing services and their routes with measures such as spray paint, pegs or flagging tape. At five metre intervals, mark the ground to identify an underground utility’s depth.
• A risk assessment will identify the appropriate means of potholing. Hand digging or vacuum excavating is a safer alternative than mechanical digging.
• Comply with the minimum approach distances (MADs) for underground utilities. For more on this, see Table 1 (Minimum approach distances) in field instruction 7.4 (Underground cables) in this manual.
Protect

- Conduct a job risk assessment before commencing work.
- Use PPE per Field Instruction 3.1 (Clothing and personal protective equipment requirements) and Field Instruction 3.2 (Glove protection)
- Install appropriate temporary safety barriers and signs.
- Earth any excavating or drilling machinery according to the manufacturer’s recommendations.
- A competent safety observer must be appointed to monitor machinery used to excavate around any underground or overhead utilities.
- Install trench or excavation shoring whenever it is possible that the soil may collapse due to vibration, instability, fine sand, water saturation, etc. Refer to training course notes or other relevant documents for specific shoring requirements.
- Trenches greater than 1.5 m deep require an engineer or a delegated person to act for the engineer to oversee the installation of the shoring.
- Reinforce any structure that is likely to fall into a trench or excavation by an appropriate means such as sheet piling, shoring, bracing or guying.
- See field instruction 6.2 (Pole support) in this manual for approved supporting methods for any pole that has the potential to fall into a trench or excavation.
- Prevent sediment entering waterways or drainage.
- If the risk cannot be controlled, stop the work.

Proceed

- Conduct a job risk assessment before commencing work.
- Use PPE per Field Instruction 3.1 (Clothing and personal protective equipment requirements) and Field Instruction 3.2 (Glove protection)
- Observe minimum depths and clearances as stated clearly from the information and on the plans provided by the asset owner.
- Underground assets may be as little as 500 mm below the surface.
- Install covers or an approved barrier to prevent damage to other underground utilities during the excavation process.
- Ensure that private vehicles are not parked on the work site.
• Do not use mechanical excavators until you have located and identified all underground utilities. Excavator operators must comply with the MADs for specific underground utilities. Mechanical excavation is **not** permitted within 500 mm in any direction of any underground electrical cables or gas pipe. When using a small excavator, attach a smooth edge bucket or a rounded tooth bucket for clay/rock excavation, taking off layers of maximum 50 mm at a time.

• Locate and keep clear of overhead conductors (where applicable).

• Backfill all open trenches/excavations at the end of each shift.

• If a utility has been damaged as a result of excavation or directional drilling, ensure appropriate risk controls are initiated and isolate the area around a damaged utility.

• Immediately report the damage to the utility and then inform the Western Power nominated representative of the damage and request that they attend the site.

• Remove any waste from the worksite.

• Leave the worksite in a safe and clean condition according to the risk assessment.

• **Mechanical excavation**
  ○ Mechanical excavators must not be used until all the underground utilities have been located and identified.
  ○ Mechanical excavator operators must comply with the MADs for all underground utilities. Mechanical excavation is not permitted within 500 mm in any direction of any underground electrical cables or gas pipe.
  ○ When using a small mechanical excavator it must be fitted with either a smooth edge or rounded tooth bucket.
  ○ For clay/rock excavating, only layers of a maximum of 50 mm may be removed at a time.

• **Directional drilling**
  ○ Identify and expose any underground utility within the drill route that may be damaged as a result of the drilling process.
  ○ A safety observer must monitor any exposed utility during the drilling process.
References

- Work Practice Manual, field instructions:
  - 2.21 (Traffic management)
  - 3.1 (Clothing and personal protective equipment requirements)
  - 6.2 (Pole support)
  - 6.8 (Conductor clearances)
  - 7.4 (Underground cables), Table 1 (Minimum approach distances)

- WorkSafe WA Code of Practice – Excavations 2005:
  vation.pdf
7.3 Cable installation

Purpose

This work practice outlines the minimum cable installation requirements on the Western Power network, and includes:

- laying cable
- pulling cable
- bedding cable
- backfilling cable trenches

Note:

This work practice must be read in conjunction with the following:

- Main Roads Western Australia - Utility Providers Code of Practice for Western Australia (1 February 2010)
- Underground Distribution Schemes Manual (UDS) (DM# 3573985)
- Underground Cable Installation Manual (UCIM) (DM# 3582804)

Familiarity with the above manuals is essential for personnel undertaking cable laying activities on behalf of Western Power.

Authorisation

- Personnel performing cable installation work on Western Power worksites must conform to work practice 5.17 (Construction site access – minimum requirements) in this manual.
- The person in charge of cable installation at the worksite must, in addition to the above, have a Cable Layer authorisation on their Network Authority Card (NAC).
  In order to achieve this authority, personnel must have attended and passed either:
    - Power Training Services WA (PTSWA) – Lay underground electrical supply cables
    - Any other registered training organisation – UETTDRCJ21ALay ESI electrical cables.
Note:

After completing either of the above courses, personnel must apply for the Cable Layer authorisation to be put on their Network Authority Card.

- Before commencing work:
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements when handling, loading, excavating, laying or pulling cables (see section 3 (Personal protective equipment) in this manual).
  - conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual).

  Consider the following:
  - shoring excavations
  - confined spaces
  - vehicle and pedestrian traffic management
  - using machinery (for pulling cable)
  - work near other underground and overhead services
  - stability of any structure near excavations
  - public safety
  - additional PPE requirements

Note:

- Livestock behind fences must be kept secure.
- Private property must not be damaged.
- Services must not be damaged.
- If trees in the road verge must be pruned, the pruned limbs must be sealed and left in a reasonable condition.
Instructions

Planning

- All work planning must take place before excavation begins. The following must be notified at least five days before work commences:
  - Main Roads WA
  - Railways services (see Appendix 3 (Brookfield Rail data) in this manual)
  - Local shires
  - Councils and affected public
    For contact details, see Appendix 4 (Emergency contact information) in this manual.

- Use the Dial before You Dig service to obtain information from all utilities about the location of existing underground services within the proposed area of work.

- When planning to install new cable, the following site access requirements and limitations must be considered:
  - Environmental impact (see section 11 (Environmental) in this manual).
  - Private property or utilities (gas, telecom, rail, etc.).
  - Other Western Power services (overhead, underground).

  For more information, see:
  - Main Roads Western Australia - Utility Providers Code of Practice for Western Australia (1 February 2010)
  - AS 4799-2000 Installation of underground utility services and pipelines within railway boundaries
  - work practice 5.9 (Restricted access areas)
  - work practice 9.1 (Consumer site access)
  - work practice 7.10 (Gas mains – working adjacent)

Note:

Pavement or any constructed portions of any road reserve must not be broken to any extent without prior approval. For more on this, see the Underground Cable Installation Manual (UCIM), section 16.5 (Restoration of surface) (DM# 3582804).
Excavation and directional drilling

The requirements for excavation and directional drilling are covered in work practice 7.2 (Excavation and directional drilling) and the UCIM (DM# 3582804).

Ploughing

- Ploughing technology allows cables to be ploughed into the ground with an envelope of clean backfill sand. Ploughing equipment has the capability of installing cables in the following arrangements:
  - Three single core cables (not twisted) in flat or trefoil (triangular) formation. As a minimum, cores must be transposed at every drum change.
  - Triplex (twisted).
- The cable configuration must be surrounded with clean sand that is free of rocks and other hard formations:
  - 150 mm underneath the cable
  - 50 mm on either side of the cable
  - 300 mm above the cable
- Lay orange marker tape over the clean sand, as described in the Marking the ploughed cable route section, below.
- Fill the trench and compact to ground level with remaining material (ensure that stones and rocks have been removed).

Marking the ploughed cable route

Permanent above-ground cable markers must be installed along a cable route as described in Table 1 (Cable marking requirements), below.
Table 1: Cable marking requirements

<table>
<thead>
<tr>
<th>Alignment category</th>
<th>Description</th>
<th>Marker tape required? (300 mm above cables)</th>
<th>Above ground cable markers required?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Cable within the standard 0–500 mm alignment</td>
<td>Install cable at a depth of 850 mm. Use orange marker tape above cable.</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>Cable within the 2.4–3.0 m alignment</td>
<td>Install cable at a depth of 850 mm. Use orange marker tape above cable.</td>
<td>Yes</td>
</tr>
<tr>
<td>C</td>
<td>Cable outside road reserve (in remote area where there are no other services or infrastructure in the vicinity)</td>
<td>Install cable at a depth of 1200 mm. Use orange marker tape above cables and above ground cable markers.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

When markers are required (per Table 1, above), they must be placed:
- on either side of the road at the crossing point
- wherever a cable crosses a boundary (e.g. road reserve property boundary, etc.) and as close as possible to the cable installation

For cables in paddocks and open spaces:
- place markers so that the impact or damage to agriculture (including livestock) is kept to a minimum
- place markers at the boundaries if a cable has to cross a paddock

Markers should also be placed:
- to signify a change in direction of the cable route
- so that adjacent markers are visible from each other
- at a maximum distance of 150 m apart
Note:
The approved above ground cable marker for ploughing is the ezy-drive flexible steel post, stock code CR 0327.

Cable alignments

- If cables are placed on alignment—marker tape must be placed above the clean sand. The marker tape must be wide enough to cover the cables.
- If cables are placed off alignment (outside the 0-500 mm alignment or the 2.4-3.0 m alignment) – prior approval from Western Power and any other affected utilities must be obtained.
- If cable is out of the nominal 0-500 mm or 2.4-3.0 m alignment – use heavy duty ducts to provide mechanical protection.
- If off alignment cables are buried direct – cable cover slabs must be placed on top of 75 mm clean sand above the cable so that they overlap the width of the cables. This is followed by a further layer of clean sand to a depth of 300 mm above the cable and then marker tape.

Note:
For more information, see:
- Main Roads Western Australia - Utility Providers Code of Practice for Western Australia (1 February 2010).
- Underground Cable Installation Manual (UCIM), section 10 (Cables on and off Alignment) (DM# 3582804).

Handling cable drums

- Cable drums and cable are easily damaged through poor handling. Drums must be carefully loaded and handled using either:
  - a forklift (with tines long enough to reach under both drum flanges)
  - a crane (use spindles through the drum centre holes in conjunction with crane slings, lifting beams or spreader bars to prevent side pressure on the drum flanges)
- Never drop cable drums off a vehicle.
• The rolling of cable drums must be kept to a minimum.
• On delivery, visually inspect the cable drum for damage.
• Ensure that the cable end seals are intact.
• Cables must be returned to the supplier if the armouring, serving or sheath is:
  o damaged
  o corroded

**Positioning the drum**

• Align the drum in the direction of the cable pull.
• Suitably mount the drum on purpose-built jacks, trailer or stands (a stable base must be provided for the drum during pulling).
• Spool the cable off the top of the drum.
• Check the drum flanges and remove any protrusions such as nails and splinters that could pierce the cable sheath.
• Ensure that the cable does not rub against the drum flange.
• Ensure that the drum is level and rotates freely and evenly.
• Provide adequate barricading around the drum to prevent unauthorised access.

**Note:**

Cable may be pulled off the bottom of the drum if there are space restrictions. Ensure that the reason for doing this is recorded on the risk assessment.

**Laying cable**

• Laying or pulling cable into trenches or ducts presents a risk of damage to the outer sheath of the cable. Also, bending a cable beyond a certain limit can damage the insulation which may result in shortened life or faults (see the cable manufacturer’s instructions for minimum bend radii).
• Ensure that there is someone monitoring the drum during the pull to prevent overrun (two-way communications must be in place).
• When pulling cables, cable rollers must be used as they will:
  o provide protection from abrasion
  o assist with pulling cable around corners
  o reduce friction and pulling tension
• In all instances, cables that are being drawn into place must be kept clear of abrasive surfaces by suitable means (e.g. rollers) to prevent any damage to the cable sheath. The cable must be placed in the trench without sustaining abrasion damage and without allowing rocks, etc. to fall into the trench and onto the cable.

• During cable installation, ensure that no twists, knots or kinks are formed.

• If the cable is being flaked directly into its final position in the trench and is not being pulled (i.e. the drum is moving) then rollers, etc. are not necessary. The cable must still be laid onto the required 150 mm of clean sand bedding (see the Bedding cable section, below).

### Pulling cable through ducts

The cable outer sheath must not be damaged when pulling cables through ducts. A flared or belled entry must be used at the entry end of ducts during pulling to prevent damage to cable. For more information, see Underground Cable Installation Manual (UCIM), section 15 (Conduits) (DM# 3582804).

**Note:**

When pulling cable into a duct:

• it is recommended that personnel use specialised conduit rollers or flutes

• use a suitable lubricant to reduce friction between the cable and the duct

### Pulling tension

• Pulling tension must be regulated according to the size and type of cable. See the cable manufacturer’s instructions for maximum pulling tensions. Pulling tensions can be limited using:
  
  o breakaway swivel rated to the cable (pulling fuse)
  
  o preset winch tension rated to the cable
  
  o dynamometer (must be monitored)
  
  o force gauge (must be monitored)

• Pulling speed must be limited to avoid drum overruns and damage to the cable.

### Pulling methods

• When using power winches, there are four methods of attaching cable to the winch rope. The most suitable depends on the following:
  
  o type of cable
o size
o length
o construction

- Armour pulling – Uses the armour wires extended beyond the end of the cable and formed into a pulling eye.
- Stocking pulling – Common for cables up to 33 kV. Care must be taken to not apply too much tension and stretch the cable sheath.
- Nose pulling – For long cables and large cross section cables. Uses pulling eyes attached to the cable conductors. Used when stocking pulling exceeds sheath strength.
- Bond pulling – Cable is lashed to steel wire rope to distribute pulling tension throughout its length (bonded). This method is only used when end pulling tensions for the cable are exceeded.

**Bend radii**

Use rollers to reduce friction and provide an adequate bend radius when pulling cable around corners. Trenches must be wide enough to allow for the minimum installing bend radius (see the cable manufacturer’s instructions for minimum bend radii).

**Cable sealing**

Cable that is not going to be terminated immediately must be re-sealed if the seal is damaged after pulling and/or removing any pulling eyes.

**Bedding cable**

- The minimum cover for cables is 850 mm. This will ensure that a depth of 750 mm at the joints is maintained.
- The cable configuration must be surrounded with clean sand that is free of rocks and other hard formations:
  o 150 mm underneath the cable
  o 50 mm on either side of the cable
  o 300 mm above the cable.
- For cables vertically above one another, the sand filling between them must be 200 mm and the top cable must be covered with a further 300 mm of soft sand.
Backfilling

When backfilling a cable trench, ensure that:

• the backfill material is free of stones, rocks and paving material
• rubbish, pipe or cable off-cuts are not buried in the trench
• the backfilled material is compacted in layers to the same density as the surrounding soil
• the backfill is the same level as the original, unexcavated land
• all surplus spoil is removed from site

Surface restoration

• Any pavement or constructed surfaces that are damaged during excavation must be restored in accordance with the *Restoration and Reinstatement Specification for Local Governments in Western Australia* (see the References section, below). Restoration of surface includes restoration of footpath of all type of materials (e.g. bitumen, brick paving, liquid limestone)
• Where cement footpath slabs have been removed to allow cable trench excavation, they must be reinstated in accordance with the local council's requirements. For contact information for local government authorities and shire councils, see Appendix 4 (Emergency contact information) in this manual.
• All damage to private property must be repaired (within reason) to the landowner’s satisfaction, this may include:
  o trees (limbs cut, sealed and debris removed)
  o fences and walls (protected from damage)
  o structures (protected from damage)
  o paving (restored back to former condition)
  o reticulation systems (repaired)
  o underground services (repaired)

For more on this, see *Underground Cable Installation Manual* (UCIM), sections 16 (Reinstatement) and 17 (Damage to property) (DM# 3582804).
References

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 5.9 (Restricted access areas)
  - work practice 5.17 (Construction site access – minimum requirements)
  - work practice 5.24 (Network Authority Card (NAC))
  - work practice 7.2 (Excavation and directional drilling)
  - work practice 7.10 (Gas mains – working adjacent)
  - work practice 9.1 (Consumer site access)
  - section 11 (Environmental)
  - appendix 3 (Brookfield Rail data)
  - appendix 4 (Emergency contact information)
- AS 4799-2000 (Installation of underground utility services and pipelines within railway boundaries)
- Main Roads Western Australia - Utility Providers Code of Practice for Western Australia (1 February 2010)
- Restoration and Reinstatement Specification for Local Governments in Western Australia
- Underground Cable Installation Manual (UCIM) (DM# 3582804)
- Underground Distribution Schemes (UDS) Manual (DM# 3573985)
7.4 Underground cables

Purpose

The purpose of this work practice is to outline the working requirements and minimum approach distances (MADs) that must be maintained when working on underground cables.

Safety

Before commencing work:

- conduct a job risk assessment and job briefing. For more on this, see work practice 2.28 (Job briefing process) in this manual.
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements. For more on this, see section 3 (Personal protective equipment) in this manual.

Instructions

- Before doing machine excavation work near live high voltage (HV) apparatus:
  - obtain a Vicinity Authority (VA)
  - disable any auto-reclosing devices, if present
  - physically locate underground utilities by non-destructive methods such as hand digging, vacuum digging or low pressure water jet
- Personnel must not touch live HV cables unless they are a cable technician trained in identification techniques. For more on this, see work practice 7.9 (Identifying and proving of HV cables) in this manual.
- Always remove covers laid for mechanical protection of cables by hand.
- Do not blast within 30 m of any live, buried cable.

Exposed underground cables

- Do not leave live cables:
  - unattended in excavations without approved barriers
  - accessible to the public
- Do not move cable joints during excavation as this may damage the joint and endanger the work team.
• When a joined cable has been de-energised and moved, perform an insulation test to confirm the joint integrity before re-energising. For more on this, see work practice 7.7 (Commissioning testing of apparatus and underground cables) in this manual.

• If cables, conduits or ducts are suspended across openings greater than two metres, they must be supported to prevent movement, misalignment and damage. To do this, use a rigid, non-conductive support that must not damage the outer sheath of the cable or conduit.

• Live cables that are suspended across openings must be covered with non-conductive material to prevent them from being accidentally contacted.

• Precautions must be taken to prevent contact with the underground services. If any underground services are damaged, it must be immediately reported to the Western Power’s fault centre on 13 13 51 or the owner of the service. Then report the incident to the Incident Hotline 1300 CALL WP (1300 2255 97) within 60 minutes.

• A Western Power representative must supervise any excavation work that will disturb the soil beneath underground cables that may allow them to become unsupported and unprotected.

• When working near live cables, always maintain the appropriate MADs as shown in Table 1, below.

### Table 1: MADs to underground cables

<table>
<thead>
<tr>
<th>Nominal voltage</th>
<th>MAD (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Powered tool or plant</td>
</tr>
<tr>
<td>Up to and including 1,000 V</td>
<td>300 mm</td>
</tr>
<tr>
<td>Greater than 1,000 V up to and including 33 kV</td>
<td>500 mm</td>
</tr>
<tr>
<td>Greater than 33kV up to and including 132 kV</td>
<td>3,000 mm</td>
</tr>
</tbody>
</table>

Adapted from Electrical System Safety Rules, 6.3.6 (Approach to cables)
Note:
Powered excavating tools or machinery may not be used at distances any closer than indicated in Table 1, above. Only unpowered excavating hand tools or vacuum extraction can be used at closer distances.

For cables 33 kV and above, a Western Power representative must supervise the work.

Moving cables
- Never move live HV cables.
- When moving low voltage (LV) cables, the manufacturer’s stated minimum bending radius must be maintain.
- Only move HV cables if the cable has been isolated and earthed.
- Only move live LV cables when:
  - a separate risk assessment has been performed for the task
  - the cable sheath is in good condition and at earth potential
  - the cable is either Wavecon 25 mm, four-core Cross-linked polyethylene (XLPE) 10 mm, or streetlight cable 16 mm

Placing new cables in a trench with existing live cables
- A safety observer must be present. For more on this, see work practice 2.2 (Safety observer role) in this manual.
- Carry out a risk assessment before installation.
- Protect existing cables against damage.

Conduit cutting

When locating cables enclosed in conduits and cutting open the conduits to access either HV or LV cables, the following must be done:
1. Obtain records of cable locations using Dial Before You Dig and SPIDAweb services.
2. Complete a specific risk assessment for this task.
3. Ensure that all personnel comply with the minimum personal protective equipment for this task (PPE) requirements (see section 3 (Personal protective equipment) in this manual).
4. De-energise and earth the cable if HV or LV, unless LV live jointing is necessary.

5. Obtain an Electrical Access Permit (EAP).

6. Use an electronic cable locator with separate transmitter while trenching to locate the cable enclosed within a conduit.

7. Where the conduit is grouped with other conduits, confirm that the correct conduit has been selected by using an approved cable identity tool, for example:
   - frequency cable identity tool with transmitter
   - SebaKMT with transmitter and receiver loop

8. Cut a suitable viewing hole in the top of the conduit to release any water inside and help determine the number of cables inside. To do this safely:
   a. use a battery-powered drill and 35 mm boring bit (e.g. Haron) to bore a hole of 1-2 mm depth
   b. replace the boring bit with a 35 mm hole saw bit but with the central drill bit removed
   c. consult Table 2, below, to determine the conduit wall thickness then fit a hose clamp around the hole saw to ensure that the drill depth does not fully penetrate the conduit wall. The cutting depth in the conduits should be less than the wall thickness in order to leave a thin plastic skin. The tables below show the approximate wall thickness of commonly used conduits.

   **Table 2: Conduit wall thickness (mm)**

<table>
<thead>
<tr>
<th>HD conduit size (outside diameter)</th>
<th>Approx. wall thickness</th>
<th>HDPE conduit coil (outside diameter)</th>
<th>Approx. wall thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50</td>
<td>63</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>3.4</td>
<td>3.9</td>
<td>4.6</td>
</tr>
</tbody>
</table>

   d. using the circle bored by the boring bit as a guide, cut a hole in the conduit wall, leaving a thin plastic skin
   e. use a hammer to break the thin plastic skin and remove the section of conduit
9. If electric power tools or hand tools are required to open the hole further, update the risk assessment including the new identified risks.

10. Use the appropriate tool (e.g. router or saw) with the depth set as shown in Table 2, above, to cut a letter-sized opening (e.g. 130 x 240 mm) in the top of the conduit with the viewing hole at the centre.

11. Carefully cut along the top and ring-cut around the ends of the section of conduit to be removed.

12. Remove the section of conduit.

13. Before starting any work on the cable, prove that the correct cable has been identified by doing both of the following:
   a) Use the cable identity tool to determine the correct cable.
   b) Spike/cut the cable while de-energised.

For more on this, see:
   • HV cables – work practice 7.9 (Identifying and proving of HV cables) in this manual
   • LV cables – work practice 7.5 (Proving the status of LV Wavecon underground cables) in this manual

14. Complete work to the cable, referring to any relevant work practice.

**HV cables for greenfields subdivision (future connection)**

1. Ring main unit (RMU) or supply source cable ends:
   • Cable ends must be terminated and connected to load side of switchgear.
   • For the future circuit, switchgear must be padlocked in the earthed position and a “Do Not Operate” danger tag fitted, describing the location of the remote end where the white universal pillar is located.

2. Remote cable ends must be trenched to a position beyond where the future connection point will be, allowing cable length for termination.

3. Remote cable ends must:
   • have a live end seal kit on the actives at HV burial depth
   • be buried in the prescribed cable alignment and to the prescribed depth

4. Record the location on SPIDAweb prior to commissioning. Mark remote cable end location:
   • on as-constructed drawings
   • in SPIDAweb
LV cables for greenfields subdivisions (future connection)

1. If laying a cable for a future scheme or connection from a universal pillar, kiosk, or LV frame unit in an existing scheme, the remote end of the cable must not be left on the drum. Instead, ensure that it is:
   - terminated
   - insulated to approved methods
   - buried in the prescribed cable alignment and to the prescribed depth

2. Mark cable ends location:
   - on as-constructed drawings
   - in SPIDAweb

Cable preparation before termination

- Check heat shrink cap and cable for signs of damage. If the cable is damaged or there are signs of moisture ingress, ensure that the cable is tested before termination.
- Use a proximity tester (e.g. Modiewark) to check that no voltage is present.
- Remove the heat shrink cap. To prevent possible static build up, while removing the heat shrink cap, the tool must not contact the cable core or screen.
- Before touching the exposed conductors, use a proximity tester (e.g. Modiewark) set to the lowest voltage to check that no voltage is present.
- While remaining insulated from the cable, short the exposed conductor and cable screen.

References

- Work Practice Manual:
  - work practice 2.2 (Safety observer role)
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 7.7 (Commissioning testing of apparatus and underground cables)
  - work practice 7.9 (Identifying and proving of HV cables)
- Electrical System Safety Rules (ESSR)
7.5 Proving the status of LV Wavecon underground cables

Purpose
This work practice outlines the minimum requirements for safe-cutting in order to prove the status of low voltage (LV) Wavecon underground cables.

Authorisation
Safe-cutting LV underground cables must only be carried out by a trained person who has successfully completed the PTS course 'Joint and maintain de-energised LV underground Polymeric cables' (or equivalent) and has the appropriate Network Authority Card (NAC) endorsement.

Equipment
The following tools are required for this task:

- approved insulated ground mat
- insulated sleeves (for neutral screen)
- insulated knife
- insulated wedges
- approved test instrument.

Safety
Before commencing work:

- conduct a job risk assessment and job briefing (see 2.28 (Job briefing process) in this manual).
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see Section 3 (Personal protective equipment) in this manual. LV rated insulated gloves and protective outers must be worn.

Note:

- Treat all cables that are to be worked on as live until proved de-energised and shorted.
- Work from an approved insulated ground mat when doing a safe-cut.
Instructions

1. Identify the peak wave in the neutral conductor screen of the underground cable.
2. Cut and remove the outer cable sheath to at least 330 mm along the length of the cable.
3. Divide and spread the neutral conductor screen into two sections and put an insulating sleeve on each section.
4. Remove the layer of black mastic (butyl) insulation.
5. Separate the phase conductors with the approved insulated wedges.
6. Use an approved insulated knife to expose the conductor by making a small incision through the insulation of the first phase.

**Note:**
Make sure that the insulating sleeve is fitted to the neutral conductor to avoid simultaneous contact between the neutral and the knife when cutting.

7. Prove that the test instrument is operating correctly by confirming on a known live source
8. Test between the neutral conductor and the phase conductor (at incision) to confirm the phase conductor status.
9. Prove that the test instrument is still operating correctly by confirming on a known live source
10. Cover the open incision of the phase conductor with an insulating medium before testing the next phase.
11. Repeat steps 6 - 9 to prove the status of the remaining phases.
12. If no further work is to be carried out on the cable, remove the insulated sleeves, apply the appropriate sized joint shell to the safe-cut area, and fill with compound.

References

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - Section 3 (Personal protective equipment)
7.6  Live low voltage cable jointing and working on live LV apparatus

Purpose

This instruction outlines the minimum safe working requirements for live low voltage cable jointing work and working on live LV apparatus.

Overview

This instruction applies to anyone performing live low voltage cable jointing. They must have successfully completed the training course PTS 371 – Joint and Maintain Energised Low Voltage Underground Polymeric Cables. Based on the job risk assessment all live low voltage jointing must be carried out in accordance with live low voltage jointing principles, including the proper use of test equipment, tools, accessories and personal protective equipment (refer to Field instruction 3.1 – Clothing and personal protective equipment requirements), to conduct the above task on behalf of Western Power.

Instructions

Before commencing work on exposed energised low voltage cables, a written assessment (JRA) of the associated risks shall be made in consultation with the persons proposing to do the work and to implement control measures to reduce the risks.

The job risk assessment must include the following:

- Identify adjacent exposed live apparatus and isolation points of the relevant electrical supply.
- Identify an emergency evacuation route without the need to negotiate or remove obstacles.
- Hazard and control measures.
- An inspection and check of the rescue kit and for it to be placed directly at the worksite location.
- The nominated safety observer should also be the rescuer.
Follow the principles for live low voltage work

- Insulate and separate.
- Work in the correct position.
- One potential at a time.
- Do not become part of the circuit.
- Appropriate clothing and personal protective equipment must be properly worn and used by the persons performing live low voltage cable jointing, refer to Field instruction 3.1 (Clothing and personal protective equipment requirements).

Ensure that

- Appropriate test equipment, tools and accessories, provided to the persons doing the live LV jointing, are properly used and are well maintained, these must be inspected, checked to be in sound serviceable conditions prior to use. Use approved Western Power insulated tools compliant with IEC 60900 – 2004 (DM# 8205797).
- Inspect and confirm all insulating barriers and covers to ensure they are free of cracks, holes and dirt.
- Place barriers and danger tags on all open points.
- When working on below ground pits use an insulated ground mat, in test date to comply with Western Power’s testing requirements.
- Unauthorised persons must be prevented from entering the live work area by use of signage, barriers or both.

**DANGER**

The following low voltage tasks **MUST NOT** be carried out live:

- Work on Consac cables in pillars.
- Work on energised Consac cable jointing.

Safety observer
• A competent safety observer must be present throughout the job when performing live low voltage cable jointing work

• The safety observer must possess a current first aid certificate and be competent in rescue procedures (releasing a person from live LV electrical equipment) and emergency communications.

• The safety observer must be experienced in recognising electrical hazards when performing live low voltage cable jointing.

In the event of an emergency

• Eliminate the potential for injuries to the rescuer or others.

• If the supply cannot be isolated immediately, wear insulated gloves (refer to Field instruction 3.2 – Glove Protection) and use the rescue crook to break contact where the casualty is in contact with live apparatus.

• The rescuer must not make direct contact with the casualty until they have removed them from the hazard and must never make contact with the live apparatus.

• Must have successfully completed the training course PTS 766 – Low Voltage Switchboard and Apparatus Rescue.

The rescue kit must contain the following items at all times

• electrically insulated gloves

• insulated crook

• torch

• fire blanket

• wound dressing

Provide an insulated ground mat or cover for an emergency cover to exposed cable in the trench (in test date to comply with Western Power’s testing requirements).

Inspect the rescue and first aid kits to ensure all contents are present and in good condition prior to work commencement, replace all used equipment.

References
• Work Practice Manual: Field instruction 7.1 (Safety procedures for high voltage and low voltage cable work)
• Training course PTS 371 – Joint and Maintain Energised Low Voltage Underground Polymeric Cables
• Training course PTS 766 – Low Voltage Switchboard and Apparatus Rescue
• AS/NZS 4836:2011 Safe working on or near low-voltage electrical installations and equipment
7.7 Commissioning testing apparatus and underground cables

**Purpose**

This work practice outlines commissioning procedures for new and existing apparatus and underground cables.

**Overview**

Electrical commissioning and recommissioning (maintenance testing), proves that the equipment meets a specific performance criterion before it is energised. Testing plant prior to energisation mitigates the possibility of failure on connection to the Western Power network.

**Important**

- Commissioning and maintenance testing of electrical equipment can be extremely hazardous. It is crucial to take all safety precautions at each step of the process.
- Failure to take safety precautions can result in serious injury to personnel and to the public. It may also cause significant damage to plant and disruption to the electrical network.
- Commissioning and maintenance testing practices for transmission equipment can be more detailed and complex than equipment for connection to distribution voltages (i.e. up to and including 33 kV). However, in both cases, the same extreme care and vigilance to potential hazards must be exercised.

**Safety**

- During pre-planning, ensure that any concerns of safety are raised with the project manager and/or your formal leader (preferably prior to the job) so that they can plan appropriate measures to control the risks.
Before commencing work:
  - conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual). The risk assessment must include:
    - placing barriers and relevant signs to isolate the test area. This must be done throughout the entire period that the electrical apparatus is subjected to the test voltage.
    - ensuring that the appropriate permit (e.g. Sanction to Test (STT)) is in place to control access to the equipment during testing
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

Instructions

DCWIs 2.1 to 2.9 (Distribution commissioning work instruction) and their instructions are to be used in conjunction with this work practice.

Commissioning – New reticulated installations

Low voltage (LV)

- Check the nominated area that is to be energised to ensure that:
  - all pillars and switchgear are correctly installed
  - cable ends are made off according to as-constructed drawings
- Check the underground distribution scheme drawings. Ensure that the drawings indicate LV cables feeding into another scheme are terminated in a mini pillar with a working end or made off in a joint shell. The cable ends must be terminated or buried in the prescribed cable alignment and to the prescribed depth. Record the location on SPIDAweb prior to commissioning.
- Check all below-ground service pits to ensure that they are installed according to the guidelines in Distribution Construction Standards Handbook, HB01-2007, Part 5 – Low Voltage Underground, drawings U30/1 and U30/2 (DM#5115018).
- Check that all terminations are complete and fitted according to the manufacturer’s instructions.
High voltage (HV)

- The following HV cables must be commissioned:
  - new installation feeder cables distribution transformer cables with joints that are protected by a fuse
  - all new transmission cables up to 33 kV, including:
    - new transformer cables between transformer and switchboard
    - new capacitor bank cables
    - local substation transformer cables
    - switchboard bus cables
    - neutral earthing compensator cables

**Important**

Earth out cable cores or apparatus between tests and on completion of testing to dissipate any stored energy. Equipment should be left in an earthed state to eliminate any possible recovery voltage until reconnection is required.

- For gas insulated switchgear, ensure that the switchgear is in good order and that the gas gauge indicates a sufficient level of SF$_6$ gas to operate.
- For vacuum insulated switchgear, testers must mitigate the danger of x-rays. A two metre radius should be maintained for root mean square (RMS) test voltages ≤ 50 kV. For more on this, see AS2981-2008 - High voltage a.c. Switchgear and controlgear - Vacuum interrupters - High voltage testing - Protection of personnel from x-ray emission.
- Check that all terminations are complete and fitted according to the manufacturer’s instructions.

**Important**

Always check that transformers with two sets of HV bushings have had the dust covers removed and dead end plugs fitted, if only one set of bushings is in use.

- Submit a Distribution Network Access Request (DNAR) and a network or system change form to Network Operations Control (NOC) before any changes
are made to the HV distribution network. This includes the installation of any new apparatus that becomes connectable to the network.

- Cables should be energised as soon as possible after the very low frequency (VLF) test is completed. If this is not possible, the maximum time allowed between VLF testing and energising the cable is seven days (for new URD (Underground Reticulated Distribution) only). Where energising takes place more than one day after the VLF testing, the cable must undergo a 5 kV insulation resistance test, to ensure that it is not damaged.

**Maintenance testing – Aged equipment or equipment connected to aged apparatus**

- Prior to starting any work, ensure the equipment has been isolated, confirmed to be de-energised and the appropriate permit is issued.

- If, during maintenance testing, the scope of testing is to be reduced or deferred, a comprehensive risk evaluation of the aged plant must be carried out by the Conductor Performance area and the tester.
  - Tests may be deferred in critical situations. If this is done, then the apparatus should be energised remotely if possible. Examples of conditions that may use a reduced criteria, or cause testing to be deferred, are:
    - LSE (Life Support Equipment) customers (minimal testing time)
    - declared total fire ban (minimal testing time or deferred)
    - transformer oil link box (deferred due to possible polychlorinated biphenyl (PCB) contamination, or reduced to 2.5 kV insulation resistance test due to transformer winding still being connected)
    - transformer boots that have no easy access (deferred)
    - determining if adjacent equipment is faulty
    - switching officer confirming serviceability (reduced time)
    - moving cables
    - civil works in close proximity
    - any transmission cable joint repaired or found to be faulty
**Important**

Earth out cable cores or apparatus between tests and on completion of testing to dissipate any stored energy. Equipment should be left in an earthed state to eliminate any possible recovery voltage until reconnection is required.

- For gas insulated switchgear, check that the switchgear is in good order and that the gas gauge indicates a sufficient level of SF\(_6\) gas to operate.
- For vacuum insulated switchgear, testers need to mitigate the danger of x-rays. A two meter radius should be maintained for RMS test voltages ≤ 50 kV. For more on this, see AS2981 - 2008 *(High voltage a.c. Switchgear and controlgear-Vacuum interrupters-High voltage testing-Protection of personnel from x-ray emissions)*.
- Check that all terminations are complete and mechanically sound.
- Submit a DNAR (Distribution Network Access Request) and a network or system change form (Patch) to NOC before any changes are made to the HV distribution network. This includes the installation of any new apparatus that becomes connectable to the network. For more information on this see *G 151 DNAR User Instructions* (DM#2319398).
- Maintenance testing of ancillary equipment (i.e. equipment associated with the outage, but not worked on) may be deferred if a comprehensive risk evaluation is done and the impact during any maintenance to the apparatus is minimal. A risk evaluation must include:
  o Mechanical damage
    - Removal and replacement of parts
    - Bend radii exceeded
    - Physical damage or significant force applied to the outer surface
    - Excavation near or over the apparatus
    - Replacement or connection of new parts
  o Environmental damage
    - high humidity
    - rain
    - dust (contamination)
Operational work practice standards

- extended outage
- lightning
- Electrical damage
  - fault events
  - aging
  - chemical deterioration

- The risk evaluation must be agreed to by a tester and the Conductor Performance Area (part of the Asset Performance function). This would be assessed prior to the outage and updated if outage delays occur or the scope of the job changes.

- Where it has been agreed that the cables are to be Very Low Frequency (VLF) tested, they must be energised as soon as possible after the VLF test is completed. If this is not possible, a risk evaluation must be carried out. The assessment will guide the project manager through the requirements for repeat testing. If the cable is energised more than one day after the VLF testing, the cable must undergo a 5 kV insulation resistance test to ensure that it has not been subjected to damage.

**Note:**

The primary purpose of a risk evaluation is not for the purpose of reducing the outage time or minimising cost; instead, it is used to evaluate the plant's condition and the risk of damage or failure.

**Pre-energisation checks**

- Check apparatus to ensure that:
  - it has not been damaged during delivery or installation
  - it is protected from mechanical damage
  - all packing and items used for tests have been removed
  - it has had the dust covers removed and replaced with dead end plugs where required
  - it is installed correctly, according to manufacturer and design specifications
  - it has been supplied and installed correctly as specified for the project
• Ensure that:
  o live parts on equipment are not exposed or are accessible by the general public or animals (air insulated equipment must be installed according to minimum clearance criteria)
  o all the appropriate tests as per the relevant DCWI (Distribution Commissioning Work Instruction), on all equipment have been carried out.

**Important**

Ensure that the testing is done before making the customer connections at the pillar or flush-mounted cable pit.

  o HV screens and LV neutral screens are all solidly and separately bolted to the appropriate earth bar
  o cables are labelled, identifying the location of the other ends and isolation points
  o all equipment is in its final circuit condition and all loose cable ends and equipment is connected and terminated
  o shorting leads have been removed from cables prior to energising
  o normal open points are set to their designated position
  o all equipment is locked, sign posted and protected from unauthorised entry

**Note:**

Ensure that the HV screens at Single Phase Underground Distribution (SPUD) transformers are connected together in a common lug and bolted solidly at the earth bar.

**Energisation**

• Transmission cables above 33 kV should be energised and soaked for 24 hours before applying any load current (an unloaded transformer connected to a newly energised HV cable is not considered a load).
• Stand clear for at least five minutes after the first energisation of electrical equipment.
• As each cable is energised, conduct phasing out at the feeder pillars, mini pillars, and LV connection points.
Note:

Fit a “Do Not Operate” danger tag to a cable where it is terminated at one end only (at the point of supply) and does not immediately require energisation (see Appendix 1 (Tags and signs)).

References

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - Appendix 1 (Tags and signs)
- Distribution Construction Standards Handbook, HB01-2007, Part 5 – Low Voltage Underground, drawings U30/1 and U30/2 (DM# 5115018)
- G 151 DNAR User Instructions (DM# 2319398)
- AS2981-2008 - High voltage a.c. Switchgear and controlgear - Vacuum interrupters - High voltage testing - Protection of personnel from x-ray emission
7.8 Live LV underground pits

Purpose

This instruction outlines the minimum requirements when working on live low voltage (LV) underground electrical pits.

Safety

Live work is only permitted on unmetered supply pits after a full risk assessment has been completed. This ensures that the task can be completed safely using live work methods.

Instructions

• All personnel who work on live LV underground electrical pits must wear the appropriate personal protective equipment. For more on this, see Section 3 (Personal protective equipment) in this manual.
• Stand on an approved insulated mat when working in or around a live underground electrical pit.
• Additional ground mats or covers may be required to maintain the correct levels of insulation
• Ensure the insulated mat/s is/are not damaged or deteriorated and have a current test date.
• Ensure a full risk assessment has been completed ensuring the task can be completed safely.

References

• Work Practice Manual, Section 3 (Personal protective equipment)
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7.9 Identifying and proving of HV cables

Purpose
This instruction outlines the process for identifying and proving that high voltage (HV) cable is de-energised for the purpose of cutting. This must be done for both planned and unplanned work.

Scope
This instruction is applicable when:
- a specific HV cable must be identified
- cable cutting to prove that the cable is de-energised before working on it.

Note:
If the identification of a HV cable involves accessing the cable cores of a network-connected asset, access must be gained under a permit. For more on this, see field instruction 7.4 (Underground cables) in this manual.

General
The process of proving that a cable has no hazardous voltage present involves cutting/spiking. This is done by creating a short circuit between the core/s and neutral/earth screen using a method that poses no risk to people during the cutting of the cable. This is done using an approved spiking gun or remotely operated cutting equipment.

Requirements
- It is essential to correctly identify and cut the HV cable that is to be worked on before any HV cable work is started. The following are some exceptions:
  - where the work is restricted to only the outer part of PILCSWA cable and the lead sheath is not disturbed
  - where the work is restricted to only the outer part of a XLPE cable and the earth screen is not disturbed
  - where the route of the cable is short and clearly visible (e.g. a HV cable between a transformer and adjacent ring main unit)
where the cable is clearly out of service and the ends are clearly visible and capped

- The identification and cutting of HV cables must be written into the switching program and this task must be the responsibility of the switching operator (SO) and Network Operations Control Centre (NOCC) switching program writers.
- For planned work, the Distribution Networks Access Request (DNAR) must highlight the need for cable ID and cutting steps to be included in the switching program.
- For unplanned work, the SO and controller must include the ID and cutting steps in their switching program.
- Access to the cable cores must be under a Sanction to Test (STT) permit and when the HV cable is identified it must then be earthed and cut. Only people who are competent with the tools are to perform the identifying and cutting tasks and they are to do this under direction from the tester in charge as recipients on the STT permit.

Note:

Only qualified cable jointers experienced in the use of a remotely operated electric over hydraulic cable cutter may perform the task of cutting the cable.

Safety preparations

- The SO may use the following to assist in identifying the HV circuits:
  - dial before you dig (1100)
  - drawings and cable plans from SPIDAweb
- Cable alignment and size (in relation to other cables) must be taken into consideration.
- An onsite risk assessment must be conducted.
- Correct personal protective equipment (PPE) and clothing must be worn. For more on this, see field instruction 3.1 (Clothing and personal protective equipment requirements) in this manual.
- A remotely operated hydraulic cable cutter may only be used if the hydraulic hoses:
  - are high pressure
  - are non-conductive
• have been electrically tested and tagged with the test date not exceeding six months and three weeks from testing
• The hose test is the same as that conducted on the hoses of an insulated rated elevated work platform (EWP).
• If a remotely operated hydraulic cable cutter is to be used near or within a quarry or mine environment, then the site safety officer needs to be advised that this tool will be used and the frequency of the remote control.
• If using an explosive-powered chisel cable spiking tool, it must be inspected for signs of wear or damage before it is used.

ID apparatus and cutting tool
• Only approved cable ID equipment and cutting apparatus may be used. The recommended cutting tool is an electric over hydraulic cable cutter (wireless remote controlled cutter/crimper).
• The existing, explosive-powered chisel spiking tools are to be phased out per existing tool replacement procedures.

Key site controls
• Identification and cutting of cables is part of the HV isolation and earthing process and is included in the switching program.
• The SO is accountable for the cable identification and cutting task.
• Both the identifying and cutting of a cable must be under a work permit unless these are listed as exceptions under requirements.
• Cables must be positively identified.
• All people must be clear of the work area whenever cutting equipment is being operated.
• Check with NOCC after any cutting for alarms or feeder trips.
Note:

- The following table only covers the cable ID and cutting task steps of the switching program. There are other works and permits that will need to be done before and after doing the cable ID and cutting.

- Abbreviations in this table:
  - DT: “Do Not Operate” danger tag
  - RU: "Restricted Use" danger tag
  - TIC: Tester In Charge
  - SO: Switching Operator
  - IO: Issuing Officer

- The SO has the overall responsibility to ensure safety when undertaking switching operations.

- The delegated responsibilities, during the identification and cutting tasks are as listed below.

- The SO and IO may be the same person.

### Table 1: HV cable identification and cutting task steps

<table>
<thead>
<tr>
<th>Task</th>
<th>Responsibility</th>
<th>Actions</th>
<th>Communication</th>
<th>Instructions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolate, attach DT</td>
<td>SO</td>
<td>SO</td>
<td>NOCC / SO</td>
<td>NOCC / SO</td>
<td>DT applied</td>
</tr>
<tr>
<td>Test 'de-energised'</td>
<td>SO</td>
<td>SO</td>
<td>NOCC / SO</td>
<td>NOCC / SO</td>
<td>Cancel earlier EAP</td>
</tr>
<tr>
<td>Earth ON attach RU tag</td>
<td>SO</td>
<td>SO</td>
<td>NOCC / SO</td>
<td>NOCC / SO</td>
<td>RU tag replaces DT</td>
</tr>
<tr>
<td>Issue STT permit</td>
<td>SO</td>
<td>SO / TIC</td>
<td>SO / TIC / recipients</td>
<td>SO / TIC / recipients</td>
<td>SO or IO may be TIC (with TIC certificate), TIC explains permit to recipients and can direct their work.</td>
</tr>
<tr>
<td>Open RMU cable cover</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC / recipients</td>
<td>TIC / recipients</td>
<td>TIC / recipients</td>
</tr>
<tr>
<td>Attach signal generator</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td></td>
<td>Cable earths used</td>
</tr>
<tr>
<td>(or fault locator for fault)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth OFF</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test remote cable for generator signal</td>
<td>TIC</td>
<td>TIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task</td>
<td>Responsibility</td>
<td>Actions</td>
<td>Communication</td>
<td>Instructions</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------------</td>
<td>---------</td>
<td>---------------</td>
<td>--------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Identify and mark cable</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td></td>
</tr>
<tr>
<td>Earth ON</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove signal generator</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td></td>
</tr>
<tr>
<td>Contact NOCC</td>
<td>SO</td>
<td>NOCC</td>
<td>NOCC / SO</td>
<td>NOCC / SO</td>
<td>Advise cable cutting action</td>
</tr>
<tr>
<td>Cut cable</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td></td>
</tr>
<tr>
<td>Confirm all okay with NOCC</td>
<td>SO</td>
<td>NOCC</td>
<td>NOCC / SO</td>
<td>NOCC / SO</td>
<td>Consult NOCC to confirm that area power condition has not changed before next step</td>
</tr>
<tr>
<td>Using an approved tester, check the cable cutter has not become energised before removing</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td></td>
</tr>
<tr>
<td>Earth switch(es) OFF</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td></td>
</tr>
<tr>
<td>Cable end phase colours identified with continuity test</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td>TIC</td>
<td>Cable ID and phase colours are now proved</td>
</tr>
<tr>
<td>Earth switch(es) ON</td>
<td>TIC</td>
<td>TIC</td>
<td>SO/TIC</td>
<td>TIC</td>
<td>Confirm end of cable ID and cutting task per program</td>
</tr>
<tr>
<td>Relinquish STT</td>
<td>TIC</td>
<td>TIC / recipients</td>
<td>TIC / SO / recipients</td>
<td>TIC / recipients</td>
<td></td>
</tr>
<tr>
<td>Cancel STT permit, replace earth switch RU tag to DT</td>
<td>SO</td>
<td>SO</td>
<td>SO/NOCC</td>
<td></td>
<td>NOCC advised of STT cancellation</td>
</tr>
</tbody>
</table>

**References**

- Work Practice Manual, field instructions:
  - 3.1 (Clothing and personal protective equipment requirements)
  - 7.4 (Underground cables)
7.10 Gas mains – working adjacent

Purpose

This work practice outlines the minimum safety precautions that must be followed when working close to gas mains.

Instructions

• Before commencing work:
  o conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual). The risk assessment must include:
    – the need for gas detection
    – an emergency response plan to address a possible gas ignition incident (see work practice 2.1 (Worksite evacuation plan) in this manual)
  o ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

• Refer to and comply with work practice 7.2 (Excavation and directional drilling) in this manual.

Note:

Work in the vicinity of underground utilities must not proceed until all services:
• have been identified using the ‘Dial Before You Dig’ system on 1100
• have been properly located

High pressure gas pipelines

• No mechanical excavation is permitted within 15 m of a high pressure gas pipeline without notification and authorisation from ATCO Gas Australia (ATCO Gas).

• A Clearance to Work Permit must be requested from ATCO Gas at least 48 hours before commencing work within 15 m of a high pressure gas pipeline. Call 1300 926 755 to make arrangements.

• This permit must remain onsite at all times during the work.
• An ATCO Gas representative must be onsite at all times if there is a possibility that the work may encroach within five metres of a high pressure gas pipeline. There is a charge for this service.

• Both the Vines in the Swan Valley and Albany on the southern coast of Western Australia use a gas mixture (LPG) which is heavier than air. Accordingly, ATCO Gas must be contacted on 1300 926 755 before carrying out any work in a trench or excavation adjacent to a gas main in these areas.

Note:
Fines apply for non-compliance with these requirements.

High pressure gas transmission mains

• No excavation is permitted over high pressure gas transmission mains or within the easement set aside for high pressure gas transmission mains (or laterals) without written permission from the owner or manager of the pipeline. To obtain the asset owner details, contact ‘Dial Before You Dig’ on 1100.

• Request onsite supervision from the asset owner when encroaching into the easement area. For more on this, see work practice 5.9 (Restricted access areas) in this manual.

Gas leak detection

• Use a gas detection instrument/device to identify gas presence or any possible leaks. The gas detection instrument/device must:
  o comply with the performance criteria described in AS/NZS 60079.29.1:2008 – Explosive atmospheres - Gas detectors – Performance requirements of detectors for flammable gases
  o be able to detect the gases that may be present in the work environment

• The gas detection instrument/device must be used:
  o according to the manufacturer’s recommendations
  o in the work area while the hot work is being conducted

• Calibration of all devices must be in accordance with work practice 5.4 (Instruments – testing and calibration) in this manual.

• When a gas leak is detected:
  o immediately stop all work
  o implement the worksite evacuation plan
move all personnel away from the leak area
- ensure that any potential open flame source has been removed
- ensure that the area is isolated from the public
- inform the construction manager or the project manager. Call ATCO Gas for, gas faults and emergencies, on 13 13 52 and wait for further instructions.

Note:
In areas of older infrastructure there may be remnants of an aging gas reticulation system. Particular care is required when excavating in these areas.

Hot work

When performing any hot work in the vicinity of gas mains, the following additional requirements are applicable.

Note:
When doing any hot work, refer to AS 1674.1-1997 Safety in welding and allied processes – Fire precautions.

- Before commencing hot work:
  - contact the pipeline owner to enquire if stand-by supervision is necessary during the work. To obtain the asset owner details, contact ‘Dial Before You Dig’ on 1100.
  - establish an exclusion zone around the work area using appropriate warning bunting or barriers
- If an exclusion zone using bunting or barriers cannot be achieved, a safety observer must be appointed to prevent unauthorised access.
- Perform gas leak detection immediately before starting hot work. Test regularly while hot work is in progress.
- Identify and control any fire hazard (including flammable or combustible liquids, gases, vapours, dust, fibres or substances) within 15 m from the hot work. If not possible, contact ATCO Gas 13 13 52.
- A suitable fire extinguisher must be onsite and available while hot work is being prepared or carried out.
• Place a fireproof blanket or barrier between the gas pipe and the hot work area. If the placement of a fireproof blanket is not possible, contact ATCO Gas on 13 13 52 for assistance.

**Note:**

Where hot work is being carried out by a contractor to Western Power, the person responsible for the hot work must be approved by both Western Power and ATCO.

**References**

• Work Practice Manual:
  o work practice 2.28 (Job briefing process)
  o section 3 (Personal protective equipment)
  o work practice 5.4 (Instruments – testing and calibration)
  o work practice 5.9 (Restricted access areas)
  o work practice 7.2 (Excavation and directional drilling)

• AS/NZS 60079.29.1:2008 – Explosive atmospheres - Gas detectors – Performance requirements of detectors for flammable gases

• AS 1674.1-1997 Safety in welding and allied processes – Fire precautions
7.11 Earthing cable screens in HV switchgear fitted with frame leakage protection

Purpose

This work practice outlines the correct procedure for earthing cross-linked polyethylene (XLPE) and paper insulated lead covered steel wire armoured (PILCSWA) cable screens in high voltage (HV) switchgear that is fitted with frame leakage protection.

Safety

Before commencing work:

- conduct a risk assessment and job briefing (see 2.28 (Job briefing process) in this manual)
- ensure that:
  - all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
  - EAP (Electrical Access Permits) or relevant permits are in place
  - the correct cable installation and termination procedures are followed
  - cable screens are insulated and not connected directly to the switchgear frame or steel cable box. This will ensure the integrity of frame leakage protection.

Figure 1: Switchgear cable box underside with current transformer (CT) metering (including earth leakage monitoring)
Instructions

Switchgear cable boxes without metering CT (single termination)

1. Terminate red, white and blue phase cable screens to separate 70 mm² insulated earth conductors (yellow/green) using 70 mm² copper crimp links. Pass the 70 mm² insulated conductor through the insulated screen gland (as shown in Figure 2) and connect to the earth bar that is insulated from the frame of the switchgear.

2. To measure all of the leakage current travelling from the frame to the earth, connect an insulated 70 mm² earth conductor (yellow/green) to the cable box or frame, pass it through the frame monitoring measuring CT and connect to the earth bar that is insulated from the frame.

![Figure 2: Switchgear cable boxes without metering CT (single termination)](image-url)
Switchgear cable boxes with metering CT (double termination)

1. Terminate white phase cable screen to 70 mm² insulated conductors using the 70 mm² copper crimp link. Pass the 70 mm² insulated conductor through the insulated screen gland and through the CT of the same cable and connect to the earth bar that is insulated from the frame of the switchgear (as shown in Figure 3).

2. Terminate red and blue phase cable screens to 70 mm² insulated conductors using the 70 mm² copper crimp link. Pass the 70 mm² insulated conductor through the insulated screen gland (as shown in Figure 3) and connect to the earth bar that is insulated from the frame of the switchgear.

3. To measure all of the leakage current travelling from the frame to the earth, connect an insulated 70 mm² earth conductor (yellow/green) to the cable box or frame, pass it through the frame monitoring measuring CT and connect to the earth bar that is insulated from the frame.

![Figure 3: Switchgear cable boxes with metering CT (double termination)](image-url)
References

- Work Practice Manual:
  - Work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
7.12 Ferro resonance in the distribution system

Purpose

This instruction outlines the requirements for the Network Total Workforce to follow to prevent the influence of ferro resonance. This can occur when switching distribution transformers by single phase.

Scope

This instruction applies to all Network Total Workforce who switch distribution transformers that can be isolated or energised by single phase means (e.g. drop out fuses and single phase isolators) that have a high voltage underground cable between the transformer and the isolation point exceeding the critical cable length (creating a high enough capacitance to equal the inductance reactance of the transformer) with no load on the low voltage side of the transformer. (Refer to Table 1, following, for the critical cable length).

Instructions

General

There are two (2) methods to eliminate ferro resonance whilst switching.

- **Method 1** – The transformer may be energised and de-energised by three phases switching simultaneously (e.g. pole top switch).

- **Method 2** – Ferro resonance may also be prevented by the operator connecting load to the low voltage side of the transformer by means of a load box, to de-energise and energise the transformer when switching single phase (e.g. drop out fuses).

**Note:** The low voltage side of the transformer should be offloaded before switching the high voltage.
Safety

- A job risk assessment (JRA) must be completed before the task begins to document and identify the hazards and implement control measures.
- The relevant personal protective equipment must be worn when switching as defined in Field instruction 3.1 (Clothing and personal protective equipment requirements) and Field instruction 3.2 (Glove protection), in this manual.
- Site-specific personal protective equipment should be worn where applicable.

Connection of the load box

- Prior to connecting to the transformer, ensure the load box is operating. Operate the circuit breaker from the ‘OFF’ position to ‘ON’ and using an ohms meter check the resistance on each resistor from phase to neutral. Turn the circuit breaker ‘OFF’.
- Position the load box in a safe, convenient area, clear from live apparatus. If necessary, assign a safety observer to keep people away from the load box when the switching is to occur and while the load box is energised.
- Ensure there is no other load connected to the transformer.
- Ensure the load box circuit breaker switches are in the ‘OFF’ position.

Note:
The connection should be made using appropriate personal protective equipment for live low voltage work. Refer to Field instruction 3.1 (Clothing and personal protective equipment requirements).

- Connect the load box to the transformer low voltage terminals (or associated equipment where the low voltage is accessible), ensuring the earth and neutral connection are made first.
- Switch the load box circuit breaker switches to the ‘ON’ position.
- Energise or de-energise the transformer as per work requirements by operating the high voltage disconnectors or fuses.
Disconnection of the load box

- When disconnecting the load box, ensure the circuit breaker switches are in the 'Off' position.

**Note:**
The disconnection should be made using appropriate personal protective equipment for live low voltage work.

- Remove the load box from the transformer low voltage terminals ensuring the earth and the neutral are removed last.
# Ferro resonance in the distribution system

## XLPE cable

### System voltage 11 kV

<table>
<thead>
<tr>
<th>Tx kVA</th>
<th>35 mm²</th>
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<td>500</td>
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<td>117</td>
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<td>81</td>
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<td>267</td>
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<td>146</td>
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### System voltage 22 kV

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<td>1000</td>
<td>67</td>
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### System voltage 33 kV

<table>
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<tr>
<td>1000</td>
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<td>21</td>
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</table>

(Source: Ferro resonance calculation for cable critical cable lengths DM# 3270851)
## Critical cable lengths (metres)

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<th>Tx kVA</th>
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<th>95 mm²</th>
<th>185 mm²</th>
</tr>
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<td>36</td>
<td>23</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>500</td>
<td>57</td>
<td>36</td>
<td>33</td>
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</tr>
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<td>630</td>
<td>72</td>
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<td>30</td>
</tr>
<tr>
<td>1000</td>
<td>114</td>
<td>72</td>
<td>65</td>
<td>47</td>
</tr>
</tbody>
</table>

(Source: Ferro resonance calculation for cable critical cable lengths DM# 3270851)

## References

- Western Power Switching Operator's Manual One, Section Five – Distribution of HV supply (underground) (DM#1852677)
- Western Power document: Investigation into ferro resonance (DM# 1184073)
- Western Power document: Use of a load box to control ferro resonance (DM# 1659259)
7.13 Testing cables or locating faults near petrol stations

Purpose

This work practice outlines the minimum requirements when performing work associated with testing cables or locating faults when near petrol stations and related dispensing units, e.g. liquefied petroleum gas (LPG).

Instructions

Before commencing work:

- conduct a risk assessment and job briefing (see 2.28 (Job briefing process) in this manual). The risk assessment must include the following, if relevant:
  - traffic management (see work practice 2.21 (Traffic management) in this manual)
  - emergency escape routes (see work practice 2.1 (Worksite evacuation plan) in this manual)
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- obtain location data for all utilities on the worksite by contacting ‘Dial Before You Dig’ on 1100
- ensure that the data is current and never assume that the plans received represent the only underground assets in the work area
- obtain the ‘hazardous area’ plan that is specific to the site. If unable to source the plan from a site representative, ensure that the proposed works do not encroach into the ‘Zone 1’ area (see Figures 1, 2 and 3).

Zones

Observe the exclusion zones as prescribed in AS/NZS 60079.10.1:2009 Explosive atmospheres, Part 10.1: Classification of areas – Explosive gas atmospheres. For more information, see figures 1, 2 and 3.

Zone 1 is the zone in which an explosive gas atmosphere is likely to occur in normal operation.
**Important**

Any work which can cause a spark within ‘Zone 1’ is **not** permitted due to the high risk of causing ignition of fumes or an explosion.

*Zone 2* is the zone in which an explosive gas atmosphere is not likely to occur in normal operation, and if it does occur, will exist for a short period only.

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**Figure 1: Petrol dispensing units in outdoor locations**

**Figure 2: LPG dispensing units in adequately ventilated locations**
If the risk of creating an electrical spark in a hazardous area is present, use an alternative, safer test technique (e.g. time-domain reflectometer (TDR), bridge insulation resistance tester, audio frequency).

Do not use surge generation equipment (thumper) or items that can generate sparks and ignite fuel atmospheres.

Determine the appropriate method for potholing when excavation works are required to locate faults. For more information see work practices:
  o 7.2 (Excavation and directional drilling)
  o 7.4 (Underground cables)

Figure 3: Vent pipe outlet
References

- Work Practice Manual:
  - work practice 2.1 (Worksite evacuation plan)
  - work practice 2.21 (Traffic management)
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 7.2 (Excavation and directional drilling)
  - work practice 7.4 (Underground cables)
7.14 Rezap Fault Master and Kelvatek Fusemate instruments

Purpose

This instruction outlines the procedures to follow when using the Rezap Fault Master or the Kelvatek Fusemate to temporarily replace a fuse in a low voltage (LV) network during fault management or supply restoration.

Overview

This instruction applies to switching operators and fault response teams (with the correct network authorisation: switching levels 1, 3, 4) authorised to use the Rezap Fault Master or Kelvatek Fusemate instruments for temporary fuse replacement in existing uni-pillars, LV kiosks and 2-way link uni-pillars.

Instructions

- Before operating either the Rezap Fault Master or Kelvatek Fusemate, all hazards associated with their operation shall be identified and recorded on the job risk assessment (JRA).

- All persons operating the Rezap Fault Master or Kelvatek Fusemate must be familiar with their operation.

- The minimum PPE requirements (Level 4) for persons using these instruments is set out in Field instruction 3.1 (Selection, use and maintenance of approved personal protective equipment) in this manual.

Rezap Fault Master

- Perform the pre-connection checks
  - Before setting up the instrument, ensure the REMOTE OPERATION is in the DISABLE position. Visually check all the cables and busbar attachments for imperfections and ensure the glands on the fuse box are hand tight and that the insulation is free from cuts.
  - Follow the connecting procedure detailed in the document Rezap Fault Master and Kelvatek Fusemate instruments (DM# 8584305).
Operational work practice standards

- Operate the Rezap Fault Master using the remote control.
  The Rezap Fault Master can be in only one of five (5) states during operation:
  - State 1 Lockout
  - State 2 Close – initial state
  - State 3 Close – normal state
  - State 4 Reclose
  - State 5 Fault thumper mode

- When disconnecting the Rezap Fault Master:
  - Press the TRIP button before disconnecting and ensure the blue LED is OFF
  - If the yellow LED is ON the feeder is live and appropriate precautions are required for disconnecting the feeder cables.

Note:
Do not disconnect the antenna until the Rezap Fault Master indicates it is no longer transmitting data.

Kelvatek Fusemate

- Perform pre-connection checks
  - Place the test unit in the jaws of the Fusemate and verify its correct operation by confirming the TEST OK and SWITCH OPEN LEDs light up.

- Remove the test unit and place Fusemate into the fuse position. At a safe distance away from the equipment close the Fusemate by using the remote control.
  The two possible results are:
  - SWITCH CLOSED LED does not turn ON – fuse should be checked and replaced if necessary.
  - SWITCH CLOSED LED turns ON – there is no fault on the circuit. The current bar-graph will light up to show the approximate current flowing in the circuit.
DANGER

Currents below 5 amps are not registered.

- When disconnecting the Fusemate:
  - Open the Fusemate using the manual trigger handle and ensure that the SWITCH CLOSED LED turns OFF and the current indication shows zero current. Loosen the finger wheel and pull the unit out of the fuse stalks. A fuse can now be fitted as normal.

References

- Rezap Fault Master Operating Manual, 2009 (DM# 8352624)
- Kelvatek Fusemate Operating Manual Version II, 2005 (DM# 8352620)
- Western Power document: Product Information Report: Kelvatek Fusemate and Rezap (DM# 7459965)
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7.15  LV shorts for universal pillars and LV frames

Purpose

This instruction outlines the safe working requirements for applying portable low voltage (LV) shorts designed for use in universal pillars and LV frames.

Scope

This instruction applies to:

- authorised Switching Operators (SO) when applying and removing program LV shorts in universal pillars and LV frames
- Testers in Charge (TIC) working under a Sanction to Test (STT)
- Recipients in Charge (RIC) when applying and removing working LV shorts under an electrical access permit (EAP)

Switching programs include:

- approved (planned) switching programs
- emergency LV programs
- schedules written onsite

Training and authorisation

SOs must have a Switching Operator Authority Level 4. Anyone else doing work activities associated with this instruction must possess a current Network Authority Card (NAC) and have authorisation to perform the tasks.
Safety

A risk assessment must be done before starting the switching operations. Listed controls may include:

<table>
<thead>
<tr>
<th>Control</th>
<th>Relevant section / field instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional PPE</td>
<td>Section 3 (Personal protective equipment)</td>
</tr>
<tr>
<td>Appointment of a safety observer</td>
<td>2.2 (Safety observer role)</td>
</tr>
<tr>
<td>Rescue procedures</td>
<td>2.24 (Rescue procedures for personnel working on live LV apparatus at ground level)</td>
</tr>
<tr>
<td>Traffic management</td>
<td>2.21 (Traffic management)</td>
</tr>
<tr>
<td>Application of insulating barriers</td>
<td>7.1 (Safety procedures for high voltage and low voltage cable work)</td>
</tr>
<tr>
<td></td>
<td>7.6 (Live low voltage cable jointing and working on live LV apparatus)</td>
</tr>
</tbody>
</table>

The correct personal protective equipment (PPE) relevant to the task must be used, as described in Section 3 (Personal protective equipment) in this manual. The minimum requirement is level 2 PPE, to ensure the use of a face shield when applying shorting leads.

LV must be treated as live until it is proved de-energised, shorted and earthed. This means that:

- rated gloves and outers must be worn as described in field instruction 3.2 (Glove protection) in this manual during the:
  - switching and testing procedure
  - application and removal of shorts
- any part of the network that cannot be shorted and earthed must be treated as energised, as described in field instruction 7.6 (Live low voltage cable jointing and working on live LV apparatus) in this manual and the Electrical System Safety Rules (ESSR)

Portable earths are not designed to protect persons from the effects of lightning. For more on this, see field instruction 2.12 (Electrical storms) in this manual.
Instructions

Program LV shorts must be:

• placed to ensure the work area is adequately protected
• applied and removed following the steps in an approved switching program by an authorised SO acting within the limits of their authority as described in the ESSR

Note:

Portable LV shorts are not rated to dissipate the full network kA fault currents close-up to the LV terminals of many transformers. The purpose of LV shorts is to:

• safely discharge induced or residual voltages
• safely discharge static electrical charges caused by lightning, wind and changes in ambient conditions or altitude
• limit the rise in potential if any weak energy sources (e.g. PV installations, small generators) are inadvertently connected to the network

Applying LV shorts to universal pillars and LV frames

1 Check that the LV shorting kit (supplied by Hylec Energy Solutions number H98464) is in a serviceable condition.

2 Fit the appropriate clamps to the ends of the shorting leads.

3 De-energise and isolate the circuit according to the switching program.

Note:

The test instrument used in the following step must be tested on a known live source before and after proving the LV de-energised. This is to ensure that the instrument is operating correctly.

4 Test to prove that the circuit is de-energised at the position where the shorts will be applied using an approved test instrument as described in field instruction 5.4 (Instruments – testing and calibration) in the Work Practice Manual.

5 Apply insulating barriers or ganged covers to any live exposed parts.

6 First connect the shorting lead to the neutral or earth bar before applying the LV shorts to the de-energised phase terminals. Ensure that the connection is tight and secure.
7 Apply the shorting leads to the LV terminals to be shorted (wear insulated gloves and outers).
   - Keep the leads clear from all uninsulated personal contact
   - Arrange the leads so that they hang into the void below the pillar/frame
8 Attach a “Do Not Operate” danger tag to the LV shorts in a prominent position (see Appendix 1 (Tags and Signs), p1).
9 Issue an EAP to the RIC as required.

The points of isolation and shorting are typically within a pillar or panel which would be closed and locked after switching has taken place. Such pillars and panels are considered to have an abnormal condition inside. An “Information” caution tag detailing the abnormal condition must be attached to the pillar/panel locking device for the duration of the abnormal condition (see Appendix 1 (Tags and Signs) p1).

Removing LV shorts in universal pillars and LV frames
1 Ensure that all personnel are clear from the apparatus and cancel the relinquished EAP if applicable.
2 Continue to follow the switching program (restoration).
3 Remove the “Information” caution tag and access pillar/panel.
4 Remove “Do Not Operate” danger tag from the LV shorts.
5 Remove the LV shorts and then the earthing lead from universal pillar and/or LV frames.
6 Remove insulating barriers from any live exposed parts.
7 Proceed with energising according to the switching program.
8 Test and prove the apparatus is re-energised using an approved test instrument.

ABB SLBM-type earthing cover on LV systems
The ABB SLBM-type series earthing cover is a ganged earthing accessory for ABB LV switchgear frame, used for shorting and earthing de-energised LV circuits.

Note:
Before switching, confirm the type of ABB isolator. Do not use the BSL-type isolator to break load. For more on this, see Switchgear Instruction Manual 1.

1. Perform isolation procedure for the specific circuit that you are required to work on and apply tags and barriers.
2. Lift the 3-phase gang isolator off the lower fixed hinge.
3. Attach the ABB earthing accessory lead onto the switchgear frame earth busbar.
4. Place the ganged earthing cover hinge arms into the lower fixed hinge fitting.
5. Confirm 0 volts from phase to phase, and phase to neutral at the load side.
6. Firmly close the ganged earthing cover.
7. Attach a “Do Not Operate” danger tag to the cover.

For permit work

Under an STT, the shorts must have a “Restricted Use” danger tag attached for the duration of the permit.

Under an EAP, the RIC:
- may elect to attach additional working shorts closer to the worksite
- is responsible for removing the additional working shorts before relinquishing the permit

Inspection and maintenance

- LV shorts are the primary method of ensuring that apparatus remain safe after being de-energised. They are an essential part of safe work practice and must be well maintained.
- Portable earths used on the Western Power network must be regularly inspected and tested to ensure that they remain compliant with their specification. This provides for:
  - a six-monthly detailed inspection (see Appendix 1 – Tags and signs, p2)
- Inspections, repairs and testing must be performed by a person deemed competent to do so. Repaired portable earths must pass an electrical test before being put back into service.
- If an earth set or component of an earthing or shorting set has been subjected to fault current or energisation, it must be removed from service and retained as possible evidence for an investigation by Western Power’s Compliance and Investigations Section. It must be tagged out of service and not used again.
References

- Work Practice Manual:
  o field instruction 2.2 (Safety observer)
  o field instruction 2.12 (Electrical storms)
  o field instruction 2.21 (Traffic management)
  o field instruction 2.24 (Rescue procedures for personnel working on live LV apparatus at ground level)
  o Section 3 (Personal protective equipment)
  o field instruction 5.4 (Instruments – testing and calibration)
  o field instruction 7.1 (Safety procedures for high voltage and low voltage cable work)
  o field instruction 7.6 (Live low voltage cable jointing and working on live LV apparatus)
  o Appendix 1 (Tags and Signs), pp 1-2
- Electrical System Safety Rules, Section 11 – Procedure for LV switching (DM# 9199327)
- Switchgear Instruction Manual 1 (supplied by NOCC)
7.16 Powerwatch security lighting – metal streetlight column

Purpose

This field instruction outlines the minimum requirements when carrying out inspection, maintenance and replacement of Powerwatch security lighting installed on metal streetlight columns.

Scope

This instruction is applicable to all Network Total Workforce (NTW) personnel who are required to work on class 1 and class 2 Powerwatch security lighting installed on metal streetlight columns. It also provides the minimum clearances and safety requirements.

This instruction only applies to existing installations, as Powerwatch security lighting is no longer being installed.

Training

Personnel carrying out Powerwatch security lighting work on Western Power metal streetlight columns must be suitably trained and authorised for the task. The minimum requirements are:

- be a licensed electrician or a Certificate III (ESI) distribution linesperson or equivalent
- possession of a valid Network Authority Card
- current – Perform EWP rescue UETTDFFR03B

Safety

All personnel must wear the correct level of personal protective equipment (PPE) for the task that they are doing. For more on this, see section 3 (Personal protective equipment) in this manual.

All work at height must be carried out via an insulated elevated work platform (EWP). For more on this, see field instruction 2.6 (Mobile elevated work platform (EWP) safety) in this manual.

A safety observer must be appointed as described in field instruction 2.2 (Safety observer role).
Instructions

1. A risk assessment must be done before any work commences.

2. Check the column for signs of corrosion. For more on this, see Appendix C2 in Technical Maintenance Requirements – Metal Pole Inspections (DM# 3271956).

3. Confirm whether the unit is:
   - class 1
   - or
   - class 2 – double insulated

   Record this information on the Powerwatch Data Sheet (DM# 10443953).

   **Note:**

   All class 1 Powerwatch units and streetlights must be converted to class 2 double insulated.

4. Before isolation, check for touch potential between the steel column and an independent earth, as described in Distribution Commissioning Work Instruction (DCWI) 2.7 – Steel standard streetlights (DM# 1698111).
   a. If the column is found to have a potential over 6 volts:
      i. isolate the supply to the steel column
      ii. disconnect the Powerwatch unit
      iii. re-energise the supply
      iv. perform the test again to ascertain whether the problem is associated with the Powerwatch unit or the streetlight luminaire
      v. If the streetlight luminaire is the problem, replace it and perform the test again until there is no potential between the independent earth and the steel column
   b. If the column is found to be safe, identify and isolate the supply to the Powerwatch unit

5. Remove the inspection cover of the streetlight, identify and remove the associated cut-out fuse to the Powerwatch unit, then test the unit to confirm that it is isolated.

6. Inspect the Powerwatch unit for the following:
   - cracked lens covers
7. Remove all covers from the lamp wiring chamber, separate the control gear (where installed) and check the internal wiring for:
   - damaged insulation
   - excessive heat
   - poor connections
   - damaged fittings

8. Remove the lamp (globe) and check the lamp holder for damage, moisture or any exposed connections.

9. If any defects are found during the inspection of the Powerwatch (steps 6 to 8 above), then a new class 2 Powerwatch unit must be installed, following these instructions.

10. Disconnect the wiring from the cut-out and remove all Powerwatch wiring and associated fixtures. Note the position and angle of the unit and photo electric (PE) cell so that the new unit can be replaced in the same position.

11. Install the new, class 2 Powerwatch unit and associated wiring as detailed in Technical Requirements for Powerwatch Installations on Metal Columns Only (DM# 11087608).

   **Note:**
   All external wiring must be installed in grey, flexible, corrugated conduit and snap bushings installed to column cable entry holes.

12. Flexible wiring should be fixed to the column by double-sided saddles using 20 mm galvanised tech screws. When installing the screws, take care not to damage the internal streetlight wiring.

13. Ensure that the cut-out is a separate neutral earth (SNE) type cut-out and that the neutral bridge has been removed.

14. If the column is a class 1 street light with a common neutral earth (CNE) cut-out, it must be changed to a class 2 double-insulated unit. There must be no mixture of class 1 and class 2 wiring at the street light.

15. Before energising the installation, test in accordance with AS/NZS 3760:2010 (In-service safety inspection and testing of electrical equipment, section 2.3.3).
16. Energise the unit via an appropriately sized fuse.
17. Check the Powerwatch unit’s floodlight to ensure that it is operational.
18. Check for potential between the steel column and an independent earth, as described in Distribution Commissioning Work instruction (DCWI) 2.7 – Steel standard streetlights (DM# 1698111).

Clearances

- Powerwatch security lights must be installed between 5 m and 6 m from the ground.

**Note:**
If the pole is positioned relatively close to a road, the minimum clearance must be at least 5.5 m (or 6 m in the case of high load routes).

- Adequate consideration towards minimising light pollution must be considered when installing or positioning the unit.

References

- Work Practice manual:
  - field instruction 2.6 (Mobile elevated work platform (EWP) safety)
  - section 3 (Personal protective equipment)
- Distribution Commissioning Work Instruction (DCWI) 2.7 – Steel standard streetlights (DM# 1698111)
- Metal Pole Inspections (DM# 3271956)
- Powerwatch Data Sheet (DM# 10443953)
- Technical Requirements for Powerwatch Installations on Metal Columns Only (DM# 11087608)
- AS/NZS 3760:2010 (In-service safety inspection and testing of electrical equipment, section 2.3.3 (Testing))
7.17  Separating the Schneider Electric RM6 RMU kiosk from its support stand

Purpose

This work practice outlines the process for disengaging and removing the Schneider Electric RM6 ring main unit (RMU) kiosk from its support stand.

Training and authorisation

Personnel involved in this task must:

- be qualified, competent and authorised to carry out the task
- have a Network Authority Card (NAC)
- meet the requirements of the following work practices in this manual:
  - 5.17 (Construction site access – minimum requirements)
  - 9.2 (Substation entry requirements)

Additional requirements apply to:

- onsite person in charge – must possess a Network Access level 3 (NA3) authorisation
- crane operator – must have a current licence to perform high risk work when using a crane with lifting capacity greater than 10 tonnes
- dogger – must have a current licence to perform high risk work

Safety

- Appropriate personal protective equipment (PPE) must be worn. For more on this, see section 3 (Personal protective equipment) in this manual.
- Before any work commences:
  - ensure that the relevant permits are issued, where required
  - a risk assessment must be performed, taking care to consider:
    - the method that will be used to remove the RMU from the support stand
    - if any previous work may have been undertaken to disconnect the RMU
• Follow all relevant requirements of work practice 2.19 (Crane use in substations and near power lines) in this manual.
• Three workers must be used to simultaneously move the RMU kiosk.

Instructions

1. Check that the RMU is de-energised and earthed.
2. Disconnect all electrical connections from the kiosk, including:
   • wiring loom
   • earth wires
   • RMU antenna
   • street light cutout
   • kiosk door switch
3. Clear all obstructions from around the RMU kiosk to maintain a safe work area.
4. Remove all kiosk stand mounting bolts and nuts.
5. Position three personnel spaced evenly in front of the kiosk, and have them simultaneously push the kiosk back 25 mm to 35 mm so that the tongue separates from the support stand groove (see Figure 1 and Figure 2).

If the kiosk will not slide back easily, apply lubricating oil between the RMU kiosk base and support stand, then try again with more personnel to assist with the push. If the kiosk still will not move, consider using a lever to push the RMU kiosk back.

Figure 1: Schneider Electric RM6 RMU kiosk “tongue in groove” arrangement
Figure 2: Schneider Electric RM6 RMU kiosk and support stand

6. Confirm that the RMU kiosk’s tongue and the support stand have separated.

**Note:**
If a crane is used to remove the RMU kiosk from the stand, follow steps 7 to 9, below.

7. All personnel who are not required to assist in the lifting of the RMU kiosk must keep clear of the immediate work area.

8. Use rated straps/chains to attach the crane to the four designated lifting points of the RMU kiosk.

9. Have the crane lift and remove the RMU kiosk.
References

- Work Practice Manual:
  - 2.19 (Crane use in substations and near power lines)
  - section 3 (Personal protective equipment)
  - 5.17 (Construction site access – minimum requirements)
  - 9.2 (Substation entry requirements)
7.18 Degassing of XLPE cables

Purpose

This work practice outlines how to degas high voltage (HV) cross-linked polyethylene (XLPE) cables before using electric or hydraulic cutters to cut the cable. This allows methane gas that may be built up in the cable to vent into the atmosphere before cutting.

Scope

This work practice applies to personnel cutting HV (11–330 kV) XLPE cables which have been in storage.

This work practice does not apply to personnel cutting:
- low voltage cables or XLPE cables which are already installed on the network
- any cable fitted with a pressure relief valve on the cable cap. For more on this, see the Cable caps with pressure relief valve section, below.

Background

XLPE cables generate methane gas during the manufacturing process and may continue to generate methane gas when stored at temperatures over 30°C. Methane gas is highly flammable and incidents have been known to occur where the gas has ignited during cable cutting, causing an explosion.

Instructions

Before cutting any XLPE cable with an end cap, personnel must do the following (as shown in Figure 1):

1. Slowly cut off the very tip of the end cap (avoid cutting the cable) using a hacksaw.
2. Allow the cable to vent for five minutes to allow any trapped gas to escape.
3. Before cutting the cable at the other end, mark where you need to cut the cable and slowly make two shallow cuts through the sheath at that mark (one on each side of the cable). To do this, use a hacksaw, taking care not to cut through the metallic screen.
4. Allow the cable to vent for five minutes to allow any trapped gas to escape.
5. The cable may now be cut with electric or hydraulic cutters.
Figure 1: Cable degassing procedure (diagram)

Note:
Authorised cable jointers can use alternative approved safe methods for cutting the end cap and sheath.

Cable caps with pressure relief valve
In the future, XLPE cables may be delivered with cable caps that have a pressure relief valve (see Figure 2). This device allows the automatic venting of any gas generated in the cable. Cables fitted with these caps do not need to be degassed via the above procedure.

Fig 2: Cable cap with pressure relief valve
7.19 Removing or preparing underground cables for abandoning

Purpose

This work practice outlines:

- the requirements for preparing underground cables for abandoning so that they can be easily identified in the future during improvements on land or excavation
- the process that must be followed to identify an abandoned underground cable

Scope

This work practice applies to personnel removing or preparing abandoned underground cables.

It does not cover terminating an abandoned cable (i.e. reconnecting an abandoned cable to the network). For more on this, see the Cable preparation before termination section in work practice 7.4 (Underground cables) in this manual.

Background

- Abandoned cables are assets that:
  - have been left in the ground
  - have been disconnected
  - are no longer used by the Western power network

- Abandoned cables can create a serious problem for identification if they have not been prepared properly and are not referenced on the Spatial Information Display and Analysis tool (SPIDAWeb). If abandoned cables are located during an excavation, personnel must use approved procedures to prove that the cables are:
  - isolated and de-energised
  - not still an active part of any live network
Training and authorisation

- Personnel who intend to work on Western Power owned assets, in order to locate, move or cut a cable, must:
  - have a Network Authority Card (NAC) – For more on this, see work practice 5.24 Network Authority Card (NAC) in this manual.
  - be a Cert. III Linesperson (or equivalent), or electrician with experience on underground systems (i.e. cable testing specialist)
- For fluid filled cables, the personnel must have had specific training on this equipment.

Financial responsibility

- The owner or person engaged by the owner to excavate or improve the property is financially responsible for any costs associated with locating, proving, identifying, removing and preparing abandoned cables.
- As Western Power are the asset owner of the equipment, they must be informed of any activities that may:
  - endanger the serviceability of the cable
  - expose any personnel to dangerous voltages

Note:

In some cases, Western Power may request that a representative of their company be present to oversee moving, cutting or removal of cable. Any costs associated with inductions or site access will be at the cost of the company requesting to change the condition of the cable.

Instructions

General requirements for abandoning cables

- Inform Network Operations Control (NOC) after the cutting has occurred but before removing the cutter.
- Metal labels that are engraved or stamped ‘abandoned cable’ must be tied around each cable end using two nylon cable ties at each end of the label.
The location of each cable end must be measured from a local reference point or have global positioning system (GPS) coordinates and the data noted on the 'As constructed' drawings.

Information must be updated in SPIDAWeb once work is completed on the abandoned cable. This includes all information associated with the location of the ends, depth of the cable (as the lie of the land may have changed) and detailed information of the route.

Cables can be considered industrial waste depending on the products they contain. Disposal of part or whole sections of cable must be in line with environmental regulations. For more information, see:

- Disposing of General and Controlled Waste (DM# 7808253)
- Work Practice Manual, section 11 (Environmental)

**Important**

- Cables must be treated as live in all circumstances unless the cables are proved otherwise using approved procedures.
- Personnel must not touch the insulation which covers any conductor of a high voltage (HV) cable/conductor unless that conductor is isolated, earthed and covered by an appropriate safety document.

**Identifying and proving HV cables**

See work practice 7.9 (Identifying and proving of HV cables) in this manual.

**Note:**

The only personnel who are allowed to cut a Western Power cable are Western Power authorised cable jointers. They must use a hydraulic cable cutting tool that can be operated remotely.
Determining if a cable is to be removed or left buried

Abandoned underground cables (both HV and low voltage (LV)) fall into one of two groups, depending on whether they are intended for future use.

**Cables not intended for future use**

These are cables that have been in service and have now become redundant.

May be removed or prepared depending on the circumstances:

- **Remove**
  - After identification has been confirmed and handed over to the person who is developing the land, excavation must be initiated from a known (identified) location on the cable, with digging continuing along the length.
  - Prior to any excavation commencing, refer to *Utility Providers Western Australian Code of Practice and Western Australia Occupational Safety and Health, Code of Practice, Excavation, 2005*.

- **Prepare**

  **Note:**

  Cables **must** be removed unless there are circumstances which make removal impractical (e.g. a building over the route, infrastructure, or an environmental sensitive area).

  - Use GPS and cable locating equipment to record the position of the cable in SPIDAWeb for future excavations. The information about the cable in SPIDAWeb must show it as being abandoned. The cable must be prepared depending on the cable type. For more on this, see the *preparing cables for abandonment* sections, below.

**Cables that are intended for future use**

These are cables that have been in service and have now been temporarily disconnected or re-routed and are intended for future use.

- Prepared – use GPS and cable locating equipment to record the position of the cable in SPIDAWeb for future excavations. The information about the cable in SPIDAWeb must show it as being abandoned. The cables must be conditioned depending on the cable type. For more on this, see the *Preparing cables for abandonment* sections, below.
Before reuse, the cables must be tested by a cable testing specialist according to *Underground Cable Installation Manual, Part 2 – Technical requirements* (DM# 3582804).

**Remove abandoned cables not intended for future use**

1. Remove a cable once it has been identified as abandoned and is not intended for further use.
2. After the work is completed, enter the details of the cable removal into SPIDAWeb within seven days, ensuring that an accurate GPS location is entered.

**Preparing cables for abandonment – distribution**

**Single cable casing for three phases**

1. Cut through the cable.
2. Remove outer casing and packing to 150 mm.
3. Strip back casing of each phase to expose the screens.
4. Join screens together and pull back along the length of the cable.
5. Trim so screens will remain in the cap.
6. Fit braid that will be long enough to extend out of the shrink cap.
7. Cut through the insulation on the main conductors.
8. Strip the insulation back an equal distance only to allow all three conductors to be joined together.
9. Apply self-amalgamating tape to braid.
10. Fit a shrink cap.

---

**Important**

Do not attempt to work on:

- energised concentric solid aluminium core/cable (ConSAC) cables in pillars
- energised ConSAC cable jointing

For more on live LV work, see work practice 7.6 (Live LV cable jointing and working on live LV apparatus) in this manual.
Note:
Leave the screen protruding out of the shrink cap so that it will be in contact with the surrounding soil when buried. This will help with future identification.

Separate cable casings for each phase:
1. Cut through all three cables.
2. Strip the outer casing off of the three cables at 150 mm to expose the screens.
3. Pull each screen back along the length of the cable trim so it will remain in the shrink cap.
4. Attach braid to the screen.
5. Apply self-amalgamating tape to braid where it will be covered by the cap.
6. Fit lugs to end of braid and join screens together.
7. Fit a shrink cap over the end of each cable.

Note:
Leave the protruding joined screens out of the shrink cap so that it will be in contact with the surrounding soil when buried. This will help with future identification.

Preparing cables for abandonment – transmission

- In many circumstances, transmission cables are fitted with different earthing systems. This may involve a number of link boxes fitted at intermediate points along the cable length.
- Transmission cables can be fitted with the following earth bonding methods:
  - solid bonding
  - single point bonding
  - cross bonding
- If earth pits require removal, cores and screen need to be reconnected so that the continuity of the cable is restored.
XLPE cables

The screens on cross-linked polyethylene (XLPE) cables must be extended so that they protrude from the shrink cap and are joined together.

**Note:**

Leave the screen protruding out of the shrink cap so that it will be in contact with the surrounding soil when buried. This will help with future identification.

Oil-filled (fluid-filled) cables

Consider environmental hazards when working with oil-filled cables. Sealing techniques must be used to prevent oil leaks. Only specialty personnel and organisations who are trained and competent in the following may carry out this task:

- specific jointing on oil-filled cables
- fitting accessories to transmission HV oil-filled cable

Techniques used for these cables are specific to the design.

**References**

- Work Practice Manual:
  - work practice 5.24 (Network Authority Card (NAC))
  - work practice 7.4 (Underground cables)
  - section 11 (Environmental)
- Disposing of General and Controlled Waste (DM# 7808253)
- Underground Cable Installation Manual, Part 2 – Technical requirements (DM# 3582804)
- Utility Providers Code of Practice of Western Australia
- Western Australia Occupational safety and health, Code of Practice, Excavation, 2005
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8.1 Consumers – managing connections to the network

Purpose
This instruction outlines the requirements for working on Western Power equipment that connects the consumer to the Western Power network.

Scope
This instruction applies to any person authorised to connect consumers to the Western Power network, including working on faults or defective consumer equipment.

Training and authorisation
- Any person undertaking any work activities described in this instruction must have a valid Network Authority Card (NAC) with a current authorisation for the appropriate tasks.
- When working at heights, all personnel must have undertaken approved Western Power training and assessment, and hold a current authorisation.
- Training: PTS 704 – Service Connection Testing (Metrel Polarity Plus) and six-monthly reassessment for connection testing is mandatory.
- An electrical worker’s licence will be required to work on certain consumer equipment.
- Switching authorities and a commissioning authority may also be required to energise certain installations.

Instructions
- Conduct an onsite risk assessment.
- Wear and use the correct level of personal protective equipment for the task. For more on this, see section 3 (Personal protective equipment) in this manual.
- Before commencement, determine the status of services through voltage, polarity, phase rotation and continuity tests.
Before energising any high or low voltage installation, confirm that the consumer’s equipment is safe and that an authorised person has completed all necessary documentation and commissioning sheets. All commissioning checks must be completed before any energisation begins.

Commissioning must be carried out by an authorised person in accordance with apparatus requirements.

A service connection test must be carried out to confirm that the supply has been correctly connected when:
- replacing or installing any service cables
- replacing or installing any neutral service connections
- replacing or installing any consumer revenue meters
- replacing or installing a mains connection box
- carrying out any fault or maintenance work that removes or breaks the consumer’s service
- carrying out any connection to an unmetered supply
- upgrading or changing over to single/three phase
- relocating consumer’s equipment where connections have been broken

**DANGER**

If in doubt, stop and ask. **Do not energise!**

References

- Work Practice Manual, section 3 (Personal protective equipment)
8.2 Service connections on overhead mains

**Purpose**

This work practice outlines the process for connecting services to overhead mains.

**Training and authorisation**

All personnel carrying out service connections to overhead mains on behalf of Western Power must hold a current Network Authority Card (NAC) with authorisation to perform overhead service connections.

**Instructions**

- **Pre-planning**
  - Any planned supply interruption must be preceded by the submission of a Distribution Network Access Request (DNAR) and the outage must be approved. For more on this, see work practices:
    - 5.19 (Planned interruptions (multi-customer outage))
    - 5.25 (Minor planned interruptions (single customer))

- **Before commencing work:**
  - conduct a risk assessment and job briefing (see 2.28 (Job briefing process) in this manual)
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

- **Before ascending a pole,** see work practice 6.2 (Poles – assessment and support before climbing or changing load) in this manual.

- **To prevent accidental contact with live conductors,** apply insulating covers to all live low voltage (LV) electrical apparatus and conducting surfaces (see Electricity Supply Safety Rules (ESSR) section 11.3 (Minimum rules for work on live LV)).

- **Upgrade all twisted or spliced (hand bound) service connections on the pole at the same time.** Where there is sufficient cable length and the existing cable joint is not altered or damaged, strip the existing cable and reconnect to the line using an approved clamp.
Service connection testing must be performed in accordance with the requirements of work practice 8.1 (Consumers – managing connections to the network).

**Installing the split bolt clamp**

The split bolt clamp is used to attach copper service cable to copper network main lines.

Use the smallest split bolt that will fit over the main copper conductors.

![Figure 1: Split bolt clamp (stock codes FC 0160-0163)](image)

1. Clean the main line using a conductor brush (for copper) at the intended point of attachment.
2. Immediately spread some conductor contact paste (stock code: PG0002) around the copper conductor at the intended point of attachment.
3. Strip back the insulation of the service conductor approximately 60 mm.
4. Clean the service conductor using a conductor brush (for copper) and twist the bare end of the service conductor.

**Note:**

If the conductor is 6 mm² – fold the end back over itself to enlarge the conductor surface area in the split bolt clamp.

5. Apply conductor contact paste to the service conductor end.
6. Insert the conductor into the apex of the clamp and tighten to 10 Nm with a torque wrench. Ensure that some conductor contact paste oozes out as the split bolt is tightened.
7. Mechanically check that the connection is tight by performing a pull test.
8. Loop the service wire over the line conductor for support.
9. Apply anti-corrosion treatment (see the Anti-corrosion section, below).

Installing the Bi-metallic service T-clamp (the FC 0110 connector)

This clamp is used to attach copper service cable to aluminium network main lines.

**Note:**
Bi-metallic service T-clamp (stock code: FC 0110) must not be used on copper overhead mains.

![Bi-metallic service T-clamp](image)

**Figure 2: Bi-metallic service T-clamp (stock code FC 0110)**

1. Clean the main line using a conductor brush (for aluminium) at the intended point of attachment.
2. Immediately spread some conductor contact paste (stock code: PG0002) around the aluminium conductor at the intended point of attachment.
3. Liberally coat the jaws of the connector with conductor contact paste and attach it to the mains. Tighten to a torque of 35 Nm.
4. Align the clamp grooves with the conductor to ensure maximum contact area.
5. Ensure that some conductor contact paste has oozed out around all points of contact.
6. Strip back the insulation of the service conductor approximately 60 mm.
7. Clean the service conductor using a conductor brush (for copper) and twist the bare end of the service conductor.
Note:
If the conductor is 6 mm² – fold the end back over itself to enlarge the conductor surface area in the split bolt clamp.

8. Apply conductor contact paste to the service conductor end.
9. Insert the service conductor end into the apex of the clamp and tighten to 10 Nm with a torque wrench. Ensure that some conductor contact paste oozes out as the split bolt is tightened.
10. Mechanically check that the connection is tight by performing a pull test.
11. Loop the service wire over the line conductor for support.
12. Apply anti-corrosion treatment (see the Anti-corrosion section, below).

Anti-corrosion

- A coat of non-oxidising grease (ALV-300, stock code: PG0126) must be applied to all exposed parts of the connector.
- Denso tape (stock codes: KT0019 (50mm width), KT0020 (100mm width)) must be applied over the greased clamps in the following ‘Very heavy pollution areas’ as identified in the Distribution Overhead Line Design Manual (Insulators, section 6.2 and figure 27):
  - within 5 km of the coast in the Perth Metro area and in the South Country area
  - within 20 km of the coast in the North Country area
  - where there is very heavy industrial pollution
  - where existing/old clamps exhibit a significant amount of corrosion

References

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 5.19 (Planned interruptions (multi-customer outage))
  - work practice 5.25 (Minor planned interruptions (single customer))
  - work practice 6.2 (Poles – assessment and support before climbing or changing load)
- Electricity Supply Safety Rules (ESSR)
- Distribution Overhead Line Design Manual:
  - Conductors and fittings (DM# 10253633)
  - Insulators, section 6.2 and Figure 27 (DM# 10360196)
8.3 Revenue meter – maintenance, removal and replacement

Purpose

This work practice outlines the minimum requirements for maintaining, removing and replacing revenue meters.

Scope

This work practice applies to revenue meters for single-phase and three-phase direct-wired metering installations.

Training and authorisation

- Anyone performing the activities described in this work practice must:
  - be one of the following:
    - a licensed electrician
    - a Certificate III (ESI) distribution linesperson (or equivalent)
  - hold a current Network Authority Card (NAC)
  - have completed all prerequisite training
  - have completed the approved Western Power training and assessment:
    - For licensed electricians and Certificate III (ESI) distribution linespersons (or equivalent) employed by Western Power – Power Training Services WA (PTSWA) provides training and six-monthly assessments on the Service Connection Testing (Metrel PolarityPLUS)
    - For licensed electricians employed or contracted by Western Power Metering Services – equivalent training and 12-monthly assessments are provided by the College of Electrical Training (CET)
  - Only personnel authorised in writing by their formal leader may perform the role of the witness for service connecting testing.
Test instruments and requirements

Network Total Workforce

A Certificate III (ESI) distribution linesperson or equivalent, and licensed electricians employed by Western Power, must:

- use a Metrel PolarityPLUS test instrument and use the Service connection test form - Metrel (DM# 4700316)
- have a witness who must confirm that all tests have been completed and recorded and sign the witness declaration on the test form

Licensed electricians employed by Western Power Metering Services or Customer Funded Works (Field Operations)

- Where there is no risk of the meter wires being transposed, and this is confirmed on the risk assessment, licensed electricians may use any suitable and calibrated test equipment and record the results on the Meter Replacement Test Form - Multimeter (DM# 11484571). A witness is not required.
- Where there is a possibility of the meter wires being transposed, a witness must confirm that all tests have been completed and recorded and sign the witness declaration on the test form.

Note:

- The above test instruments and requirements only apply to licensed electricians employed by Western Power Metering Services or Customer Funded Works (Field Operations) when replacing a meter only.
- All test instruments must be tested and calibrated. For more, see work practice 5.4 (Instruments – testing and calibration) in this manual.

Safety

Before commencing work:

- conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- ensure that the appropriate test form is completed when carrying out meter replacement
- use only approved and calibrated test instruments and confirm the correct operation of the test instrument. For more information on calibration, see work practice 5.4 (Instrument – testing and calibration) in this manual.

**Note:**

If you suspect that the meter panel might include asbestos-containing material (ACM) see work practice 2.22 (Asbestos and fibreglass working procedures) in this manual.

### Changing the meter and performing a service connection test

- Use the appropriate test form as detailed in the *Test instruments and requirements* section in this work practice.
- Test the metal meter enclosure to prove that it is not live. If the test indicates that the metal box is live, contact your formal leader. For the safety of the public, do not leave the site until the hazard has been eliminated.

**Important**

Where signs of suspected meter tampering are visible, do not proceed. Contact your formal leader for further advice.

- Ensure that the correct meter wiring is checked.
- Confirm the as-found status of the customer’s mains switch on the appropriate test form.
- Turn off the customer’s main switch and fit a “Do not access or alter” warning tag (see work practice 2.15 (Network tags) in this manual).

**Note:**

If the customer’s main switch is inaccessible, follow the relevant steps in the appropriate test form.

- Isolate the supply to the meter by removing the service protection device (SPD) i.e. pole fuses, aerial bundled cable (ABC) circuit breakers or meter fuses at the meter panel (see Figures 1 to 3, below).
Important

Check supply at the meter to ensure that the meter is de-energised.

Figure 1: Pole fuse  Figure 2: Meter fuses  Figure 3: ABC pole circuit breaker

Note:

For instructions on removing the meter cover from a meter with a signal and communications board on a multi-function meter terminal cover, see the Meters with signal and communications board on a multi-functional meter terminal cover section in this work practice.

- If testing indicates that the meter is still energised (even though the pole and meter fuses have been removed), do the following:
  1. Check for alternate sources of supply from overhead mains, underground mains or from supplies generated by the customer (such as faulty photovoltaic (PV) systems or generators).
  2. If still unable to establish the source of supply, do not proceed. Contact your formal leader.
- Loosen all terminal screws and change the meter, making sure that no meter wiring is transposed.
- If the meter is not being replaced immediately, the line and load neutrals must be bonded.
Note:

If a fault occurs that energises the meter enclosure or travels through the customer neutral (and causes any fuse to operate), bonding ensures that it is dissipated to the system neutral.

Take care when separating this bond as some voltage difference may be present. Wear rated gloves with outers (see work practice 3.2 (Glove protection)) and protective eyewear (see work practice 3.4 (Other personal protective equipment)) during this process.

- Depending on the status of the customer’s mains switch, follow the relevant test form to prepare the meter for testing.

Note:

- If replacing a three-phase meter with a Landis and Gyr 0530 code meter, ensure that the captive screws on the neutral terminals are still in contact with the terminals.
- When making all service connections at the meter and terminal blocks, twist the exposed strands at the stripped end together before inserting into the terminal. Tighten the terminal screws and perform a mechanical pull test to prove that a secure connection has been made.
- In situations where small wire or cable is used, after twisting together the exposed strands, the end must be bent over to double up the thickness before it is inserted into the terminal. Tighten the terminal screws and perform a mechanical pull test to prove that a secure connection has been made.

- Ensure that all steps in the relevant test are completed to confirm that the meter is connected and operating correctly.
- Perform a mechanical pull test on all connections and photograph the meter with all tails connected.
- Replace the meter cover and seal.
- When the SPD is replaced, confirm that the customer’s supply is reinstated.
- Test that the metal meter enclosure is not live.
- Remove the “Do not access or alter” warning tag and leave the customer’s mains switch in the as-found position.
• Confirm that the test instruments are operating correctly. If any abnormal readings or voltages are present:
  o de-energise and try to find the cause
  o if using a Landis and Gyr 0530 code meter, check that the captive screws are in contact with the terminal
  o contact your formal leader if unable to find a cause
• Record the new meter number and readings on the Metering Service Order Form supplied in the job pack.

**Meters with signal and communications board on a multi-functional meter terminal cover**

When testing meters with a signal and communications board on a multi-functional meter terminal cover, follow the steps outlined below.

• Remove the top cover of the remote communications board by breaking the seals and loosening the two screws.
• Access the meter terminals by unscrewing the multi-functional terminal cover on both sides.
• Remove the load neutral on a direct meter (as shown in Figure 4, below) by lifting the signal board and unscrew the meter terminal.

![Figure 4: Load neutral on direct meter](image)

• Place the communications board at the bottom of the meter main board where it is suitably safe to prevent any damage.

**Note:**

Use extra caution while moving the communications board to prevent any damage to the ribbon cables.
• Perform the relevant test to confirm that the meter is connected and operating correctly.

**Note:**
White leads on the meter terminals are the potential and neutral supply to the communications board. Take care not to break the leads while performing the test.

**Fitting service protection devices**

**Note:**
Service protection devices (SPD) (pole fuses, meter fuses and circuit breakers) are only installed as a point of isolation from the network and for short circuit protection. They are not used to regulate the amount of load that a customer may draw.

**Metro**

SPDs are required for the direct-metered customer installations in the configurations outlined in Tables 1 and 2, below.

**Table 1: Overhead supply**

<table>
<thead>
<tr>
<th>Customer mains</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double insulated in conduit (triple insulated) with meter fuse</td>
<td>Solid taps at the pole and 80 A meter fuses</td>
</tr>
<tr>
<td>Double insulated with meter fuse</td>
<td>50 A fuses at the pole and 80 A meter fuses</td>
</tr>
<tr>
<td>Single insulated in steel conduit</td>
<td>50 A service fuses at the pole and 80 A meter fuses</td>
</tr>
<tr>
<td>Double insulated with no meter fuse</td>
<td>50 A service fuses at the pole</td>
</tr>
</tbody>
</table>
Table 2: Rural

<table>
<thead>
<tr>
<th>Customer mains</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>All configurations</td>
<td>50 A fuses at the pole and 80 A at the meter fuses.</td>
</tr>
</tbody>
</table>

**Note:**
For information about fusing for cyclone or flood-prone areas, contact your local Asset Management Systems representative.

**References**

- Work Practice Manual:
  - work practice 2.15 (Network tags)
  - work practice 2.22 (Asbestos and fibreglass working procedures)
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 5.4 (Instruments – testing and calibration)
- Meter Replacement Test Form - Multimeter (DM# 11484571)
- Service commissioning form to suit Metrel device with CUSA (DM# 4700316)
8.4 Sealing revenue meters, fuses and terminal blocks

Purpose

This work practice outlines the requirements for sealing revenue meters and associated apparatus in order to restrict unauthorised access.

Scope

This work practice applies to personnel applying seals to:

- revenue meters
- service protective devices
- current transformer (CT) metering
- terminal blocks
- voltage fuses

Instructions

- Before commencing work:
  - conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

Note:

If there is any evidence of illegal tampering at the meter, stop the work process and contact Western Power’s Metering Services.

- After completing work, fit the seals in order to restrict unauthorised access or tampering.
- When sealing revenue meters and associated apparatus, use only approved seals whose colour corresponds to the Operations or Services group performing the task. For more on this, see the Meter seal identification section, below.
**Meter seal identification**

Coloured meter seals are used to identify which Operations or Services group has applied the seal (see Table 1, below).

**Table 1: Meter seal colours**

<table>
<thead>
<tr>
<th>Colour RAL #</th>
<th>Colour</th>
<th>Colour description</th>
<th>Operations/Services group</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Orange</td>
<td>Orange</td>
<td>Contract Field Operations</td>
</tr>
<tr>
<td>6004</td>
<td>Green</td>
<td>Green</td>
<td>Metering Services</td>
</tr>
<tr>
<td>1004</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Customer Funded Operations</td>
</tr>
<tr>
<td>9003</td>
<td>White</td>
<td>White</td>
<td>Metro North Field Operations</td>
</tr>
<tr>
<td>1001</td>
<td>Beige</td>
<td>Beige</td>
<td>Metro South Field Operations</td>
</tr>
<tr>
<td>2005</td>
<td>Red</td>
<td>Red</td>
<td>Lines &amp; Cable Services</td>
</tr>
<tr>
<td>3015</td>
<td>Pink</td>
<td>Pink</td>
<td>Regional North Field Operations</td>
</tr>
<tr>
<td>4005</td>
<td>Purple</td>
<td>Purple</td>
<td>Regional South East Field Operations</td>
</tr>
<tr>
<td>6027</td>
<td>Light Blue</td>
<td>Light Blue</td>
<td>Regional South West Field Operations</td>
</tr>
<tr>
<td>7000</td>
<td>Grey</td>
<td>Grey</td>
<td>Field Operations Scheduling &amp; Coordination</td>
</tr>
</tbody>
</table>
Ordering meter seals

To order meter seals, supply the following details to your local purchasing officer:

- Purchase Order number
- Meter seals required:
  - RAL colour #
  - quantity (min 100 packets)

Details of Western Power's approved meter seal supplier:

**Desmo Products Australia**

T: 0434 950 152
F: (08) 9418 6492
E: lew@desmoproducts.com.au

References

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
8.5 Overhead service cables – installation and replacement

Purpose

This work practice outlines the requirements for:
- assessing Western Power and customer installations prior to work
- installing, removing and replacing overhead service cables
- replacing polyvinyl chloride (PVC) service aerials and pre-form ends with cross-linked polyethylene (XLPE) service aerials and wedge clamps
- disconnecting overhead service cables when doing pole or cross-arm changes
- installing overhead service wedge clamps
- making joints on service cable
- stringing and tensioning
- service cables over water features
- temporary repairs on PVC services
- traffic management for service cable work.

Training and authorisation

- Anyone performing the activities described in this work practice must:
  - be a Certificate III (ESI) distribution linesperson (or equivalent)
  - hold the relevant authorisations on their current Network Authority Card (NAC). For more on the authorisation process, see work practice 5.24 (Network Authority Card (NAC)) in this manual.
- In addition, anyone performing a Mains Connection Box (MCB) replacement or a gooseneck to MCB conversion must also have completed the training course, MCB replacement, provided by Power Training Services WA (PTS).

Instructions

Pre-job planning

- Before commencing work, conduct a visual and physical examination of customer installation assets, as stated in work practice 8.7 (customer installation assets at the network interface).
If an existing PVC service is disconnected at any point, the PVC service cable must be replaced with XLPE service cable and wedge clamps. Examples of disconnection points are:
- LV cross-arm
- customer installation pole fuses
- points of attachment
- single phase transformer bracket.

If the job is to be scoped at a date prior to the work been done onsite the scoping will include a visual assessment of the equipment. This includes customer installations to ensure that as far as responsibly practical the equipment is not damaged or degraded and is accessible.

Before commencing planned or emergency work onsite the condition of Western Power and customer installations must be visually and physically assessed for damage or degradation and access. For more on the assessment and procedures for dealing with problematic, damaged, degraded or inaccessible customer installation assets see work practices 8.7 (Customer installation assets at the network interface) in this manual.

**Important**

The MCB must be isolated before any physical work can commence on the MCB. For more on this, see work practice 8.7 (Customer installation assets at the network interface) in this manual.

**Customer outages and testing requirements**

- Ensure that the process for planned outages has been followed and the customer is aware that their supply is going to be interrupted. For more on this, see the following work practices in this manual:
  - 5.19 (Planned Interruptions (multi-customer outage))
  - 5.25 (Minor planned interruptions (single customer))
- When installing and energising overhead service cables on the low voltage (LV) network, record on *SCT form – Service Connection Test (SCT) – Metrel* (DM# 4700316):
  - initial state of the customer’s service prior to any work
  - results of testing after the work is completed.
• This must be carried out for all customer services that have been disconnected. For more on this see work practice 8.6 (Customer connections – installation, testing and energising) in this manual.

Removing service cable

• Before climbing or changing load (removal or displacement of conductors) on any Western Power network or consumer pole, assess the condition of the pole to ensure that it is not damaged or degraded. For more on this, see work practice 6.2 (Poles – assessment and support before climbing or changing load) in this manual.

• Before disconnecting any service from the supply mains, record the pre-checks on the SCT form.

• Isolate by opening the customer’s main switch. If the main switch is remote, remove all the load tails from the kWh meter. This will remove any potential back-feed from a customer installation and protect the customer during the work. Attach a ‘Do not access or alter’ tag in the customer’s meter panel on all points of isolation.

• Before removing the service cable from the MCB, make sure that the service cable is de-energised and physically disconnected from any source of supply (including the neutral).

• When removing the service cable from the MCB, cut the cable close to the MCB so that no wires hang below 2.5m from finished ground level.

• If the cable is only being temporarily disconnected, it may be securely coiled up and attached to the pole, but all of the following steps must be completed first:
  1. Ensure that the bottom of the coil is no less than 2.5m above finished ground level.
  2. Attach a ‘Neutral marker’ tag (stock code HG2101) to the supply end of the neutral service cable.
  3. Attach a ‘Do not access or alter’ tag in the customer’s meter box. For more on this tag, work practice 2.15 (Network tags) in this manual.

Replacing service cable

• The XLPE service cable must be installed using wedge clamps.
Terminated dead-ends on XLPE service cables must be replaced with the approved wedge clamp at all points of attachment to both the Western Power network and customer assets/equipment.

Use tools specifically designed for the purpose of separating the cores when applying wedge clamps:
- core separation tool (stock code CC0076)
- core separation wedge (stock code CC0077)

If the MCB is:
- serviceable – install an MCB shroud
- not serviceable – see work practice 8.7 (Customer equipment) in this manual. MCB shroud stock codes:
  - single phase (HZ0117)
  - three phase (HZ0118)

Note:
A rubber grommet is supplied with the MCB:
- On flat surfaces, it must be fitted in the receptacle at the rear of the housing
- When fixed directly to conduit, the grommet is not required.

Do not:
- separate the cores with tools that may damage the insulation
- replace two twin-core service cables with a four-core service cable. Each service must have an independent service cable.
- ‘piggy back’ to an MCB on a consumer pole. A second service must be run from the mains pole.
- tee-off from a service on a consumer pole to powerwatch light. A second service must be run from the mains pole.
- use pre-formed dead-ends (twisties)
- cut drainage holes into the insulation of LV aerial bundled conductor (ABC) cable when used in its bundled state.

For instructions on installing the service cable at the supply pole, see work practice 8.14 (Overhead service cable installation on 1.2 metre cross-arms) in this manual.
Disconnecting the overhead service when changing the pole or cross-arm

When doing pole or cross-arm changes, all of the overhead services must be disconnected and de-energised from the LV overhead mains at the structure been worked on. Service cables must not be left energised or any additional strain be applied to any service connections.

If the overhead service does not comply with the Distribution Overhead Line Design Manual, the service must be replaced.

- All of the requirements in the ‘Removing service cable’ section of this work practice must be followed for assessment of equipment, de-energising, disconnection and testing.
- Ensure that the customer’s service is temporarily supported or lowered to the ground ensuring that no additional strain is applied to the service connections.
- Carry out the pole or cross-arm change.
- Reinstall or replace (if required) the overhead service and reconnect to the LV mains. The requirements in the ‘Replacing service cable’ section of this work practice must be followed.
- Complete and record the service connection tests on all of the customer services that were affected.

Jointing of service cables

- When jointing service cables, ensure that you use the approved crimp tool (stock code NT 0702) and approved crimp sleeves (stock code FC 0149).

**Note:**

- The joint must not be crimped with any tool other than the approved crimp tool as this may create a weak joint that will prematurely fail and cause harm to the customer or damage to equipment.
- The joints are not for use under tension.

- The completed joint must not be put under tension (in a bay).
- The crimp sleeves can be used to make:
  - permanent joints between XPLE service cables
  - temporary joints between XLPE and PVC service cables.
- Ensure that there is no exposed bare conductor showing outside of the crimp.
Once crimped at both ends the crimp sleeve must be covered with two layers of black self-fusing Butyl rubber tape (stock code HT0162) and two layers of black PVC tape. This results in a total of four layers of tape.

1. Ensure that the crimp sleeve and conductor is free from grease and oil.
2. Apply the Butyl rubber tape first, by gently stretching the tape to reduce its width by 20%.
3. Each turn of tape must be overlapped by 50% of its width, i.e. half-lapped. See Figure 1, below.

![Half-lapped tape](image)

**Figure 1: Half-lapped tape (first layer)**

4. The black Butyl rubber tape must extend 20mm past each end of the crimp sleeve.
5. Apply the black PVC tape overlapping by 50% and extend 30mm past each end of the crimp sleeve.

**Note:**

Once a joint is made, conduct a mechanical pull test to ensure the integrity of the connection by applying a reasonable force in the opposite direction to the ferrule/split joint conductor entry. This only applies to newly made connections.

### Installing overhead service wedge clamps

- Attach the wedge clamp so that the open side of the clamp is facing upwards.
- Unwind the cable cores 100mm beyond the rear of the clamp to allow for the correct installation into the clamp.

**Note:**

Only discard the wedge spacer if the cable is larger than 6mm².
• Withdraw the wedges and position cores into the clamp:
  o For two core cables – cores must be located in the lower positions in the clamp opposite each other.
  o For three core cables – two cores must be located in the lower positions and the third core in one of the upper positions of the clamp. A short length of core must be inserted in the vacant upper position.

  ![Correct installation of the wedge clamp](image)

  **Figure 2: Correct installation of the wedge clamp**

• Ensure cores are of even length as they enter the clamp body to ensure even load distribution.
• Push wedges firmly into the clamp body and ensure that cores are correctly located in the grooves of the clamp. Tap both wedges (approaching from the side, not from above) into the clamp, making sure the wedges are the same depth.
• Do not pull on the cable at the rear of the clamp as this could cause the wedges to loosen their grip on the cable.
• Visually check that the service cable is secure in the grooves.

**Stringing and tensioning**
• When running out and stringing overhead service cable, avoid possible damage to the insulation by not using sharp or metal objects to separate the cores.
• Do not over-tension the service cable to obtain the desired clearance to ground level.
• It is recommended that you use a Prusik loop rather than a come-along.
Prusik loop

- Before each use, examine the Prusik loop for any damage or wear and tear. If it is damaged, dispose of it.
- It is recommended that you tension by hand rather than with a tensioning device.
- If you need to use a tensioning device, use a device specifically designed for tensioning service cable conductors.

Service cables over water features (e.g. pools, spas, fish ponds)

Service cables must be outside the restrictive zone of a water feature. That is, the path of the service cable must not:

- cross over a water feature
- be within 3.5m of the water feature’s edge
Whenever it is identified that the restrictive zone has or will be breached, the service cable must be re-routed a minimum of 3.5m from the water’s edge. One of the two following rules will apply:

1. **Customer initiated works**

   It is the customer’s responsibility to inform Western Power when they initiate installation of a water feature. If this would result in the path of the existing service cable being inside the restrictive zone, the service cable must be rerouted at the customer’s cost. This may be done by doing one of the following:
   - converting the service to underground
   - relocating the point of attachment to re-route the service cable
   - providing a consumer pole to re-route the service cable

   If the service cable cannot be permanently relocated until the installation of the water feature is completed, install a temporary service cable so that the cable is routed clear of the planned restrictive zone. After the water feature works are complete, a permanent service cable must be installed.

2. **Western Power initiated works – relocating a network pole**

   If this work impacts overhead service cable clearances on the restricted zone around the water feature or other obstruction, Western Power must organise to relocate the service, at Western Power’s cost, to maintain the correct clearances.

   In this circumstance, the care and maintenance of the new consumer pole becomes the responsibility of the customer. The customer will receive written confirmation of the gifting of the pole using a ‘Gifted Asset Note’ (see the *Customer Pack*). For more details on this see work practice 8.7 (Customer installation assets at the network interface).

**Temporary repairs on Western Power’s PVC services**

Temporary repairs are permitted on PVC services where:
   - a visual inspection has been carried out on the service cable
   - attachments and connections are in good order

   In this case the following is done:
   - Raise a job in PowerOn Fusion - Trouble Call System (TCS) to record the temporary repairs and indicate further works required (by the depot).
Operational work practice standards

- The relevant formal leader has 10 working days to arrange removal of the temporary repairs.

When the formal leader arranges removal of the temporary repairs (within the 10 day time limit), they must also replace those temporary repairs with a permanent XLPE cable and new wedge clamps and connections.

Service cables over roadways

The ground clearances between the roadway and the service cable are described in Table 1, below.

Table 1: Insulated Service cable clearances over roadways

<table>
<thead>
<tr>
<th>Location</th>
<th>Clearance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre of the roadway</td>
<td>5.5</td>
</tr>
<tr>
<td>Any other part of the roadway</td>
<td>4.6</td>
</tr>
<tr>
<td>Footpath or land that is likely to be used by vehicles</td>
<td>3.0</td>
</tr>
</tbody>
</table>

(See work practice 6.8 (Conductor clearances) Table 1 in this manual)

Note:

Where the clearances cannot be maintained or the service cable distance exceeds 30m, install a carry-over pole in the Western Power public utilities alignment or a consumer pole (which must be gifted to the customer) within 10 working days.

Traffic management for service cable work

A service cable can be strung across a roadway if the conditions below can be met. If all of the following conditions cannot be met, full traffic management arrangements are required.

- Anyone performing the work must be trained and current (valid for three years) in basic worksite traffic management.
- Traffic cones or bollards must be deployed where required.
- Vehicle-mounted warning devices must be switched on.
- No vehicle can occupy the carriageway.
- If the vehicle is stationed within 1.2m of the carriageway, the duration of work must be less than five minutes.
If the vehicle is stationed within 3m of the carriageway, but more than 1.2m, the duration of the work must be less than 20 minutes.

An observer for traffic must be present to alert other workers of the approach of vehicles. The observer must be able to see along the roadway in both directions for a minimum distance, depending on the speed zone:
- up to 60km/h – 150m
- over 60km/h – 250m

Ensure the service cables are strung to obtain clearances set out in work practice 6.8 (Conductor clearances) in this manual.

When raising service cables across roadways, ensure that both ends are secure before allowing traffic to proceed underneath.

References

- AS/NZS 3000:2007 Electrical Installations, known as the Australian/New Zealand Wiring Rules
- AS/NZS 7000:2010 Overhead line design – Detailed procedures
- Customer Pack (DM# 12941812, 12941825, 12990324)
- Distribution Overhead Line Design Manual
- SCT form Service Connection Test (SCT) – Metrel (DM# 4700316)
- Work Practice Manual:
  - work practice 5.19 (Planned interruptions (multi-customer outage))
  - work practice 5.24 (Network Authority Card (NAC))
  - work practice 5.25 (Minor planned interruptions (single customer))
  - work practice 6.2 (Poles – assessment and support before climbing or changing load)
  - work practice 6.8 (Conductor clearances)
  - work practice 8.6 (Customer connections – installation, testing and energising)
  - work practice 8.7 (Customer installation assets at the network interface)
  - work practice 8.14 (Overhead service cable installation on 1.2 metre crossarms)
  - Appendix 1 (Tags and signs)
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8.6 Customer connections – installation, testing and energising

Purpose

This work practice outlines the requirements for working on Western Power equipment that connects the customer to the Western Power low voltage (LV) network.

Training and authorisation

Anyone performing the activities described in this work practice must:

- be one of the following:
  - a licensed electrician
  - a Certificate III (ESI) distribution linesperson (or equivalent)
- hold a current Network Authority Card (NAC)
- have completed all prerequisite training
- For licensed electricians and Certificate III (ESI) distribution linespersons (or equivalent) employed by Western Power, Power Training Services WA (PTS) provides training and six-monthly assessments on the use of the Metrel PolarityPlus® tester. This tester is also known as a ‘Metrel’
- For licensed electricians not employed by Western Power, equivalent training and 12-monthly assessment are provided by College of Electrical Training (CET).
- Only personnel authorised in writing by their formal leader can perform the role of the witness for service connection testing.
- A trainee who has completed the Metrel course must be supervised by an authorised person when doing the testing (the authorised person is also the witness). The SCT form – Service Connection Test (SCT) – Metrel (DM# 4700316) must then be signed by the trainee (as the tester) and the authorised person countersigns as tester and also signs as the witness.
Instructions

Installation – service cable and conduit to an LV service pillar

When installing service cable and conduit to an LV service pillar ready for connection, the installer must:

- install the service cable and conduit to the correct depth
- install the service cable and conduit to the side of the LV service pillar
- leave sufficient conduit to reach the centre of the LV service pillar
- leave sufficient service cable to allow for the connection to the LV service pillar.

When making the service connection to the LV service pillar, the connection crew must:

- excavate the ground at the side of the LV service pillar
- move and install the conduit and cable under the LV service pillar so all of the cable is protected by the conduit. Do this until the cable is within the LV service pillar.
- back-fill the excavation
- carry out installation and connection tests as described in this work practice.

Three-phase position and sequence

Some three-phase installations may not be wired for normal phase position or sequence at the meter.

- Before disconnecting, to ensure that no customer equipment is damaged after being re-energised:
  - identify the existing phase sequence and position
  - ensure that the meter wiring is correct.
- If it is not possible to check the phase sequence and position before disconnection, complete the following steps.
  1. Connect the cables to the customer’s services by following the correct sequence (below):
     - connect red to red/L1
     - connect white to white/L2
     - connect blue to blue/L3.
2. Check with the customer if any three-phase motorised equipment is installed:
   o **No** – the main switch can be returned to the ‘I’ (ON) position.
   o **Yes** – advise the customer to arrange for an electrician to check that the equipment is functioning correctly before restoring power.

3. If the customer cannot be contacted:
   o leave the main switch ‘OFF’
   o fit an ‘Out of Service’ warning tag to the main switch
   o issue a *Customer Pack*
   o for details on issuing the *Customer Pack* see work practice 8.7 (Customer installation assets at the network interface) in this manual for additional information.

**Incorrect phase sequence on existing three-phase connections**

If a phase rotation test indicates an incorrect phase sequence on an existing three-phase connection:

1. Record each phase position as it is removed at the pole top, pillar or meter position.
2. Replace each phase as recorded.
3. Report the incorrect phase sequence to the relevant formal leader, who will make the decision to correct the phase sequence, or leave it as it is.

**Important**

Circuit breakers (25kA fault rating) that are installed on a meter panel in place of fuses are not only used as isolation points, but also protect the customer’s installation from overload current.
Testing and energising

**Important**

- Do not energise installations and customer requested reconnections until a Western Power representative has received or sighted the service order or completed a ‘Temporary disconnection’ tag (stock code UA 3145).
- Do not connect service cables to installations that have not been prepared for testing.

**Performing the Service Connection Test**

- Refer to work practice 8.1 (Customers – managing connections to the network) for circumstances when a SCT must be performed.
- Ensure the following before any testing or energising takes place:
  - The customer’s main switch is OFF and tagged with a ‘Do not access or alter’ warning tag, indicating that work is in progress. For more on this tag, see work practice 2.15 (Network tags) in this manual.
  - The load neutral is disconnected from the meter.
  - If the main switch is remote, remove all the load tails from the kWh meter.
- Attach a ‘Do not access or alter’ warning tag to the service fuse or main switch.
- Perform a continuity test on any customer mains before connecting them to the supply mains.
- Before connecting to the supply mains, complete all connections to the mains connection box (MCB) and the meter.
- During installation, use an approved neutral marker tag (stock code HG2101) to identify and label the overhead neutral service conductor at the:
  - customer’s MCB
  - pole termination.
- Before attaching the service neutral connection, identify the overhead supply mains neutral and label it using the approved neutral marker tag (stock code HG 2101).
- Use a general inspection tag (stock code HG2102) when making a new service connection or reconnection into an underground pillar. Write the house number on the tag and attach it to the phase core (single-phase) or red phase core (three-phase) of the customer mains.
Note:
After a connection is made, to ensure the integrity of the compression, a reasonable force must be applied in the opposite direction to the ferrule/split joint conductor entry. This is to confirm the integrity of the connection on the conductor (mechanical pull test). This only applies to newly made connections.

Testing customer connections

- When energising a service cable or customer main, test the connections and record the results on the appropriate SCT form. For more on these forms, see the ‘SCT forms’ section in this work practice.

Important

Test lamps must not be used to perform a service connection test.

- Western Power uses the Metrel PolarityPlus® test instrument when conducting service connection tests.
- Use a separate SCT form for each connection and attach all completed SCT forms to the relevant job documentation.
- File and maintain the forms as a record of the testing procedure.
- All test equipment must have a valid calibration certificate. For more on this, see work practice 5.4 (Instruments – testing and calibration) in this manual.
- At the beginning and on completion of the task, use an approved instrument and independent earth to verify that the metal meter enclosure is not live.

Note:
Never test the service connection at sub-meters.

- Certificate III (ESI) distribution linesperson (or equivalent) and licensed electricians employed by Western Power must:
  - use a Metrel PolarityPlus® test instrument and appropriate test form
  - have a witness confirm that all tests have been completed and recorded, and sign the witness declaration on the SCT form.
Licensed electricians not employed by Western Power (but who are Contractor Connect accredited or working on the Service Apparatus Connection Scheme (SACS)) must use the Service Apparatus Test Form (DM# 9767615).


These licensed electricians may:

- use any suitable and calibrated test equipment to record all results on the Service Apparatus Test Form and have a witness confirm that all tests have been completed and recorded, and sign the witness declaration on the test form

or

- use an electrical installation tester that has three wires and is capable of storing a minimum of 420 results in its memory, recording the results on the Service Apparatus Test Form.

Note:

For more information, see Service Apparatus Connection Scheme (SACS) Information for Contractors:

Service Connection Test forms

The following SCT forms (and their associated guides) must be used for recording test results. See Appendix 2 (Standard forms) in this manual for DM details.

Service Connection Test (SCT) Form – Metrel

For use on installations where the direct-wired meter has been replaced or the service mains have been worked on (disconnected/reconnected). A witness is required to verify the test results.

Customer Mains SCT Form – Metrel

For use on mains conductors between the Western Power point of supply and the customer’s service protection device (SPD) for the following metering installations:
- multiple master meter (MMM)
• distributed master meter (DMM).

**Meter Replacement Test Form – Multimeter**

Used by licensed electricians (Metering personnel only) to perform SCTs on installations where the meter has been replaced or the service mains have been worked on (disconnected/reconnected).

**New/Replacement Meters in Multiple Master Meter Panels SCT Form – Metrel (Metrel version and multimeter version)**

Used to perform SCTs on installations where a meter has been added or replaced in a multiple master meter panel. A continuity tester will also be required when using the Metrel version of the form.

**Unmetered Supply SCT Form – Metrel**

For use on unmetered installations when the service mains have been worked on (disconnected/reconnected). For more on this, see work practice 8.16 (Unmetered supply fuse installations) in this manual.

**Wiring defects**

If an SCT fails and the fault is:

- on Western Power’s supply/wiring (see Figures 1 and 2 in work practice 8.7 (Customer’s electrical equipment) in this manual):
  1. Stop testing and commence fault finding.
  2. Repair the fault. For more on this see work practice 8.12 (High network loop impedance (Z line) experienced during service connection testing) if required.
  3. Start the test procedure again on a fresh form.

- on the customer’s wiring or multiple earth neutral (MEN), see work practice 8.7 (Customer installation assets at the network interface) in this manual for additional information on how to complete and record the issue of a Customer Pack.

If during the service connection test the MEN test result is:

- if the voltage is between (U1-Pe minus 11V) and (U1-Pe) – no action required
- above 1V, but less than (U1-Pe minus 10V):
  o leave the supply connected and energised
issue a *Customer Pack* to the customer to advise them to have the installation checked by a licensed electrician

- contact the Western Power Customer Service Centre on 13 13 51 (select ‘option 3’) and provide details for further actions.

- less than 1V
  - leave the supply disconnected and the customer’s main switch OFF
  - issue a *Customer Pack* to the customer and attach a ‘Temporary disconnection’ tag at the SPD
  - contact the Western Power Customer Service Centre on 13 13 51 (select ‘option 3’) and provide details for further actions.

**Note:**

- The customer’s MEN is tested to ensure that their electricity installation neutral is connected to earth.
- U1-Pe is the voltage recorded at step 12 (auto sequence test).

### Touch potential on a customer’s installation

One requirement on SCT forms is to check and record the voltage between an independent earth and the metal meter box (i.e. touch potential) before opening the box, and again upon completion of the SCT. For a non-metallic meter box, check for voltage between a water tap or similar earthed component (if available) and the independent earth. The result of this test is compared with the Un-Pe voltage recorded at step 12 (auto sequence test). If no metallic equipment accessible put N/A on test form.

If the voltage is:

- equal to or less than Un-Pe V no action required
- between Un-Pe volts and 5V:
  - leave the supply ON
  - issue a *Customer Pack* to advise the customer to have the installation checked by a licensed electrician
- 6V and above:
  - leave the supply disconnected and the customer’s main switch OFF
issue a Customer Pack to the customer and attach a ‘Temporary disconnection’ tag at the SPD

for details on issuing the Customer Pack see work practice 8.7 (Customer installation assets at the network interface) in this manual for additional information.

References

- Customer Pack (DM# 12941812, 12941825, 12990324)
- Service Apparatus Connection Scheme (SACS) Information for Contractors (DM# 9818256)
- Service Apparatus Test Form (DM# 9767615)
- Service Connection Test Forms:
  - Customer Mains SCT Form – Metrel (DM# 13298795)
  - Meter Replacement Test Form – Multimeter (DM# 11484571)
  - New/Replacement Meters in Multiple Master Meter Panels SCT Form – Metrel (DM# 13298863)
  - Service Connection Test (SCT) Form – Metrel (DM# 4700316)
  - Unmetered Supply SCT Form – Metrel (DM# 13298813)
- Work Practice Manual:
  - work practice 5.4 (Instruments – testing and calibration)
  - work practice 8.7 (Customer’s electrical equipment)
  - work practice 8.12 (High network loop impedance (Z line) experienced during service connection testing)
  - work practice 8.16 (Unmetered supply fuse installations)
8.7 Customer installation assets at the network interface

Purpose

This work practice outlines the requirements for working at the interface between the Western Power Network and low voltage (LV) customer installation assets (also referred to as 'customer installations'). Information is provided on how to:

- identify ownership
- safely manage any degraded or damaged customer equipment.

Where customer installations are identified as damaged or degraded, network operatives must keep the general public safe from mechanical and electrical hazards, where reasonably practical. This responsibility is considered to be part of Western Power's duty of care.

A 'network operative' is defined as an employee or contracting partner working on behalf of Western Power that is deemed competent and authorised to work on the Western Power Network.

This work practice aligns with the Management and assessment of low voltage consumer electrical installation assets procedure.

Scope

This work practice applies to network operatives who, in the course of their duties, work at the interface between the Western Power network and low voltage customer installations.

Equipment supplied from customer installations and not direct from the Western Power Network is out of scope. Examples of these assets include:

- street lighting owned by Main Roads, local government or a strata company
- free-standing reticulation control boxes
- illuminated signs such as those found at bus stops and other advertising signs
- traffic lights
- shopping centre signs
- private overhead lines
- bus stops
- customer-owned mini pillars.
For information on the management of customer installations that are damaged or degraded in publicly accessible areas, not at the network interface, see work practice 8.18 (Damaged or faulty customer equipment in public areas) in this manual.

**Customer installation assets**

It can be difficult to determine whether electrical equipment or installations belong to Western Power or a customer. Figures 1 to 8 in this work practice illustrate how to identify between Western Power and customer installations.

Maintenance and repair of customer installations is the customer’s responsibility. However, in order to avoid wasting mobilised resources, delays to planned works and additional costs to Western Power, network operatives may replace the following damaged or degraded customer installations:

- Mains connection box
- Meter fuse
- Point of attachment (POA) bracket
- Consumer pole

Customer installation assets that have been replaced are considered ‘gifted’ by Western Power, becoming the customer’s property and responsibility. This information is outlined in the ‘Gifted Asset Note’, supplied to the customer at the time of replacement.

‘Problematic’ customer installations are assessed as being of poor condition such that the asset is not fit for purpose and may introduce unreasonable risk of immediate mechanical or electrical failure to the customer, workforce or environment.

‘Damaged or degraded’ customer installations define assets that are assessed as being of poor condition but of no immediate danger to the customer, workforce or environment.

**Training and authorisation**

Network operatives performing the tasks outlined in this work practice must have the appropriate authorisations on their Network Authority Card (NAC). For more on this, see the ‘Training and authorisation’ section in work practice 8.1 (Connecting customer services to the network) in this manual.
Instructions

Pre-job planning

Visually and physically assess both Western Power and customer installations at the network interface to confirm that they are not damaged or degraded or problematic extent. This assessment must be conducted according to the guidelines in this work practice.

Use of Western Power Customer Pack and ‘Temporary Disconnection’ tag

This section outlines when to use the leaflets that make up the Western Power Customer Pack or a ‘Temporary disconnection’ tag to inform a customer that their installation is damaged, degraded and where it may need to be replaced.

Table 1: Western Power Customer Pack and tags

<table>
<thead>
<tr>
<th>Title</th>
<th>When to issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Electricity supply disconnection’ leaflet*</td>
<td>Customer installation is identified as damaged or degraded to the extent of being problematic.</td>
</tr>
<tr>
<td>Also known as a ‘customer information leaflet’.</td>
<td></td>
</tr>
<tr>
<td>‘Important information about your electricity supply’ leaflet*</td>
<td>Customer installation is assessed and found to be degraded or damaged but not considered to be problematic.</td>
</tr>
<tr>
<td>Also known as a ‘customer information leaflet’.</td>
<td>Customer installation is assessed and found to be degraded or damaged but not considered to be problematic.</td>
</tr>
<tr>
<td>or Visual or physical inspection of a customer installation is not</td>
<td>Customer installation is assessed and found to be degraded or damaged and is replaced by Western Power in the course of the work been</td>
</tr>
<tr>
<td>practical at the outset of the work (e.g. not accessible because of</td>
<td>carried out at the property.</td>
</tr>
<tr>
<td>enclosure or obstruction by a built structure).</td>
<td></td>
</tr>
<tr>
<td>‘Gifted Assets Note’*</td>
<td></td>
</tr>
<tr>
<td>Also known as ‘An important note from Western Power’.</td>
<td></td>
</tr>
</tbody>
</table>
Title | When to issue
---|---
‘Temporary disconnection’ tag (stock code UA 3145) | This tag is completed and fitted to the customer’s mains switch or point of isolation in the meter box, clearly stating the reason for disconnection. It must be completed and returned by the customer’s electrician to network operatives before the supply is restored.

* Contained in the Western Power Customer Pack

The following actions must be taken when issuing any of the customer information leaflets outlined in Table 1:

1. Complete the appropriate customer information leaflet to indicate that degraded or damaged customer installations have been identified and that the customer needs to appoint a private electrical contractor to carry out the repair.
   or
   Complete the ‘Gifted Asset Note’ to indicate that the degraded or damaged customer installation has been replaced by Western Power.

2. The attending network operative must call the Western Power Customer Service Centre on 13 13 51 (select ‘option 3’) to document in PowerOn Fusion Trouble Call System (TCS) that a Western Power customer pack has been issued to the customer. A full explanation of the reasons why this documentation has been issued is required for this formal record.

3. Record the PowerOn Fusion TCS reference number under the reference heading on the customer information leaflet or ‘Gifted Asset Note’.

4. Give the customer the completed Customer Pack.
   or
   If the customer is not available, place the customer pack in a weather-proof envelope and post in a prominent place where the customer will most likely find the note. That is, secure to the main access door to the property, meter box or post in the letter box.

5. Inform the Customer Service Centre on 13 13 51 (select ‘option 3’) if the electricity supply is to be disconnected and the customer has not been
contacted. A customer services officer will attempt to contact the customer and document the actions taken in PowerOn Fusion TCS.

**Temporary disconnection and reconnection of a customer’s electricity supply**

Complete the following steps when a customer installation is deemed to be problematic and a decision is made to temporarily disconnect the customer’s electricity supply.

**Important**

Check with Customer Service Centre on 13 13 51 (select ‘option 3’) that the customer is not a registered as a Life Support Equipment (LSE) customer or Commercial/Industrial Sensitive Customer. If the customer is identified as a registered LSE or Commercial/Industrial Sensitive Customer the Head of Customer Service may at their discretion liaise with the customer to manage their situation, under the auspice of customer service.

1. Disconnect the installation from all sources of supply (including the neutral).
2. To remove any potential back-feed from a customer, isolate by opening the customer’s main switch. If the main switch is remote, remove all the load tails from the kWh meter. This will eliminate any voltage from a customer’s photovoltaic generator back-feeding onto the Western Power Network.
3. All Western Power assets must be removed for any consumer asset that is identified as problematic due to mechanical or structural defect.
4. Where possible, contact the customer to inform them of the situation.
5. Issue a ‘Electricity supply disconnection’ leaflet. This will inform the customer of the situation and the action they must take to restore the electricity supply.
6. Fit a ‘Temporary disconnection’ tag on the customer’s main switch and clearly write the details of the conditions of the disconnection on the tag. For more on this tag, see Appendix 1 (Tags and signs) in this manual.
7. Do not restore supply until the customer’s electrician completes and signs the ‘Temporary disconnection’ tag.
Important

Service phase conductors must always be disconnected from the network first, and then the neutral conductor (if necessary).
The disconnected conductors must be clearly visible with an ‘Out of Service’ warning tag attached to them.

- A ‘Temporary disconnection’ tag must be used in conjunction with the customer information leaflet when the customer’s power has been disconnected. These are a means of communication between the customer’s agent or electrician and network operatives to facilitate the safe disconnection, repair and reconnection of the customer’s installation.
- There is no obligation for the customer to rectify any conditions as the notice is advisory only.
- If a customer does not accept the assessment by the network operative, a Designated Electrical Inspector will be requested to attend site. This is done by the network operative calling the Customer Service Centre on 13 13 51 (select ‘option 3’). The Designated Electrical Inspector provides a decision on the customer installation and takes appropriate actions to ensure the customer complies with their determination.

Restoring a customer’s electricity supply

- Restore power when the customer’s electrician has made the repairs and contacts Western Power to arrange reconnection.
- The Customer Service Centre will notify the relevant work group to arrange the reconnection.
- The network operative reconnecting the power must:
  - sight the completed ‘Temporary disconnection’ tag before supply is reconnected
  - send any electrical notices left by the customer’s electrician through internal mail to the Customer Service Centre.
- The network operative does not need to collect the customer information leaflet from the customer.
Customer installation assets accessible to network operatives

Western Power – customer interface installations

The following installations could be found at the Western Power/customer interface, and must be assessed visually and physically for damage or degradation before commencement of work.

Customer installation assets

- Consumer poles, inclusive of any associated fittings, cross-arms and fixtures.
- Mains connection box.
- Mains fuse.
- POA bracket, associated fixings or the material to which the bracket is fixed.
- Meter enclosure and door.
- Multiple earth neutral.
- Street furniture (e.g. streetlights).
- Private underground cables.
- Private overhead lines.
- Pillars.

Western Power-owned equipment

- Aerial service lead.
- Meter.
- Meter fuse cartridge (not the fuse fitting).

Figures 1 and 2 (below) illustrate the difference between customer installations and Western Power-owned equipment.

- Western Power-owned equipment is displayed in green.
- Customer installations are displayed in orange. In the case of customer mains, the only work which can be carried out is the termination of each end.
- Customer installations that Western Power must not work on are displayed in red.
Figure 1: Underground

Figure 2: Overhead
Customer mains

Visual assessment

- Visually assess customer mains cables, enclosures, supports and fixings, (excluding any equipment in the roof space) prior to the commencement of any works. This is to confirm that the equipment is in good condition, free of damage, deterioration and indications of cable overheating or potential failure.
- Carry out the visual assessment before, or in association with, testing. This should, where practical, be completed before the customer installation is touched in any way by a network operative.
- Check the following when performing the visual assessment of the customer mains cables, enclosures, supports and fixings:
  o Connections, joints and terminations.
  o General condition of the electrical equipment, e.g. signs of damage that could impair the safe operation or disconnection of unused electrical equipment.
  o Basic protection against direct contact with live parts, e.g. insulation and enclosure.
  o Protection against hazardous parts, e.g. enclosure, guarding or screening of flammable materials, hot surfaces and parts that may cause physical injury.
  o Protection against external influences, e.g. interference by children or untrained persons.
  o Protective and isolating devices, e.g. main switches, fuses.
  o Intact and functional earth connections.

Physical assessment

- Physical assessment of the customer installation must be completed before commencing any work to verify that the work can proceed without introducing unreasonable risk. The physical assessment must be carried out before the relevant part of the customer installation is worked on.
- Check the following when performing the physical assessment of the consumer mains cables, enclosures, supports and fixings:
  o Conduit and fittings must be securely fixed to the consumer installation structure, bracket or pole. Joints must be rigid and intact with no joining
cement failure. There should be no signs of problematic UV degradation, weathering, cracking or damage.

- Conductors must not be damaged or display signs of problematic internal heating or UV degradation. Conductor insulation must be electrically intact, not be Vulcanised India Rubber (VIR) and, where exposed to sunlight, be UV stabilised.
- Terminations must be enclosed within an appropriate capsule or enclosure with no signs of problematic damage, internal heating or UV degradation. Connections to the customer’s mains connection box (MCB) or boundary fuses must be secure, in good condition and free from corrosion.
- Conduit and cable fixings must provide adequate support to negate distortion of the equipment. Fixings must be intact and free from problematic rust, corrosion, cracking or damage.

Requirements

- Report any indication of problematic or damage or degradation consumer mains cables to the property owner or occupier by issuing a customer information leaflet. Instructions associated with these leaflets are detailed in Table 1.
- Customer mains cabling must not be replaced or repaired by network operatives.

When the customer mains are found to be defective or insulated with VIR:
1. disconnect the service cable from all sources of supply (including the neutral)
2. fit a ‘Temporary disconnection’ tag
3. issue a customer pack advising the customer to arrange for a licensed electrician to change the customer mains.

**Important**

- **Do not** install any temporary customer mains.
- **Do not** install overhead customer mains to replace underground customer mains.
Mains connection boxes

Visual assessment

- Carry out a visual inspection from an arm’s length distance. During inspection, the following must be worn:
  - Face shield
  - LV insulated gloves with protective outers
  - Level 1 PPE.

For more on this equipment, see section 3 (Personal protective equipment) in this manual.

- Check the following items when performing the visual assessment of the MCB:
  - Location, e.g. unrestricted access to the customer installation.
  - Connections, joints and terminations.
  - General condition of the electrical equipment, e.g. signs of damage that could impair safe operation, disconnection of unused electrical equipment.
  - Basic protection against direct contact with live parts, e.g. insulation and enclosure.
  - Protection against external influences, e.g. interference by children or untrained persons.
  - Adequate support and fixing at the POA, including the bracket.

- Exercise caution when examining MCBs as the terminals are close together and any movement of a live MCB could cause a flashover.

Physical assessment

- Before doing any physical assessment of the MCB, disconnect the service cable from all sources of supply (including the neutral).

- Apply light pressure to the MCB to test the firmness of fixings.

Requirements

- Any indication of problematic, damaged or degraded MCBs must be reported to the property owner/occupier by issuing a customer information leaflet. Instructions associated with these leaflets are detailed in Table 1.
• Western Power is permitted to change MCBs in circumstances where it is financially efficient for the company (the cost is greater to cancel the job than it is to replace the asset):
  o the MCB is unserviceable and the customer mains are in good serviceable condition
  and
  o the conductors are polyvinyl chloride (PVC) not VIR.

• The MCB may also require replacement during the PVC to cross-linked polyethylene (XLPE) upgrade works Overhead Service Connection (OHSC) program (Twisties Project). During these works, the MCB must be replaced if it is found to be defective.

• If the MCB has flashed over and carbon marks are present, carry out the following actions:
  1. Do not attempt to replace the MCB.
  2. Disconnect supply, including the neutral.
  3. Fit a ‘Temporary disconnection’ tag.
  4. Issue a customer information leaflet to the customer for a licensed electrician to replace.

  **Note:**

  Only Western Power personnel who have completed the MCB replacement course at Power Training Services WA (PTS) are allowed to change an MCB. Licensed electricians carrying out work for Western Power do not need to do this training.

• As some existing installations do not meet the current requirements, some MCBs may have to be relocated by an electrician. Issue a customer information leaflet to the customer advising them to arrange for a licensed electrician to relocate the MCB to meet current WA Electrical Requirements.

• If the MCB is replaced as part of upgrade works, it must meet the following requirements:
  o On a building, the height of the lowest cable entering the MCB must be 2.5m. This ground clearance must be maintained from any finished ground or floor level.
Where the POA is on a pole, the height of the lowest cable entering the MCB must be 3m.

The MCB must be accessible by ladder or EWP. Access to the POA must not require network operatives to walk across a roof or structure.

The POA must be no higher than 7m.

The position of the POA on the building must be facing the supply mains.

- Clearances must be maintained according to work practice 6.8 (Conductor clearances) in this manual.
- Preplanning of upgrade works is vital to identify these locations and to notify the customer of their need to relocate the POA and MCB.

**Mains switches**

**Requirements**

- If a customer’s main switch is defective, remove either the board or the pole fuses to isolate supply to the main switch.
- Issue a customer information leaflet to the customer to have a licensed electrician replace the main switch. Fit a ‘Temporary disconnection’ tag to the point of isolation.

**Important**

Do not short out or bypass main switches.

**Consumer poles, meter poles and private power lines**

**Visual assessment**

- Complete a visual assessment of the consumer pole prior to the commencement of any works to confirm it is safe to touch and in good condition.
- Check the following when performing the visual assessment of the consumer pole:
  - Consumer poles must maintain statutory ground clearances. Poles should be free of problematic damage/degradation, including rot, loss of cross-section or termites, and have no signs of significant leaning or problematic
checks or cracking. The foundation at ground line, and to 300mm below, should be in good condition including any reinforcing applied.

- Untreated softwood and sawn timber consumer poles will be considered problematic and should be reported to the property owner or occupier. Where a pole is fashioned from hardwood and its age cannot be determined, it is assumed to be greater than 25 years old and must be condemned as problematic or defective.

- Metal consumer poles should be checked for signs of degradation (i.e. heavy pitting, loss of cross-sectional area greater than 20% of the original thickness and/or laminating of steel). Conductors should be appropriately fixed to the pole, not exposed or abraded. If installed in a manner where the conductor runs vertically inside a metal pole, it is preferred that conduit is fixed to the metal.

Physical assessment

- A physical assessment must be completed before commencing any work on a customer installation to verify that the work can proceed without introducing unreasonable risk. The physical assessment must be carried out before the relevant part of the customer installation is worked upon.

- Check the following when performing the physical assessment of the consumer pole:
  - Metal poles must be tested for voltage between the pole and an independent earth to reduce the risk of electrical shock.
  - Apply light pressure to the consumer pole to test firmness of foundation.
  - The consumer pole must be brushed off using a gloved hand for wood poles or a wire brush for metal poles to check for signs of heavy pitting, loss of cross-sectional area greater than 20% of the original thickness and/or laminating of steel.
  - A hammer test must be performed above and below ground line to assess for internal degradation of the consumer pole.

The following illustrations are taken from EnergySafety’s Private power poles and lines brochure (Copyright permission – DM# 13314229). They describe the ownership of power poles and powerline assets for common connection types. These illustrations are not intended to be exhaustive as the connection setup for a property may vary from these examples.
All poles on customer land belong to the property owner or occupier. Carry-over poles in the road reserve (verge) are owned and maintained by Western Power. Assets shown in red define consumer installation assets, including the MCB and fixing bracket at the pole top and building.

Figure 3: Diagram 1 – Overhead service cable owned by Western Power to pole owned by the customer
Figure 4: Diagram 2 – Overhead service cable owned by Western Power to pole owned by the customer

Figure 5: Diagram 3 – Overhead service cable owned by Western Power to pole owned by the customer
Figures 6: Diagrams 4 & 5 – Overhead service cable owned by Western Power to pole owned by the customer
Figure 7:  Diagram 6 – Pole and overhead service cable owned by Western Power

Requirements

Consumer poles are the responsibility of the customer.

**Important**

Do not climb unsupported consumer poles. Consumer poles are the property of the customer and are not subject to regular inspection by Western Power.

- Western Power may install a service carry-over pole in the road reserve alignment to maintain the height clearances of services over roadways.
- A new consumer pole must be installed by:
  - Western Power works conducted by Western Power and the height or angle of the service are changed affecting compliance with the WA Electrical Requirements.
  - the customer’s electrical contractor, for all other cases.
- Issue a customer information leaflet to the customer to have them replace the consumer pole if it does not meet current standards or is in a defective state. Poles that do not meet current standards include:
150mm x 150mm wooden poles
- steel pipe tripod poles.

Note:
Western Power has a responsibility to the customer to notify them of the unsafe condition of a pole and to make the site safe.

Point of attachment brackets

Visual assessment
- Complete a visual assessment of the customer POA bracket before the commencement of any works, to confirm it is safe to touch and in good condition. Any problematic damage or degradation identified, including corrosion, must not be to a problematic extent if work is to continue.
- Check the following items when performing the visual assessment of the bracket:
  - Location, e.g. unrestricted access to the consumer installation asset.
  - Basic protection against direct contact with live parts, e.g. insulation and enclosure.
  - Protection against external influences, e.g. interference by children or untrained persons.
  - Adequate support and fixing at the POA, including the bracket.
  - Positioned as required by the current WA Electrical Requirements.

Physical assessment
- Complete a physical assessment before commencing any work on a customer installation to verify that the work can proceed without introducing unreasonable risk. The physical assessment must be carried out before the relevant part of the customer installation is worked upon.
- Check the following items when performing the physical assessment of the bracket:
  - Apply light pressure to the bracket to test firmness of fixings.
Check that the bracket is firmly fixed to the consumer installation by means of functional bolts or screws appropriate for the material to which it is fixed (or able to be re-fixed).

Check that the fixings and structure to which the bracket is fixed are in good condition with no problematic signs of damage, distorting, weathering, cracking, corrosion or infestation.

**Requirements**

- It is the customer’s responsibility to provide an adequate attachment point.
- Where attachment points are defective, the service must be de-energised from all sources of supply including the neutral and removed, unless a secure alternative attachment can be provided by the customer.
- Complete a ‘Temporary disconnection’ tag and issue a customer information leaflet to the customer to engage an electrical contractor to make repairs.
- Issue and record a customer information leaflet if a temporary attachment is made. Do not attempt to install permanent attachment points.
- Do not make repairs to point of attachments.

**Boundary fuses**

**Visual assessment**

- Complete a visual assessment of the customer boundary fuses, insulators and supports must be completed prior to the commencement of any works. This is to confirm the equipment is safe to touch and in good condition, free of problematic damage/ degradation with no signs of problematic overheating or potential equipment failure.
- The visual assessment shall be carried out before, or in association with, testing and should, where practicable, be completed before the consumer installation is touched in any way by a network operative.
- Check the following items when performing the visual assessment of the consumer boundary fuses, insulators and supports:
  - Location, e.g. unfettered access to the consumer installation asset.
  - Connections, joints and terminations.
  - General condition of the electrical equipment, e.g. signs of damage that could impair safe operation, disconnection of unused electrical equipment.
o Basic protection against direct contact with live parts, e.g. insulation and enclosure.

o Protection against external influences, e.g. interference by children or untrained persons.

o Adequate support and fixing at the POA, including the bracket.

**Physical assessment**

- Complete a physical assessment before commencing any work on a consumer installation to verify that the work can proceed without introducing unreasonable risk. The physical assessment must be carried out before the relevant part of the customer installation is worked upon.

- Check the following items when performing the physical assessment of the consumer boundary fuses, insulators and supports:
  
  o The cross-arm must be fit for the purpose with sufficient strength to support the attached equipment. It must not show signs of problematic damage, distortion, weathering, burns, cracking, corrosion or infestation.
  
  o Boundary fuses must be functional, complete with shrouds, securely fixed to the cross-arm or structure and must not show signs of problematic damage, UV degradation, weathering, cracking, internal heating or corrosion.
  
  o Insulators must be of sufficient condition and size to adequately support the attached conductors and must not show signs of problematic damage, weathering, rust, cracking, heating, corrosion or contamination build up.

**Requirements**

- Boundary fuses are the responsibility of the customer.

- Issue a customer information leaflet to the customer to have an electrician notify Western Power for a disconnection, to enable safe replacement of the fuse fitting.
Meter enclosures

If the internal components of a customer’s meter enclosure are exposed to the elements, or the wiring is accessible to the public:

- issue a customer information leaflet to the customer

or

- if the enclosure is immediately dangerous, disconnect the supply and issue a customer information leaflet to the customer.

Important

If it is suspected that there is a defect behind a meter panel, the service must be de-energised before the panel is removed.

Meter panels, fuses bases and holders

- Meter panels and meter fuse fittings are the responsibility of the customer.
- Network operatives may change the meter fuse fitting for the customer as an exception after:
  - the supply has been disconnected
  - all required tests are carried out at the meter.
- If the panel or fuse bases and holders are defective to the extent where safe supply cannot be maintained (e.g. burnt customer mains) disconnect from supply (including neutral) and carry out the following actions:
  1. Fit a ‘Temporary disconnection’ tag.
  2. Issue a customer information leaflet to the customer so they can arrange for an electrician to carry out the repairs.
Wiring in the customer’s meter enclosure

If any defective wiring is found in the meter enclosure during testing, the installation must be disconnected. For existing connections issue a customer information leaflet.

Multiple earth neutral

The actions to be taken in response to the multiple earth neutral (MEN) test results during the service connection test are outlined in work practice 8.6 (Customer connections – installation, testing and energising) in this manual.

Touch potential on a customer installation

It is a requirement to test for voltage between an independent earth and the metal meter box or metal pole (i.e. touch potential). For a non-metallic meter box, check for voltage between a water tap or similar earthed component (if available) and the independent earth. The actions to be taken in response to these voltages are outlined in work practice 8.6 (Customer connections – installation, testing and energising) in this manual.

High voltage equipment

- High voltage customers may have varying arrangements and configurations.
- Any obvious defect requires immediate reporting and investigation.
- The POA may not be obviously apparent, so consultation with the account manager and the customer is required before taking any action.

References

- Consumer Service Steel Pole –Technical Specification (DM# 12194142)
- Customer Pack (DM# 12941812, 12941825, 12990324)
• Management and assessment of low voltage consumer electrical installation assets standard (DM# 13102597)

• Work Practice Manual:
  o work practice 6.2 (Poles – assessment and support before climbing or changing load)
  o work practice 6.8 (Conductor clearances)
  o work practice 8.1 (Connecting customer services to the network)
  o work practice 8.6 (Customer connections – installation, testing and energising)
  o Appendix 1 (Tags and signs)
  o Appendix 2 (Standard forms)
8.8 Customer disconnection prior to demolition of a building

Purpose

This work practice outlines the requirements for disconnecting power from a building prior to the building being demolished.

Training and authorisation

A person undertaking any work activities described in this work practice must:
- be a licensed electrician or Cert. III linesperson or equivalent
- have a current Network Authority Card (NAC)

Instructions

- Before commencing work:
  - conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
  - ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)
- Obtain a final reading of any electrical metering equipment.
- Disconnect all high voltage (HV) and/or low voltage (LV) cables or conductors.
- Disconnect load neutral and load active conductors and prove de-energised.
- Remove any electrical metering equipment.
- Complete the Disconnected for Demolition Notice form. For more on this, see the Disconnected for Demolition Notice section, below.
- If disconnection and removal of HV and/or LV cables or conductors and electrical metering equipment cannot be achieved, return the disconnection documents to the issuing officer.
  - The issuing officer must then forward the documents to the Customer Service Centre (metro or country) for further action.
  - The Customer Service Centre will in turn create a work parcel for the disconnection and removal of all high and low voltage cables or conductors and electrical metering equipment.
- Prove that the installation is de-energised before leaving site.
Note:
Completely remove all Western Power overhead conductors after disconnecting from the supply mains. **Do not** leave wires cut and hanging or cable coiled up on the pole.

Disconnected for Demolition Notice

- Complete a *Disconnected for Demolition Notice* form after all overhead or underground connections and electrical metering equipment has been disconnected or removed (see Appendix 2 (Standard forms) in this manual).
- Attach the top section to the meter box or on the electrical switchboard.
- Return the bottom section of the notice to the issuing officer with the disconnection documents (for filing).

Reference

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - Appendix 2 (Standard forms)
8.9 Radio switching units for overhead connections

Purpose

This work practice outlines the minimum requirements for installing and connecting remote disconnection base units to low voltage (LV) mains.

Overview

- The radio switching units is made up of two modules:
  - base unit
  - remote control
- Each module uses an infrared beam for two-way command and reporting.
- On a single-phase installation, a Flowline/Nilcrom box has been modified to accept a base unit, which is coupled to a sensor device.
- On a three-phase installation, all three Flowline/Nilcrom boxes have been modified.
- The centre box is equipped with a base unit coupled to a sensor. The other two adjacent Flowline/Nilcrom boxes both contain a base unit and are simultaneously activated by the same central sensor.

Instructions

All connections and conductors must be inspected on the structure during the job planning and hazard identification process before commencing work.

Note:

Once a joint is made, to ensure the integrity of the compression, a reasonable force is to be applied in the opposite direction to the ferrule/split joint conductor entry. This is to confirm the integrity of the connection on the conductor (mechanical pull test). This only applies to newly made connections.
Operating the base unit

Note:

- Press and hold the black button (deadman) on the rear of the remote (you will hear an internal buzzer) for the duration of any operation.
- In between each use of the remote control, it must be put away safely to prevent any accidental operation.

1. Aim the remote control directly at the radio switching unit. Press the button once only. The base unit will operate and a red or green light-emitting diode (LED) light underneath the radio switching unit will illuminate:
   - green – base unit is on
   - red – base unit is off

Existing installation with Flowline/Nilcrom boxes – single phase

1. Assemble and pre-wire a radio switching unit and a Flowline/Nilcrom box in series on a Flowline fuse-mounting bracket (stock code: CB 3054). Use the Flowline/Nilcrom box for fusing and the other for switching (see Figure 1).

   ![Flowline/Nilcrom single phase](image)

   **Figure 1: Flowline/Nilcrom single phase**

2. Connect the mounting bracket on top of, or below, the mains or service crossarm using either the red-phase or the neutral LV pins and associated streetlight fixing bolthole.
3. Check the integrity of the neutral connection. If the neutral connection is a spliced or wrapped-on type, change to a split bolted fitting (see work practice 8.2 (Service connections on overhead mains) in this manual).

4. Connect the neutral point at the base of the radio switching unit to the neutral supply mains with 6 mm² cross-linked polyethylene (XLPE) service cables.

5. Identify the customer’s existing connected phase and connect the line side tap of the new Flowline box to the same mains phase.

6. Insert a 50 amp HRC fuse (stock code: GF 1930) into the new Flowline/Nilcrom box.

7. Prove that the test instrument is working on a known source of supply.

8. Use the remote control to turn the radio switching unit on. To prove the radio switching unit has worked, test with a voltmeter between the radio switching unit neutral point and the load side terminal. Also, check whether the green LED indicator is illuminated.

9. Remove approximately 25 mm of insulation from the customer’s service phase tap (between the service termination and Flowline/Nilcrom box) where a split bolt connection will be made.

10. Test between the load side of the radio switching unit and the 25 mm area of removed insulation on the customer's service phase to prove the same phase.

11. Prove that the test instrument is still working by testing a known source of supply.

12. Use the remote control to turn the radio switching unit off. Prove this with the test instrument between the load side and neutral point.

13. Prove that the test instrument is working by testing a known source of supply.

14. Install a tap to the load side of the radio switching unit phase and connect it to the customer's load phase tap with a small split bolt connector (where the 25 mm of insulation has been removed).

15. Use the remote control to turn the unit on and ensure that the green light is illuminated.

16. Cut away the old existing tap between the new split bolt connection and the old existing Flowline/Nilcrom box.

17. Ensure that the green light at the base of the radio switching unit is still illuminated.

18. Cover the split bolt connection with self-amalgamating tape then with bituminous tape.
Existing installation with Flowline/Nilcrom boxes – three-phase

1. Assemble and pre-wire the radio switching unit and three Flowline/Nilcrom boxes to a Flowline fuse mounting bracket (stock code: CB 3054). Use the three Flowline/Nilcrom boxes for fusing and the radio switching unit for switching (see Figure 2).

![Diagram of Flowline/Nilcrom three-phase system]

**Figure 2: Flowline/Nilcrom three-phase**

2. Connect the mounting bracket on top of, or below, the mains or service crossarm, using either the red-phase or neutral LV pins and associated streetlight fixing bolt hole.

3. Check the integrity of the neutral connection. If the neutral connection is a spliced or wrapped-on type, change to a split bolted fitting (see work practice 8.2 (Service connections on overhead mains) in this manual).

4. Connect the neutral point at the base of the radio switching unit to the neutral supply mains with 6 mm² XLPE service cable.

5. Connect the line side taps of the new Flowline/Nilcrom boxes to the supply mains phases.

6. Insert a 50 amp HRC fuse (stock code: GF 1930) into each new Flowline/Nilcrom box.
7. Prove that the test instrument is working on a known source of supply.

8. Use the remote control to turn the unit on and ensure that the green light at the base of the radio switching unit is illuminated, then test between the radio switching unit neutral point and load side terminals for system voltage to prove that the radio switching unit has worked.

9. Remove about 25 mm of insulation from one of the customer’s service phase taps where a split bolt connection will be made.

10. Test between the 25 mm area of removed insulation on the customer’s service phase tap and the load side of the selected radio switching unit phase to prove the same phase.

11. Prove that the test instrument is working on a known source of supply.

12. Use the remote control to turn the radio switching unit off and prove with test instrument that the power has been interrupted between the load side and neutral point.

13. Prove that the test instrument is working on a known source of supply.

14. Install a tap to the load side of the selected radio switching unit phase and connect it to the customer’s load phase tap with a small split bolt connector where the 25 mm of insulation has been removed.

15. Use the remote control to turn the radio switching unit on and ensure that the green light at the base of the radio switching unit is illuminated.

16. Confirm that the radio switching unit is still on then connect the next two phases the same way that the first phase was connected (steps 9 – 15).

17. After the third phase has been connected, individually remove the original service taps from the supply mains to the Flowline/Nilcrom box and from the Flowline/Nilcrom box to the new split bolt connection.

18. Check that the green light at the base of the radio switching unit is still illuminated.

19. Cover the split bolt connections with self-amalgamating tape then bituminous tape.
1. Assemble and pre-wire the line side of the radio switching unit on a Flowline fuse mounting bracket (CB 3054) (see Figure 3).

2. Connect the mounting bracket on top of, or below, the mains or service crossarm using either the red phase or neutral LV pins and associated streetlight fixing bolt hole.

3. Check the integrity of the neutral connection. If the neutral connection is a spliced or wrapped-on type, change to a split bolted fitting (see work practice 8.2 (Service connections on overhead mains) in this manual).

4. Connect the neutral point at the base of the radio switching unit to the neutral supply mains with 6 mm XLPE service cable.

5. Identify the customer’s existing connected phase and connect the line side tap of the radio switching unit Flowline/Nilcrop box to the same mains phase.

6. Prove that the test instrument is working on a known source of supply.

7. Use the remote control to turn the unit on and ensure that the green light at the base of the radio switching unit is illuminated, then test between the radio switching unit neutral point and load side terminals for system voltage to prove that the radio switching unit has worked.

8. Remove about 25 mm of insulation from the customer’s service phase tap where a split bolt connection will be made.
9. Test between the load side of the radio switching unit and the 25 mm area of removed insulation on the customer's service phase to prove the same phase.

10. Prove that the test instrument is still working on a known source of supply.

11. Use the remote control to turn the radio switching unit off and prove this with the test instrument between the load side and neutral point.

12. Prove that the test instrument is working on a known source of supply.

13. Install a tap to the load side of the radio switching unit and connect it to the customer's load phase tap with a small split bolt connector where the 25 mm of insulation has been removed.

14. Use the remote control to turn the radio switching unit on and ensure that the green light at the base of the radio switching unit is illuminated.

15. Cut away the old existing tap between the new split bolt connection and the old Flowline/Nilcrom box.

16. Cover the split bolt connection with self-amalgamating tape then bituminous tape.
Existing installation direct connected – three-phase

1. Assemble and pre-wire the radio switching unit on a Flowline fuse mounting bracket (CB 3054) (see Figure 4).

2. Connect the mounting bracket on top of or below the mains or service crossarm using either the red phase or neutral LV pins and associated streetlight fixing bolt hole.

3. Check the integrity of the neutral connection. If the neutral connection is a spliced or wrapped-on type, change to a split bolted fitting (see work practice 8.2 (Service connections on overhead mains) in this manual).

4. Connect the neutral point at the base of the radio switching unit to the neutral supply mains with 6 mm XLPE service cable.

5. Connect the line side taps of the radio switching units to the supply mains phases.

6. Prove that the test instrument is working on a known source of supply.

7. Use the remote control to turn the unit on and ensure that the green light at the base of the radio switching unit is illuminated, then test between the radio
switching unit neutral point and load side terminals for system voltage to prove that the radio switching units have worked.

8. Remove about 25 mm of insulation from one of the customer’s service phase taps where a split bolt connection will be made.

9. Test between the 25 mm area of removed insulation on the customer’s service phase tap and the load side of the selected radio switching unit phase to prove the same phase.

10. Prove that the test instrument is working on a known source of supply.

11. Use the remote control to turn the radio switching unit off and prove this with the test instrument between load side and neutral point.

12. Prove that the test instrument is still working on a known source of supply.

13. Use a small split bolt connector to put a tap on the load side of the selected radio switching unit phase and connect it to the customer’s load phase tap where the 25 mm of insulation has been removed.

14. Use the remote control to turn the radio switching unit on and check the green LED indicator has lit up.

15. Confirm the radio switching unit is still ‘ON’ then connect the next two phases the same way the first phase was connected (steps 8 - 14).

16. After the third phase has been connected, individually remove the original service taps from the supply mains to the new split bolt connections.

17. Check the green light at the base of the radio switching unit is still illuminated.

18. Cover the split bolt connections with self-amalgamating tape then with bituminous tape.

Reference

- Work Practice Manual, work practice 8.2 (Service connections on overhead mains)
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8.10 Radio switching units for underground connections

Purpose

This work practice outlines the minimum requirements for installing and connecting a radio switching unit between a customer’s single-phase service and the low voltage terminals in universal and mini pillars.

Tools and equipment

The tools and equipment required for this task may include the following:

- radio switching unit (made up of a base unit and a remote control module)
- insulation piercing connector (IPC) 6–54 mm main / 4–35 mm service (CC 0063)
- aerial bundled conductor (ABC) 17 mm / 13 mm ratchet spanner
- service cable end cap

Overview

- The radio switching unit is made up of two modules:
  - base unit
  - remote control
- Each module uses a radio frequency that enables two-way command and reporting.
- On single-phase installations, the customer’s active conductor is connected using a base unit to de-energise or re-energise it with a remote control unit.
- A remote control unit operates the base unit on a selected frequency range and remotely de-energises or re-energises the customer’s connection.

Instructions

Operating the base unit

The actions below can be made by aiming the remote control at the pillar which contains the base unit, then pressing the defined button combination.
Note:

- Press and hold the black button (deadman) on the rear of the remote (you will hear an internal buzzer) for the duration of any operation.
- In between each use of the remote control, it must be put away safely to prevent any accidental operation.

**Send status request** (always check the status of the base unit after sending a status request)

1. Press and hold the deadman and press either the red or green button for less than three seconds. Either the red or the green light-emitting diode (LED) light will flash to indicate that the command has been sent to the base unit in the pillar.
2. Within two seconds the remote will indicate the state of the base unit by a continuous illumination of either the red or green light:
   - green light – base unit is on
   - red light – base unit is off

**Send ‘on’ command**

1. Press and hold the deadman, then press the green button for at least three seconds.
2. The green light will momentarily flash to indicate that the command is being sent.
3. Within two seconds, the base will display a steady green light, which indicates that the base unit has been turned on.

**Send ‘off’ command**

1. Press and hold the deadman and then press the red button for at least three seconds.
2. The red light will momentarily flash to indicate that the command is being sent.
3. Within two seconds, the base will display a steady red light, which indicates that the base unit has been turned off.
Connecting the base unit

1. Identify the customer’s cable to be worked on and write the associated house number on the tag and attach to the cable (use a general inspection tag for identification (stock code: HG 2102)).

2. If you cannot correctly identify the relevant house cable, attach a tag with the house number to all other customer cables in the pillar.

3. Attach the base unit around the terminal block-mounting panel in the pillar, using the plastic chain provided or large zip ties. Check that the base unit is attached to the mounting panel in such a way that sufficient cable is able to be connected to the relevant terminals.

4. Connect the neutral lead (blue) to the neutral terminal block.

5. The factory settings of the base unit are set to ‘off’ before the initial connection, but the load tail (conductor) must be made safe before energising the unit.

6. Connect the line side of the base unit (marked ‘in’) to the terminal block of the same phase in the pillar.

7. Use the remote control to identify the status of the base unit.

8. If the base unit is ‘on’, use the remote control to turn it ‘off’.

9. Attach an IPC (stock code: CC 0063) between the customer’s active conductor and the end of the load cable from the base unit (marked ‘out’) (see Figure 1 (Paralleling customer active conductor through base unit)). Attach the IPC to the customer’s active conductor, close to the terminal block.

Note:

Once a joint is made, to ensure the integrity of the compression, a reasonable force is to be applied in the opposite direction to the ferrule/split joint conductor entry. This is to confirm the integrity of the connection on the conductor (mechanical pull test). This only applies to newly made connections.

10. Use the remote control to turn the base unit ‘on’.

11. After confirmation from the remote control that the active connections at the IPC are in parallel, cut away the original line active 40–50 mm from the IPC and make it safe (see Figure 2 (Customer active conductor fed through base unit)).
12. Remove the original customer active tail from the terminal block.
13. Attach a service cable end cap to the protruding 40–50 mm active tail that extends from the IPC.

Note:

- If the line side (marked ‘in’) of the base unit cannot be connected to a terminal of the same phase in the mini-pillar (such as when all terminals are used), connect an IPC (stock code: CC 0063) between it and the customer phase close to the terminal.
- If the supply or customer neutral is disconnected, service connection testing is required for this procedure.

Figure 1: Paralleling customer active conductor through base unit
Figure 2: Customer active conductor fed through base unit
8.11 Consumer de-energisation/disconnection and re-energisation/reconnection

Purpose
This instruction outlines requirements for the de-energisation/disconnection and re-energisation/reconnection of consumer installations connected to the Western Power network for:
- non-payment or non-application of consumers’ electricity account
- on request from the energy retailer (Synergy)

Scope
This instruction applies only to consumers with direct-wired metering installations. It does not cover current transformer (CT) meter installations.

Training and authorisation
Any person doing work activities described in this instruction must:
- be one of the following:
  - licensed electrician
  - a Certificate III (ESI) distribution linesperson or equivalent
- possess a Network Authority Card with current meter training certified relevant to the task

Training can be provided by either Western Power (PTS) or College of Electrical Training.

Background
Consumer installations can be de-energised or disconnected for the following reasons:
- non-payment
- non-application of consumers’ electricity account
- on request from the energy retailer (Synergy)
De-energisation

This can be done by:
- removing the meter fuse at the meter board and replacing the fuse wedge and resealing. For plug-in electro-mechanical type meters only – unplugging and rotating the meter in the plug-base and resealing.
- opening the consumers’ main switch then tagging and sealing the main switch/circuit breaker
- removing the fuse at the pole

Disconnection

This can be done by:
- disconnecting the aerial service cable at the pole
- disconnecting the consumer mains cables at the pillar

De-energisation or disconnection?

Disconnection is preferable to de-energisation when:
- the meter or consumer’s main switch/fuse is not accessible
- the consumer has illegally re-energised
- other technical issues prohibit de-energisation

Safety

1. Complete a risk assessment. Risks associated with the task include:
   - underground services
   - other services and attachments to the pole
   - working with live low voltage (LV)
   - public access to the worksite
   - traffic
2. Conduct a job briefing.
3. Wear the correct level of personal protective equipment (PPE) for the task. See field instructions 3.1 (Clothing and personal protective equipment requirements) and 3.2 (Glove protection) in this manual.
Note:

It is important to remember that this is a stressful time for the customer as well as the work team. Keep the following points in mind.

- Remain calm and do not get into any type of confrontation with the consumer.
- Do not make any promises.
- Be polite and courteous.
- Refer the customer to the 1313 51 customer services number.
- Consider the best action to be taken to ensure the safety of the work team. Disconnection via the pole or pillar may be the better option.

Instructions – De-energisation and disconnection

De-energisation

1. Confirm the position of the fuse(s) and/or consumer’s main switch; visually determine if communications equipment (metering modem) is installed.

2. Contact the Metering Data section for remote read before de-energisation occurs.

3. Remove fuses according to reason for de-energisation:
   - non-application – remove fuses and replace fuse wedges and reseal.
   - non-payment – remove fuse cartridge/holder, replace with blanking plate and reseal. Ensure the fuse cartridge and fuse is removed from site.

4. If there is no individual service protective device (SPD), de-energisation may be performed at the consumer’s main switch/circuit breaker. Tag and seal the main switch/circuit breaker.

5. Treat meters according to type:
   - plug-in meters – unplug the meter in the plug-base, rotate, then plug-in sideways and reseal
   - permanent meter – remove meter, fit the blanking plate and reseal

6. For pole top fuse removal, use an approved LV operating pole stick.

7. Remove the meter terminal cover and test meter terminals to prove de-energised.

8. Replace the meter terminal cover and seal including the meter fuse wedges.
Disconnection

Disconnection at the pole/pillar can not be done for multiple master or distributed master metering installations, as more than one consumer is connected to the same service.

1. Conduct a worksite inspection to identify the correct service cable which is to be disconnected from the low voltage network.
2. Use a clamp ampmeter at least CAT IV 600 V to identify the consumer’s load. If the measured load is less than 15 A, proceed with the disconnection.
3. If the load exceeds 15 A, wait for a few minutes and recheck using the ampmeter until the load is less than 15 A before proceeding with the disconnection.
4. Disconnect the consumer service cable at the pole or by removing the consumer mains at the pillar. Care must be taken as this may create an arc.
5. Ensure that the cut phase conductor at the pole does not drop onto any other phases or neutral.
6. Confirm the correct installation has been disconnected by checking supply to adjacent properties.
7. Leave a warning card in the letter box to advise the consumer that the supply has been disconnected.

Instructions – Re-energisation and reconnection

Re-energisation

1. Re-energise supply by:
   a. replacing the meter fuse with the correct type and size before resealing. Replacement fuse rating/capacity is to be as close to the previous fuse rating/capacity and should not exceed the SPD wedge or socket rating.
   b. rotating the meter back in the plug-base and resealing
   c. removing the tag the on consumer’s main switch/circuit breaker
   d. replacing the pole fuse with the correct type and size
2. Perform a load test between the load neutral and the load active terminals at the meter.
3. Check and record correct kWh meter function.
4. Replace meter terminal cover and reseal.
5. Ensure that the main switch is in the off position unless the consumer is at home or has specifically requested it to be turned on.
6. Record the meter reading.

**Reconnection**

1. Conduct a worksite inspection to identify the correct service cable which is to be reconnected to the LV network.
2. Ensure that the consumer meter fuse and main switch is accessible.
3. Turn off the consumer’s main switch, isolate the board/meter fuse and remove the load neutral at the meter.
4. Reconnect the service cable at the pole or pillar.
5. Conduct the service connection testing procedure.

**Meter interference/bypass**

Suspected meter bypass should be reported to your formal leader immediately. Photographs must be taken if a camera is available and the site left as found.

**References**

- Work Practice Manual, Section 3 (Personal protective equipment)
- De-energisation and Re-energisation Technical Procedure (DM# 6315351)
- Network Operator Protocols for Retailer De-energisation Work (DM# 5383606)
8.12 High network loop impedance (Z line) experienced during service connection testing

Purpose
This work practice outlines the process that is to be followed when you find a high network loop impedance (Z line) greater than 1 Ω during the service connection testing process.

Scope
- This work practice covers the process to follow when carrying out a service connection test SCT:
  - during the initial connection
  - when replacing the service of a direct metered installation

Training and authorisation
All personnel who install, test and energise low voltage (LV) customer connections must:
- possess a valid Network Authority Card (NAC)
- be trained, assessed and competent in the course, Service connection testing (metrel polarity plus), provided by Power Training Services WA (PTS WA). Re-assessment of this course must be completed every six months from the date of completion of the initial training.

Instructions
1. If the loop impedance reading exceeds 1 Ω during the SCT:
   a. ensure that all of the service connections have been reterminated and a good connection has been made
   b. retest
2. If it is still greater than 1 Ω, follow fault investigation steps below.
Note:
Once a joint is made, to ensure the integrity of the compression, a reasonable force is to be applied in the opposite direction to the ferrule/split joint conductor entry. This is to confirm the integrity of the connection on the conductor (mechanical pull test). This only applies to newly made connections.

For overhead connections

1. Use the service connection tester (a typical unit is a Metrel PolarityPLUS) to check the loop impedance connections of the installations at the adjacent property on the same phase and LV network. If the reading is substantially lower, the fault is with the service connection on the installation you have been working on.

2. If the loop impedance is still greater than 1 Ω, inspect the network from the point of supply for possible signs of loose or burnt connections that could contribute to the high reading and rectify them accordingly. These connections may need to be remade or jumpered out.

3. Recheck the loop impedance and, if still greater than 1 Ω, check the loop impedance of the installations closer to the transformer supplying the LV network to determine if the mains are at fault. The loop impedance should decrease when the readings are taken closer to the point of supply (transformer).

4. Advise Network Operations Control (NOC) of:
   - the actions that have been completed
   - location/address of where the network loop impedance exceeds the limit of 1 Ω
   - request that a Technical Network Officer (TNO) make contact to advise on further action to be taken. Stay onsite until communication with the TNO has been made and approval to leave the site has been given.

For underground connections

1. Use the service connection tester to check the loop impedance of the network conductors at the pillar where the service has been connected. If this reading is substantially lower, then the fault is with the customer’s mains connections or the customer’s mains.
2. Use the service connection tester to check the loop impedance connections of the installations at an adjacent property on the same phase and LV network to determine if the network is at fault.

3. If still greater than 1 Ω, check the loop impedance of the installations closer to the transformer supplying the LV network to determine if the mains are at fault. The loop impedance should decrease when the readings are taken closer to the point of supply (transformer).

4. Advise NOC of:
   - the actions that have been completed
   - location/address of where the network loop impedance exceeds the limit of 1 Ω
   - request that a TNO make contact to advise on further action to be taken. Stay onsite until communication with the TNO has been made and approval to leave the site has been given.
8.13  Revenue meter communications equipment

Purpose

This instruction outlines the minimum requirements for installation and replacement of revenue meter communications equipment.

Authorisation

Any person undertaking work activities described in this instruction must be either a licensed electrician or a Certificate III (ESI) distribution linesperson or equivalent. They must possess a Network Authority Card with current authorisation for the appropriate tasks.

General requirements

- Before commencing work, conduct a job risk assessment (JRA).
- Wear appropriate personal protective equipment, as per Field instruction 3.1 (Clothing and personal protective equipment requirements) and Field instruction 3.2 (Glove protection) in this manual.

Instructions

- For DM1 type modems (externally fitted to all types of meters):
  - Isolate power supply to meter and prove meter is de-energised.
  - Locate and secure the modem to the meter panel. Care must be taken when drilling the holes for the self-tapping screws. Open the meter panel and confirm that the cables behind the panel are remote from the modem fixing screws.
  - A 2 amp fuse must be fitted in line with the active cable and a link in line with the neutral cable for DM1 modem.
- For GM3 type modems (undercover modems):
  - For Q4W type meters – isolate power supply to meter and prove meter is de-energised. Fit the under cover GM3 modem below the meter. Fit both
the potential and neutral leads into the connectors provided on the meter. If connectors are not provided, insert leads into the appropriate connection on the meter, phase and neutral.

- For EM series type meters (except EM1000 (0200) meters) – fit the under cover GM3 modem below the meter via the serial port adaptor.

- Check the meter for correct operation. Check the revenue meter communications is in the correct operating mode. Call the Data Centre and request them to check they can communicate effectively with the meter via MV90.

- Once the correct operation has been determined, seal at the appropriate points and fit a ‘Remotely Read’ sticker and record all required information.

- For Network Interface Cards (NIC) unplug the NIC card and replace it with a new one by plugging it into the NIC card module. Contact the UIQ operator (1800 084 406) and request a communication’s test.

- Once the communications is confirmed to be successful, replace the NIC card cover and seal it.

References

- Metering Communication Equipment Installation Procedure (DM# 6630273)
- Q4W Meter, Removing the Multi Functional Terminal Cover (DM# 7627792)
8.14 Overhead service cable installation on 1.2 metre crossarms

Purpose

This work practice outlines the minimum requirements for installing or replacing an existing overhead service cable that is terminated onto 1.2 m (4 ft) low voltage (LV) crossarms on Western Power’s network.

Note:

This work practice is not applicable to service cable that is connected through Flowline or Nilly fuse.

Instructions

• Prior to commencing work:
  o conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
  o ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

• During overhead service replacement, an additional 500 mm length of spare cable on the two furthermost conductors must be provided in addition to the normal 500 mm connection tail that is required (see work practice 8.5 (Overhead service cables – installation and replacement) in this manual).
  o The 500 mm of additional cable ensures sufficient service conductor length when 1.2 m LV crossarms are upgraded to 2.1 m (about 7 ft) LV crossarms.
  o The additional cable length (spare cable) must be secured by rolling it and zip tying (or taping) it at the bull horn attachment (see Figure 1) or looped on the LV mains (see Figure 2).

Note:

Once a joint is made, to ensure the integrity of the compression, a reasonable force is to be applied in the opposite direction to the ferrule/split joint conductor entry. This is to confirm the integrity of the connection on the conductor (mechanical pull test). This only applies to newly made connections.
Overhead service cable installation on 1.2 metre crossarms

Figure 1: Additional cable zip tied at the bull horn

Figure 2: Additional cable looped on the LV mains

References

- Work Practice Manual:
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 8.5 (Overhead service cables – installation and use)
8.15 Meter panel replacement

Purpose

This work practice outlines the minimum requirements when removing or replacing meter panels.

Important

For asbestos meter panel replacement, read this work practice in conjunction with work practice 2.22 (Asbestos and fibreglass working procedures) in this manual.

Scope

This work practice only applies to meter panel replacements for single-phase or three-phase, direct-wired metering installations.

Training and authorisation

- The only personnel allowed to carry out meter panel replacement and testing must:
  - be one of the following:
    - a Customer Funded Works (Field Operations) licensed electrician
    - a Western Power Metering Services licensed electrician
    - a Certificate III (ESI) distribution linesperson (or equivalent)
  - hold a current Network Authority Card (NAC)
  - have completed all prerequisite training
  - have completed the approved Western Power training and assessment:
    - For licensed electricians and Certificate III (ESI) distribution linespersons (or equivalent) employed by Western Power – Power Training Services WA (PTSWA) provides training and six-monthly assessments on the Service Connection Testing (Metrel PolarityPLUS)
    - For licensed electricians employed or contracted by Western Power Metering Services – equivalent training and 12-monthly assessments are provided by the College of Electrical Training (CET)
• Only personnel authorised in writing by their formal leader may perform the role of the witness for service connecting testing
• Customer Funded Works (Field Operations) licensed electricians employed by Western Power and Certificate III (ESI) distribution linesperson (or equivalent) are permitted to disconnect/re-connect the customers supply, carry out meter panel replacement and perform the required testing.
• Western Power Metering Services licensed electricians are not permitted to disconnect/re-connect the customers supply, but are permitted to carry out meter panel replacement and perform the required testing.
• If a customer employs any other licensed electrician to change their meter panel, the electrician is not allowed to disconnect/re-connect the customer’s supply or carry out the required testing.

Test instruments and requirements

Network Total Workforce

A Certificate III (ESI) distribution linesperson or equivalent, and licensed electricians employed by Western Power, must:

• use a Metrel PolarityPLUS test instrument and use the Service connection test form – Metrel (DM# 4700316)
• have a witness who must confirm that all tests have been completed and recorded and sign the witness declaration on the test form

Licensed electricians employed by Western Power Metering Services or Customer Funded Works (Field Operations)

Licensed electricians employed by Western Power Metering Services, or Customer Funded Works (Field Operations) must:

• use any suitable and calibrated test equipment, recording the results on the Meter Panel Replacement Test Form - Multimeter (DM# 11484548)
• have a witness who must confirm all tests have been completed and recorded, and sign the witness declaration on the test form
Safety

Before commencing work:

- conduct a risk assessment and job briefing (see work practice 2.28 (Job briefing process) in this manual)
- ensure that all personnel comply with the minimum personal protective equipment (PPE) requirements (see section 3 (Personal protective equipment) in this manual)

Instructions

1. Use the relevant service connection test form, as described below, to complete a full service connection test and confirm that the meter is connected, operating correctly and in a safe condition.

   Important
   Under no circumstances is the meter panel to be changed while the supply to the panel is still energised.

2. Isolate supply to the meter panel, including the neutral, by:
   - disconnecting the customer mains at the service dome (underground supply)

      Note:
      For disconnections at the uni-pillar and older mini-pillars with live exposed parts, two people are required (i.e. one worker and one safety observer) to perform this task.

   - disconnecting the aerial service cable from the overhead distribution network (this requires a service team)

3. Test and confirm that the meter is de-energised before proceeding with the meter panel replacement.

4. When making any service connections at the meter and/or terminal blocks, the exposed strands at the stripped end must be twisted together before insertion into the terminal.
Note:

If using thin wire or cable - twist together the exposed strands and then bend the end over (to double the thickness) before inserting into the terminal.

5. Tighten the terminal screws and then pull the wire or cable to prove that a secure connection has been made.

References

- Work Practice Manual:
  - work practice 2.22 (Asbestos and fibreglass working procedures)
  - work practice 2.24 (Low voltage ground rescue procedures)
  - Section 3 (Personal protective equipment)
  - work practice 5.4 (Instruments – testing and calibration)
  - Appendix 2 (Standard forms)
- Meter Panel Replacement Test Form - Multimeter (DM# 11484548)
- Service connection test form – Metrel (DM# 4700316)
8.16 Unmetered supply fuse installations

Purpose
This instruction describes the minimum requirements when installing connection points for loads that require an unmetered supply via a fuse.

Scope
An unmetered supply is generally used to service connection points for loads such as:
- street, traffic, park, community or security lighting
- ticket issuing machines, parking meters or community watering systems
- telephone service requirements
- loads consuming less than the starting electric current of a meter

Instructions
In addition to statutory compliance requirements, all unmetered supply arrangements must comply with Western Power's Un-metered Supply Policy (DM# 7873541).

Streetlight and unmetered supply circuits must be supplied via a fuse from the clearly labelled low voltage (LV) point of supply (e.g. mini / uni pillar).

Streetlight cable (i.e. 10 mm LV and 16 mm LV) is not fault rated and must not be connected directly onto an LV cable or conductor. It must always be fused.

Mini / Uni pillar
The mini / uni pillar is the preferred option for unmetered connections. The supply must be via a Red Spot fuse (GF1523 fuse element, GF2121 fuse holder base and carrier) securely mounted in accordance with drawings UDS - 6-4 (see Figure 1) and R32 (see Figure 3). Where there is sufficient termination space, multiple unmetered supplies may be connected to a pillar. In such cases, each connected circuit must be protected by an individual Red Spot fuse.

Pits
It may not be appropriate to install a pillar in some locations, such as when:
- the pillar presents a tripping hazard or safety concern
• the pillar presents a traffic hazard
• the next closest pillar is more than 25 m away

In such situations, an unmetered supply pit may be installed so long as:
• the pit complies with the Un-metered Supply Policy
• the connection is made via an inline fuse holder kit (FE0110) housed within the pit, as shown in drawing UM4 (see Figure 2)

LV kiosk

General unmetered supply connections should not be made within, or supplied from, an LV kiosk.

Connection of a streetlight circuit to an LV kiosk is permitted via a Red Spot fuse if:
• the LV kiosk has a streetlight and power board already installed
  or
• a new LV kiosk streetlight and power board option has been requested. For more on this see LV Board Order / Quote / Materials List form (DM # 5586486).

Do not modify an existing LV kiosk to include the streetlight and power board, as this is not a practical solution.
Figure 1: UDS-6-4
Figure 2: UM4

T-OFF WITH 25 SQMM FROM LV FEEDER CABLE

UM4
References

- Distribution Construction Standards Handbook, Section 2, Drawing R32 (DM# 4411789)
- Distribution Design Catalogue Drawing Number UM4 (DM# 3089632)
- Underground Distribution Scheme Manual UDS-6-4 (DM# 3573985)
- LV Board Order / Quote / Materials List form (DM # 5586486)
- Un-metered Supply Policy (DM #7873541)
8.17 Temporary generators

Purpose

This work practice outlines the process for requesting and installing a temporary generator during a fault or planned outage in order to temporarily supply power to part of the SWIN (South West Interconnecting Network).

Instructions

Prior to commencing work

• When fitting a temporary generator, personnel need to follow an authorisation process to ensure that:
  o the SWIN is not impacted
  o public safety is maintained
  o environmental guidelines are followed

Note:

• Western Power personnel and contractors/sub-contractors must be authorised by the Network Investigations Group in order to install temporary generators on the network.
• All personnel undertaking this task must complete an Emergency Response Generator Request Form (see DM# 6262035 or Appendix 2 (Standard forms) in this manual) and email it to the Network Investigations Group Inbox (erg.requests@westernpower.com.au).
• For any queries regarding the Emergency Response Generator Request Form, contact the Network Investigations Group on 9441 1401. The Network Investigations Group will evaluate the request for a temporary generator in line with their approved processes and procedures and will arrange for the connection to be initiated.
• For an overview of the process, see Emergency Response Generator Planned Deployment Booking System (DM# 3270950).
Important

Only personnel who are authorised and trained by the Network Investigations Group are allowed to install temporary generators to the SWIN (operated by Western Power).

Planned outages

Preventing / managing delays and overruns

Temporary generators that are to be fitted to the SWIN during a planned outage must be organised during the planning stage to allow reasonable time for the planning and scheduling of the temporary generator installation (see work practice, 5.19 (Planned interruptions (multi-customer outage)) in this manual).

Cancellation / rescheduling requirements

- The Network Investigation Group must be notified if a planned interruption requiring a generator is cancelled or rescheduled for any reason (this includes the day of the interruption).
- For information on how to cancel the requested temporary generator installation, see work practice 5.19 (Planned interruptions (multi-customer outage)) in this manual.

Fault outages

During a fault, the point of contact for requesting a temporary generator is the Network Operations Control Centre (NOCC) Coordinator. For contact information, see Appendix 5 (Western Power facilities information) in this manual.

References

- Work Practice Manual:
  - work practice 5.19 (Planned interruptions (multi-customer outage))
  - Appendix 2 (Standard forms)
  - Appendix 5 (Western Power facilities information)
- Emergency Response Generator Planned Deployment Booking System (DM# 3270950).
- Emergency Response Generator Request Form (DM# 6262035)
8.18 Damaged or faulty customer installation assets in public areas

Purpose

This work practice outlines the requirements for controlling and making safe customer installation assets, also referred to as ‘customer installations’ located in public areas. Network operatives may encounter damaged or faulty customer installations in the course of their normal work and/or when dispatched to attend situations believed to be associated with Western Power assets.

A ‘network operative’ is defined as an employee or contracting partner working on behalf of Western Power that is deemed competent and authorised to work on the Western Power network.

Scope

Different types of customer installations can be found in public areas. This equipment is fed from customer’s private installations that are not supplied direct from the Western Power Network. Examples include:

- street lighting owned by Main Roads, local government, or a strata company
- free-standing reticulation control boxes
- illuminated signs such as those found at bus stops and other advertising signs
- traffic lights
- shopping centre signs
- private overhead lines
- bus stops
- customer-owned mini pillars.

This equipment is not on the Western Power SPIDAWeb diagrams because it is not owned by Western Power. Due to this there will be no indication as to the location of the point of supply or the route of the supply cable to the equipment.

When this type of customer equipment is damaged or faulty, it may be reported to Western Power by the public, and in some circumstances by the owner, as Western Power equipment. A work crew will then attend the site based on the third party report. The differentiation between Western Power assets and those owned by third parties may not always be clear upon the initial onsite assessment.
Use of Customer Pack and ‘Out of Service’ warning tag

The Western Power Customer Pack is used to inform customers about the assessment of their installations. For more on this, see work practice 8.7 (Customer installations at the network interface).

‘Out of Service’ warning tags must be attached to a point of isolation when it is established to make faulty or damaged equipment electrical safe. For more on this, see work practice 2.15 (Network tags).

Instructions

The following principles must be adhered to when dealing with faulty or damaged customer installations:

- Do not undertake work on customer installations if there is the potential to cause injury or harm to the person undertaking the work.
- Keep an accurate account of the situation, any actions taken and inform the Customer Service Centre on 13 13 51 (select ‘option 3’) and issue a customer pack.
- Never feel pressured to carry out any work that is unsafe.
- Where all reasonable options have been exhausted to identify the customer a Designated Electrical Inspector can be contacted for advice and assistance. Contact information for the Electrical Inspectors is via Network Operations or Customer Service Centre on 13 13 51 (select ‘option 3’).

1. Onsite safety

   a. On arrival carry out a risk assessment to identify all potential hazards.
   b.Guard or barrier off the area to keep the public away from any live electrical equipment and/or mechanical hazards.
   c. Assess the area to determine the risk and appoint a safety observer to control access to the site, if required. Consider high volume public areas such as:
      - schools
      - shopping centres
      - playgrounds and parks
   d. Contact emergency services and other agencies, if required.
   e. Remain onsite until someone can take over responsibility.
f. Call Customer Service Centre on 13 13 51 (select ‘option 3’) with an update of all actions taken with the damaged or faulty equipment and to raise a PowerOn Fusion Trouble Call System (TCS) record.

2. Contact owner of customer installation asset

   a. Attempt to establish who owns the damaged or faulty customer installation.
   
   b. Contact the owner and arrange for the site to be handed over to the owner or their representative for isolation and repair. If unable to make contact with the equipment owner, then move on to Step 3.
   
   c. Remain onsite until the damaged or faulty equipment has been handed over to the owner or their representative. If it is not possible to remain onsite:

      • make arrangements for another Western Power representative to take over the site until the owner arrives

      or

      • handover to the emergency services.

   Document the handover on the risk assessment and call the Customer Service Centre on 13 13 51 (select ‘option 3’) to give an update.

   d. When handing over the site to the equipment owner:

      • gather and record the name and contact details of the equipment owner or representative (take photo if possible of person including vehicle with registration number)

      • issue the customer with a completed Western Power customer pack

      • take a photograph of the damaged or faulty equipment

      • record the time and date that the equipment was handed over

      • call the Customer Service Centre on 13 13 51 (select ‘option 3’) with all the information obtained.

   e. Do not leave site until you are fully satisfied that the risk to the public has been removed.
3. **Isolate damaged or faulty equipment**

a. If possible, isolate the damaged or faulty equipment:
   - only after carrying out a risk assessment and establishing that the isolation can be done safely
   - only if it is within your current level of competency and training and can be done without putting yourself or anyone else at risk.

b. To reduce the risk of electrical shock, test any metal customer installation for voltage between the equipment and an independent earth, before touching it.

**Important**

- Always follow Western Power work procedures and work practices when isolating electrical equipment.
- Tag isolated equipment with an ‘Out of Service’ tag at the point of isolation in accordance with work practice 2.15 (Network tags) of this manual.

c. Methods of isolation:
   - Isolate faulty equipment at a Western Power point of supply. Fit an ‘Out of Service’ warning tag at point of isolation and an Information tag at equipment end detailing the isolation point.
   - Isolate faulty equipment at the customer’s point of supply. Fit an ‘Out of Service’ warning tag at the point of isolation and an ‘Information’ caution tag at equipment end detailing the isolation point.
   - Where unable to locate point of supply, and if safe to do so, an authorised person can remove active and neutral conductors from damaged equipment and fit insulated connectors. Fit a mini pillar cover over the cable to prevent accidental contact with the removed cables.

d. Once the electrical equipment has been isolated, tagged out and made safe, issue a *Customer Pack* to the customer in accordance with work practice 8.7 (Customer installations at the network interface) of this manual.

e. Where possible remove or make safe any mechanical hazards.

f. If required, engage the use of a Western Power approved electrical contractor per existing procedures.
If the point of supply cannot be established or the isolation cannot be undertaken safely, move on to step 4.

4. **Unable to isolate customer installation or find owner**

If unable to isolate the equipment or identify the equipment owner for handover:

a. Contact your formal leader. They will make arrangements for the site to be guarded or fenced off from the public until the equipment can be isolated and made safe.

b. A Western Power representative must remain onsite until controls have been implemented to make the electrical and/or mechanical hazards safe.

c. It is the responsibility of personnel attending the site and their formal leader to take or agree with further actions to establish the equipment owner and ensure the equipment is made safe to ensure public safety.

d. The Designated Electrical Inspector will provide assistance in determining the equipment owner and enforce actions on the customer to carry out repairs to the equipment.

e. It is acceptable to hand over control of the situation to the emergency services. In such cases the details of the emergency services personnel agreeing to take control must be recorded by calling Customer Service Centre on 13 13 51 (select ‘option 3’).

**References**

- Work Practice Manual, work practices:
  - 2.15 (Network tags)
  - 8.7 (Customer installation assets at the network interface)
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9.1 Consumer site access

Purpose
This instruction outlines the considerations for working in consumer-owned substations and worksites.

Scope
This instruction applies to the Network Total Workforce (NTW) when access to consumer equipment for work-related activities and tasks is required. Such tasks and activities include:
- construction
- testing and commissioning
- operational work

Safety
When visiting a consumer’s site, the visitor must adhere to all the safety rules of that site. An induction may need to be completed before entering the consumer’s site.

Where the consumer’s safety rules and regulations are of a lower standard than Western Power’s, follow Western Power’s safety rules and regulations. These may be found in publications such as the Electrical System Safety Rules (ESSR) and work practice manuals as well as applicable standards, procedures and guidelines.

A risk assessment must be completed, with special attention paid to:
- unfamiliar site procedures
- additional or insufficient safety requirements
- unfamiliar inherent and created hazards
- unfamiliar apparatus and equipment
- other work teams onsite
- emergency procedures and contact details
- the possibility of induced voltages

Isolation and permit procedures must be at least equivalent to those of Western Power. If not, applicable Western Power procedures must be used.
Training and authorisation

All work must be undertaken by competent and authorised personnel.

**Note:**

There may be additional consumer-specific authorisations required by the consumer to work on their site or apparatus.

**Instructions**

In addition to the normal work planning processes, also consider, plan and arrange the following:

- Establish an appropriate point of contact with the consumer. Direct all correspondence through this person.
- Perform job-planning in cooperation with the consumer’s representatives. Record correspondence, decisions and plans.
- Determine property boundaries for the purpose of identifying responsibility for site control and management (e.g. permits, work practices, induction, and safety).
- Identify points of demarcation where operational control of equipment transfers from one authority to another. Such points of demarcation could exist on either Western Power’s or the consumer’s side of the property boundary.
- Identify shared equipment and establish a commissioning plan that outlines responsibilities and overlaps. Commissioning activities that involve the energisation of a new plant must be authorised and approved by the relevant operating authorities (Consumer, Western Power etc.).
- Determine the type of procedures and permits used onsite by the consumer and make sure that they meet Western Power’s requirements. If not, do not proceed with any work until this has been resolved.
- Determine if there is a need for an Operating Agreement between the Control Authority (SOCC/NOCC) and the consumer.
- Establish the existence of any environmental hazards at the site.
- If required, arrange for all Western Power employees to attend the consumer’s induction course.
- Ensure that all work is completed to Western Power’s minimum requirements.
When visiting a consumer’s site the consumer must be contacted before the visit as a matter of courtesy. This will foster a healthy working relationship and assist with security issues and access. For regular or fault visits to Western Power sites within the consumer’s boundaries, it may be possible to establish a standing arrangement with the consumer’s security.

**Kwinana Industrial Strip**

All staff entering a controlled or uncontrolled site in, or working in the vicinity of, the Kwinana Industrial Strip must comply with the SOCC CRI 00-11 ‘Kwinana Industrial Strip Emergency Response Procedure’ (DM# 1190718).

The procedure overview and map is also available in Appendix 9 (Kwinana industrial strip emergency response procedure) of this manual.

**Water Corp**

The Water Corp induction is valid for two years and the card must be carried when visiting any Water Corp site such as Baandee and Yerbillon. The induction and relevant FAQs are available online at [http://watercorpinduction.com.au](http://watercorpinduction.com.au).

To get Water Corp keys, the induction must be completed and a copy of the certificate of completion must be forwarded with a completed Water Corp key request (DM# 3479792) to Network Operations, East Perth.

**Desalination plants**

Kwinana and Binningup desalination plants are separately operated entities and have their own site-specific induction processes. All visitors must report to the site office on arrival and attend a site induction before being allowed inside the plant. For after-hours visits, the following numbers are to be called before arriving:

<table>
<thead>
<tr>
<th>Location</th>
<th>Control room (all hours)</th>
<th>Secondary number (after hours only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kwinana</td>
<td>(08) 9410 5201</td>
<td>0434 317 202</td>
</tr>
<tr>
<td>Binningup</td>
<td>(08) 9720 0754</td>
<td>0487 970 033</td>
</tr>
</tbody>
</table>
Verve Energy

When accessing substations on Verve sites, the site must be contacted before arrival to arrange an induction:

- **Pinjar**: (08) 9424 1711 or alternatively (08) 9424 1905
- **Muja**: (08) 9781 6777
- **Kwinana/Cockburn**: (08) 9411 2649

**Rail reserves**

Any person proposing work on, above, below or within any rail reserve must submit a written application to the appropriate rail authority.

- Brookfield Rail head office (08) 92122800 (see Appendix 3 (Brookfield Rail data) for emergency and local contact numbers).
- Public Transport Authority, Track Infrastructure Maintenance Manager, (08) 9326 2281
- The Pemberton Tram Company and The Hotham Valley, (08) 9776 1016
- Golden Mile Loop Line Tourist Railway, 0418 915 688, 0407 387 883 or 0400 196 997

For country areas contact the rail superintendent or inspector.

**References**

- Work Practice Manual:
  - Appendix 3 (Brookfield Rail data)
  - Appendix 9 - (Kwinana industrial strip emergency response procedure) (DM# 9356454)
- Brookfield Rail website: www.brookfieldrail.com
- Water Corporation key request (DM# 3479792)
9.2 Substation entry requirements

Purpose

This work practice outlines the requirements for all people who enter Western Power substations.

Scope

This work practice applies to Western Power substations (other than pad-mounted distribution substations) where access is controlled by System Management. The personnel covered by this instruction are:

- operational personnel
- non-operational personnel
- visitors

Training and authorisation

To enter a substation, the following requirements must be met.

<table>
<thead>
<tr>
<th>Type of worker</th>
<th>Authorisation requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Western Power construction site (non-substation)</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Operational Worker | • NAC; or  
                      • Exemption with Immediate supervision. |
| Non-Operational Worker or Visitor – as above or | • Outside danger zone – NAC; or direct supervision  
                                                     • Inside danger zone – NAC or immediate supervision |
| **Western Power substation (other than pad-mounted distribution substations)** |                           |
| Operational Worker | • NAC + substation entry; or  
                      • NAC + Immediate supervision; or  
                      • Exemption + Immediate supervision + site induction; |
| Non-Operational Worker and/or Visitor – as above or | • Outside danger zone plus 10 m allowance for inadvertent movement of any tools, equipment etc. – direct supervision + site induction  
                                                     • Inside danger zone plus 10 m allowance for inadvertent movement of any tools, equipment etc. – immediate supervision + site induction |
Note:

- All network access authorisation levels are stated in Appendix 4 (Network access levels) of the Electrical System Safety Rules (ESSR).
- Anyone who has a NAC must carry it with them at all times when in a substation.

Safety

- Clothing and personal protective equipment (PPE) appropriate to the task and location must be worn. For more on this, see section 3 (Personal protective equipment) in this manual.
- Risk assessments must include any hazards and controls that may arise from the presence of non-authorised persons.
- Permitting processes must be observed. Non-authorised persons required to be in the work area covered by the permit must have an exemption from Network Authorisations (e.g. a visiting overseas specialist from an external company that would make it impractical to complete the normal authorisation process).
- When planning to visit a Western Power substation, personnel must refer to Network Operations Bulletin: Extra Safety Precautions Prior to Entering CBD and Remote Controlled HV Substations (DM# 8355258).

Instructions

- Authorised staff entering a CBD or remote controlled high voltage (HV) substation, zone substation or terminal substation must check-in before entry and check-out on departure.
  - **Checking into a substation**
    - Smart phone: SMS the word ‘Check-in’ to 0417 631 629 to receive a link to the Check In – Check Out website. Click on the link and then select ‘CHECK-IN’. For the first login, save the link to favourites or bookmarks to easily access the site on future substation visits.
Note:
To use the smart phone check-in option, personnel must have a smart phone for which the mobile number:
• is listed under their name in Western Power's corporate directory in busbar
or
• has previously been used for a phone call check-in via the Western Power Contact Centre on 1300 884 149

— Phone call – call the Western Power Contact Centre on 1300 884 149 and register the check-in and estimated check-out time.

○ Checking out of a substation
— Smart phone – open the Check In – Check Out website and select ‘CHECK-OUT’.
— SMS – send the word ‘Yes’ to 0417 631 629.
— Phone call – call the Western Power Contact Centre on 1300 884 149 and register the check-out.

Note:
• The preferred Check In – Check Out method is via the smart phone.
• If the individual that checked in does not check-out by the estimated check-out time, an escalation process will take place. If attempts to contact the individual and the individual’s formal leader fail, local crews could be dispatched to physically search for the individual.

• If there are other work parties in the substation, the new arrival must notify the Recipient in charge (RIC) or site supervisor of their presence and business. For more on this, see work practice 2.28 (Job briefing process) in this manual.
• If operational work is being done it must be recorded in the substation logbook.

Kwinana Industrial Strip Emergency Response Procedure
All staff entering a controlled or uncontrolled site in, or working in the vicinity of, the Kwinana Industrial Strip must comply with the Kwinana Industrial Strip Emergency Response Procedure (DM# 1190718).
The procedure overview and map is also available in Appendix 9 (Kwinana industrial strip emergency response procedure) of this manual.

**References**

- **Work Practice Manual:**
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - Appendix 9 (Kwinana industrial strip emergency response procedure)
- **Electrical System Safety Rules, Appendix 4 (Network access levels)**
- **Kwinana Industrial Strip Emergency Response Procedure (DM# 1190718)**
9.3 Electrical Access Permit secondary isolation requirements

Purpose
The purpose of this field instruction is to outline the requirements for substation secondary isolations prior to issuing an Electrical Access Permit (EAP) for secondary isolations.

Scope
This instruction is applicable to Western Power personnel and contractors authorised to issue and receive EAPs to work on secondary systems.

Responsibilities

- It is the responsibility of Substation Construction Services to provide the initial isolations for work activities. Should subsequent isolations and additional barriers be required subject to the scope of work, it is the responsibility of the construction team leader to implement these controls following appropriate consultation with the work group and/or Substation Construction Services staff.

- The issuing officer is responsible for ensuring that the extent of the secondary isolation is in accordance with the requirements of the recipient in charge’s request for access. The issuing officer must instruct/demonstrate the points of isolation to the recipient in charge’s satisfaction prior to the acceptance of the Electrical Access Permit by the recipient in charge.

- Formal acceptance of the Electrical Access Permit by the recipient in charge transfers the responsibility of instruction from the issuing officer to the recipient in charge. Should the recipient in charge determine that the isolation does not meet requirements, the permit will not be accepted. Consult with the issuing officer to put in place acceptable control measures to meet isolation requirements.
• The recipient in charge is responsible for ensuring that the extent of the isolations meet their work requirements prior to formally accepting the conditions of the permit.

• The recipient must conduct whatever checks/tests are necessary to ensure that the permitted area of work meets their requirements and does not compromise safety.

• If the recipient is not satisfied with the conditions of the permit, consult with the recipient in charge so that steps may be taken to ensure conditions are acceptable.

Note:
• An isolation point must be identified by local means and detailed in the Secondary Isolation Schedule.
• Restoration of an isolation point requires a premeditated action that is not considered a routine action, e.g. turning on a switch. Some older equipment, e.g. MCB and switches, have been certified by inspection and testing to be allowable as an isolation point. However, the older equipment did not always provide a viewing window to observe the open state of the switch.

Instructions
• For work on secondary equipment, isolations must be made by certified secondary isolation officers. In the case that it is not achievable to isolate the entire panel, the equipment/wiring to be worked on within the panel must be isolated. All adjacent equipment/wiring remaining live must be securely barriered with approved devices as part of the isolations provided.

• In the event that live equipment, which constitutes a danger through inadvertent contact remains after barriers have been installed, approved insulated tools must be utilised and insulated rubber gloves with mechanical protective outer must be worn, refer to Field instruction 3.1 (Clothing and personal protective equipment requirements) and Field instruction 3.2 (Glove protection).
• All personnel involved must, using correct testing procedures, re-confirm the status of the apparatus. Other adjacent equipment/wiring identified as having the potential to compromise safety must be adequately barriered.

• Confirm status of electrical equipment prior to commencing task.

• Test equipment must be:
  • within calibration dates
  • in a serviceable condition
  • only used by personnel trained in correct use.

• All control measures that have been put in place must be recorded on the job risk assessment. In all circumstances, the hierarchy of controls and the relevant Safety LifeSavers must be adhered to.

• Isolations provided by Transmission Secondary Systems to construction teams must be listed on a Secondary Isolation Schedule.
10.1 Vegetation management near powerlines

Purpose
This work practice outlines how to perform vegetation management work near Western Power powerlines of all voltage levels.

Scope
This work practice includes minimum approach distances (MADs) for vegetation management work, based on the Code of Practice for Personnel Electrical Safety for Vegetation Control Work Near Live Powerlines (July 2012, amended January 2013). This Code of Practice deals with single and three phase bare conductors. It also includes covered conductors, insulated conductors, Aerial Bundle Cables (ABC), Hendrix, covered high voltage (HV) conductor with earthed metallic or non-metallic screens and return conductors. The MADs in this work practice apply to all types of conductors used by Western Power.

This work practice is specifically for:
- ground workers and tree climbers using plant and insulated/uninsulated tools and equipment
- vegetation management workers using insulated mobile plant, tools and equipment

Note:
The MADs for vegetation management in this section are equivalent to the safe approach distances described in the Code of Practice.

Training
Vegetation workers must have:
- a Network Authority Card (NAC). For more on this, see work practice 5.24 (Network Authority Card) in this manual.
- met the specific training requirements for the authorisation they hold as stated in the Code of Practice

Authorisations
The levels of authorisation for vegetation management workers as stated in the Code of Practice are listed below.
• Safety observer
• Low voltage (LV) vegetation management worker
• HV vegetation management worker

**Tree climber rescue**

Vegetation management workers who are required to climb trees must have a second person in attendance on the ground at all times who is capable of carrying out a tree rescue if necessary. This may be a person other than the safety observer. The national competency unit that must be successfully completed to carry out a tree rescue is: UETTDRVC34A – Undertake release and rescue from a tree near live electrical apparatus.

**Western Power permits**

Permits are required to do vegetation work in some situations. To work under a permit, a Recipient in Charge (RIC) must be onsite. Ensure that the work area Pick ID corresponds to the permit.

**Recipient in Charge (RIC)**

• An RIC is a person who has been assessed as being competent and has been authorised to receive permits.
• The RIC must be able to be contacted directly by Network Operations Control (NOC) for the duration of the work.
• The RIC must ensure that vegetation management workers understand and comply with all requirements of the permit.

**Vicinity Authority (VA)**

• A VA is required when vegetation is, or is likely to, enter the MAD as described in column D of Table 2 (MADs and vegetation clearances for vegetation management workers).
• The VA must be cancelled on completion of the work.
• Where MADs cannot be maintained, work must stop and alternative arrangements made, such as scheduling an Electrical Access Permit (see below).

**Electrical Access Permit (EAP)**

• When vegetation management work is required within the MAD, an EAP must be issued from Network Operations Centre (NOC).
- The vegetation management RIC must sign on to the EAP.

**General safety requirements**

When vegetation management work is being performed near live overhead lines, personnel must not carry out any other simultaneous activity that could compromise the safety of the work team.

**Personal protective equipment (PPE)**

For details on PPE, see the following work practices in this manual:
- work practice 2.17 (Chainsaw safety)
- section 3 (Personal protective equipment)

**Wearing metallic objects and associated hazards**

Loose metallic objects such as hanging jewellery and loose bracelets must not be worn while carrying out vegetation management work near live overhead lines. Similarly, long hair, long beards and loose non-conductive adornments must be securely fixed or confined close to the head or body.

**First aid kits**

A comprehensive first aid kit must be available at the worksite. It must be clearly identifiable, easily accessible and adequately stocked.

**Risk assessment**

- A risk assessment must be performed before commencing any vegetation work. Consider the site conditions, public and personnel safety, materials, mobile plant, permits, tools and equipment.
- Before starting each task, the construction type and voltage levels must be identified and assessed for the MADs and included in the risk assessment.
- Drop zone hazards must be assessed and indicated on the risk assessment before any work begins, as after the work has started the drop zone may be covered by vegetation, making the hazards more difficult to assess. Follow-up teams must be informed of the drop zone hazards.
- When establishing a drop zone, consideration must be given to the size of the drop zone, to account for the debris from vegetation cutting, which will fall in an uncontrolled manner. For more information on drop zones see work practice 2.3 (Height safety).
In addition to the above, control measures must be identified, monitored and reviewed for all hazards that cannot be removed or isolated.

**Note:**
For more information on hazard management, see the *Code of Practice for Personnel Electrical Safety for Vegetation Control Work Near Live Powerlines*.

**Worksite briefing**

After arriving at the worksite and before commencing the vegetation work a worksite briefing session must be completed to explain:

1. why the work is to be done
2. what is to be accomplished
3. how the work is to be done
4. where the work area limits are
5. who will carry out the designated tasks

The briefing must address factors which affect the safety of the work, workers, public and Western Power network, such as:

- safety observer
- team leader
- site co-ordinator
- voltage levels, MADs and vegetation clearances for the powerlines
- limits of the work area

For more information, see work practices 2.2 (Safety observer role) and 2.28 (Job briefing process) in this manual.

**Environmental**

The presence of any fauna in or near the work area must be assessed for its likely negative impact on the planned work. For example, bees, birds, reptiles, tree mammals and climbing animals all pose different kinds of hazards. The team must identify and put in place an effective control for these hazards.

**Note:**
For more information on environmental hazards, see section 11 (Environmental) and work practice 5.10 (Land access – private property) in this manual.
Weather conditions

Vegetation management work near live Western Power overhead powerlines is prohibited if the following weather conditions are present:

- electrical storms or lightning
- any significant rain (beyond intermittent spotting), mist or fog (unless using methods and equipment that is specifically designed and tested as being able to operate while wet)
- wind velocities that may cause conductors, elevated work platforms (EWPs) or vegetation to move unexpectedly and breach MADs
- wind velocity of 45 km/h or more. For more on this, see work practice 2.6 (Mobile elevated work platform (EWP) safety) in this manual.
- inadequate light

Note:

In the event of a storm, work must stop and only recommence after the storm has stopped and a risk assessment confirms that it is safe to return to work. For more on this, see work practice 2.12 (Electrical storms) in this manual.

Fire precautions

For information on fire safety, see work practice 2.16 (Fire precautions for field work) in this manual.

Notification of risks to Western Power's network assets

If, during the course of providing services, a vegetation worker becomes aware of any obvious faults or defects on any of Western Power's network assets, they must notify Western Power accordingly.

- For defects or faults which have the potential to cause death, injury, fire or the disruption of electrical supply, notify Western Power immediately on 13 13 51.
- For any other situation that has the potential to endanger or damage a Western Power network asset, but does not pose an immediate danger, notify NOC.

Safety observer

For details on safety observers, including their training requirements, see:

- work practice 2.2 (Safety observer role) in this manual
- Code of Practice for Personnel Electrical Safety for Vegetation Control Work Near Live Powerlines
Emergencies

Workers must stop working and move away to a safe area in the event of the following emergencies or incidents:

- vegetation being in contact with HV conductors
- conductors clashing or arcing
- broken and fallen conductors

The public must be kept a safe distance away, and the incident must be immediately communicated to NOC (see Appendix 4 (Emergency contact information) in this manual).

Prohibited work methods

The following work methods are prohibited:

- working from a ladder
- moving a HV or LV conductor to enable work to be carried out
- working before dawn or after dusk, unless it is deemed safe to do so after completing a risk assessment

Mobile plant (e.g. EWPs, cranes) – key safety points:

- EWPs must be insulated in order to be used for vegetation management work near powerlines.
- EWPs must have an insulation rating equal to, or greater than, the highest voltage of the energised network that is located in the vicinity of the vegetation to be cleared that is within the reach of the EWP.

Note:

Although the highest rated voltage for an insulated EWP is 132 kV, an EWP rated at 132 kV must be used for 220 and 330 kV powerlines; however, it must be considered to be an uninsulated EWP.

- As outlined in work practice 2.6 (Mobile elevated work platform (EWP) safety) and 2.19 (Crane use in substations and near powerlines) in this manual:
  - all EWP operators and safety observers must be trained and competent in the use of emergency retrieval systems relevant to the EWP
  - EWP’s, mobile plant and cranes must be earthed as stated in work practice 2.6 (Mobile elevated work platform (EWP) safety)
o all personnel must maintain the ground approach distance (GAD) at all times

**Testing**

Insulated mobile plant and specialised insulated plant working near powerlines must be tested every six months as specified in work practice 2.6 (Mobile elevated work platform (EWP) safety) in this manual.

**Note:**

EWPs that are constantly exposed to heavy work or a dirty environment must be tested more frequently.

**Maintenance**

Maintenance and testing of mobile plant, plant, tools and equipment must be carried out per the *Code of Practice for Personnel Electrical Safety for Vegetation Control Work Near Live Powerlines* (July 2012, amended January 2013).

**Testing intervals**

- Insulated sticks and equipment – not exceeding 6 months
- HV insulating line hoses, connectors, covers – not exceeding 6 months
- Insulated EWPs – not exceeding 6 months

The above testing intervals should be reduced for equipment with high usage or used in a dirty environment.

**Note:**

The above test intervals for insulated sticks and equipment only applies to tools continually used on vegetation work. These test intervals do not apply to insulated sticks used for HV live line work.

**Working clearances for vegetation workers**

MADs must be strictly followed to minimise risks when working with vegetation near powerlines. The distance between the vegetation and the powerline must also be taken into account. Personnel must maintain a no contact work method (i.e. there must be no intentional contact between an EWP or branches and live conductors).
Ground workers and ordinary persons

Table 1: MADs and vegetation clearances for ground workers and ordinary persons

<table>
<thead>
<tr>
<th>Nominal phase to phase ac voltage</th>
<th>Person, tools and equipment (mm)</th>
<th>Mobile plant (mm)</th>
<th>Cannot cut vegetation that is closer than (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated LV</td>
<td>3000</td>
<td>3000</td>
<td>500</td>
</tr>
<tr>
<td>Bare LV</td>
<td>3000</td>
<td>3000</td>
<td>1000</td>
</tr>
<tr>
<td>1–33 kV</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
</tr>
<tr>
<td>66–132 kV</td>
<td>6000</td>
<td>6000</td>
<td>3000</td>
</tr>
<tr>
<td>220 kV</td>
<td>6000</td>
<td>6000</td>
<td>6000</td>
</tr>
<tr>
<td>330 kV</td>
<td>6000</td>
<td>6000</td>
<td>6000</td>
</tr>
</tbody>
</table>

**Important**

Earth and neutral return wires must have the same MAD applied to them as the phase conductor voltage it is associated with for the method of vegetation management being used.

HV or LV vegetation management workers

Table 2 displays the MADs that must be maintained by vegetation management workers when carrying out vegetation management work, other than from an insulated EWP (climbing or from the ground).

If the risk assessment process determines that some vegetation may encroach the vegetation clearances listed in Table 2, column D, these trees must not be climbed. An alternative method must be used to carry out the work.

Vegetation management workers must:

- maintain MADs in all directions when working in the tree
- be attached to the tree at all times by means of approved climbing equipment
- maintain a balanced position so they cannot fall or swing into any powerlines
- have a safety observer in attendance at all times
- have someone who is trained and capable in tree rescue on the ground at all times when a climber is working
Table 2: MADs and vegetation clearances for vegetation management workers

<table>
<thead>
<tr>
<th>Nominal phase to phase ac voltage</th>
<th>Vegetation management worker/climber (mm) (A)</th>
<th>Insulated tool (mm) (B)</th>
<th>Uninsulated tool (mm) (C)</th>
<th>Vegetation clearances below and beside the overhead line (mm) (D)</th>
<th>Vegetation overhanging the overhead line (mm) (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated LV</td>
<td>200</td>
<td>Physical clearance</td>
<td>200</td>
<td>No clearance</td>
<td>No clearance</td>
</tr>
<tr>
<td>Bare LV</td>
<td>1000</td>
<td>200</td>
<td>1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6,600 V</td>
<td>1200</td>
<td>700</td>
<td>1200</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>11 kV</td>
<td>1200</td>
<td>700</td>
<td>1200</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>22 kV</td>
<td>1200</td>
<td>700</td>
<td>1200</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>33 kV</td>
<td>1200</td>
<td>700</td>
<td>1200</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>66 kV</td>
<td>1400</td>
<td>1000</td>
<td>1400</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>132 kV</td>
<td>1800</td>
<td>1200</td>
<td>1800</td>
<td>1800</td>
<td></td>
</tr>
<tr>
<td>220 kV</td>
<td>3000</td>
<td>3000*</td>
<td>3000</td>
<td>3000</td>
<td></td>
</tr>
<tr>
<td>330 kV</td>
<td>4000</td>
<td>4000*</td>
<td>4000</td>
<td>4000</td>
<td></td>
</tr>
</tbody>
</table>

* No tool or EWP is classified as insulated at 220 kV and 330 kV.

**Important**

Earth and neutral return wires must have the same MAD applied to them as the phase conductor voltage it is associated with for the method of vegetation management being used.

**Note:**

Where the MAD to powerlines cannot be maintained, an alternative work method must be considered (e.g. under a permit – either VA or an EAP).
Figure 1: MADs and vegetation clearances for Vegetation Management workers (see Table 2 above)

Vegetation management workers – using insulated mobile plant and tools and equipment

- Take special note of stay wires that may be a hazard when moving the mobile plant onsite or cutting branches.
- Before starting vegetation work, visually inspect the work area and conductors for hazards, e.g. loose wires, hanging wires, burn marks, presence of LV spreaders between conductors, loose conductors sagging at different heights.
- For work to be carried out on vegetation that is above a HV powerline, a risk assessment must be carried out, to determine if it is safe to proceed with the work.
  - If it is safe, and the MADs in Table 3 (column E) can be maintained, the work must be done under a VA.
  - If it is not safe, or the MADs in Table 3 (column E) cannot be maintained, the work must be reported as a fault by calling 13 13 51.
- Where feathering techniques are to be used, ensure falling vegetation is of a size that cannot bridge the conductors.
- Work can only be carried out using insulated mobile plant, insulated tools and equipment as detailed in Section 6.5.4 of the Code of Practice.

Table 3: MADs and vegetation clearances – working from EWP (see Note below)

<table>
<thead>
<tr>
<th>Nominal phase to phase ac voltage</th>
<th>Insulated mobile plant only (mm) (A)</th>
<th>Vegetation management worker (mm) (B)</th>
<th>Insulated mobile plant with... (C)</th>
<th>Vegetation below and beside overhead line (mm) (D)</th>
<th>Vegetation overhanging the overhead line must be with a VA (mm) (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated LV</td>
<td>Physical Clearance 200</td>
<td>200</td>
<td>No clearance</td>
<td>No clearance</td>
<td>No clearance</td>
</tr>
<tr>
<td>Bare LV</td>
<td>Physical clearance 700</td>
<td>1000</td>
<td>Physical clearance</td>
<td>No clearance</td>
<td>No clearance</td>
</tr>
<tr>
<td>6,600 V</td>
<td>700</td>
<td>1000</td>
<td>1200</td>
<td>300</td>
<td>100 700</td>
</tr>
<tr>
<td>11 kV</td>
<td>700</td>
<td>1000</td>
<td>1200</td>
<td>300</td>
<td>100 700</td>
</tr>
<tr>
<td>22 kV</td>
<td>700</td>
<td>1000</td>
<td>1200</td>
<td>350</td>
<td>150 700</td>
</tr>
<tr>
<td>33 kV</td>
<td>700</td>
<td>1000</td>
<td>1200</td>
<td>400</td>
<td>200 700</td>
</tr>
<tr>
<td>66 kV</td>
<td>1000</td>
<td>1200</td>
<td>1400</td>
<td>600</td>
<td>400 1000</td>
</tr>
<tr>
<td>132 kV</td>
<td>1200</td>
<td>1400</td>
<td>1800</td>
<td>800</td>
<td>800 1200</td>
</tr>
<tr>
<td>220 kV</td>
<td>3000*</td>
<td>3000</td>
<td>3000</td>
<td>3000*</td>
<td>3000 Not permitted</td>
</tr>
<tr>
<td>330 kV</td>
<td>4000*</td>
<td>4000</td>
<td>4000</td>
<td>4000*</td>
<td>4000 Not permitted</td>
</tr>
</tbody>
</table>

* No tools or EWP are classified as insulated at 220 and 330 kV

**Important**

Earth and neutral return wires must have the same MAD applied to them as the phase conductor voltage it is associated with for the method of vegetation management being used.
Note:

- Overhanging vegetation must be cut under a VA.
- Where the vegetation clearance to powerlines in Table 2 column D cannot be maintained, an alternative work method must be considered (for example under a permit either VA or an EAP). This applies to the MAD clearances in Table 3 column D.
- Uninsulated tools are not permitted to cut overhanging vegetation.
- Table 3 is equivalent to Table 5 in the Code of Practice.

Figure 2: MADs when using insulated mobile plant (e.g. EWP)
(see Table 3 above)
References

- **Work Practice Manual:**
  - work practice 2.2 (Safety observer role)
  - work practice 2.3 (Height safety)
  - work practice 2.6 (Mobile elevated work platform (EWP) safety)
  - work practice 2.11 (HV insulated tools and equipment)
  - work practice 2.12 (Electrical storms)
  - work practice 2.16 (Fire precautions for field work)
  - work practice 2.17 (Chainsaw safety)
  - work practice 2.19 (Crane use in substations and near powerlines)
  - work practice 2.28 (Job briefing process)
  - section 3 (Personal protective equipment)
  - work practice 5.10 (Land access – private property)
  - work practice 5.24 (Network Authority Card (NAC))
  - section 11 (Environmental)
  - appendix 4 (Emergency contact information)

- **High Voltage Live Work Practice Manual, work practice 5.1 (Equipment maintenance)***

10.2 Specialised insulated plant for vegetation management

Purpose

This work practice outlines how vegetation management work is performed by operators of specialised insulated plant near Western Power powerlines of all voltage levels.

Scope

This work practice is designed to protect vegetation management workers who use specialised insulated plant from receiving electric shocks due to step-and-touch potentials and short-circuits. This is achieved by specifying the MADs and minimum requirements when working near powerlines up to 132 kV.

Note:

‘Specialised insulated mobile plant’ means a mechanical tree trimming machine operated from a cab or from remote controls at ground level.

Training

In order to operate specialised insulated plant, personnel must:

• have a Network Authority Card (NAC). For more on this, see work practice 5.24 (Network Authority Card) in this manual.

• be trained as a high voltage (HV) vegetation management worker, as defined by the Code of Practice for Personnel Electrical Safety for Vegetation Control Work Near Live Powerlines (July 2012)

• have successfully completed the national competency unit AHCMOM305A – Operate specialised machinery and equipment

• be assessed as a competent operator

Competent operator

• An operator that has not been recognised by Western Power as competent must be considered as a trainee and must work to clearances outside the MADs until assessed as a competent operator.
To be considered a competent operator on specialised insulated mobile plant, personnel must:

- have completed 150 hours of on-the-job training while being supervised by an experienced and qualified competent operator

**Note:**
- The hours must be logged and signed by the supervisor.
- The competent operator must be experienced working on relevant voltage levels, wind conditions, structure configuration, bay lengths and conductor spacing.

- possess written documentation that an independent on-the-job assessment has been conducted, by an approved registered training organisation (RTO), as a competent operator on the specialised insulated plant
- have an updated NAC from Western Power which shows the competency authorisation

Once an operator is assessed as competent, they are allowed to work to the MADs.

**Western Power permits**

- Permits are required to do vegetation work in some situations. To work under a permit, a Recipient in Charge (RIC) must be onsite.
- Ensure that the work area Pick ID corresponds to the permit.
- The permit must be kept onsite in the support vehicle or specialised insulated plant for the duration of the work.

**Recipient in Charge (RIC)**

- An RIC is a person who has been assessed as being competent and has been authorised to receive permits.
- The RIC must be able to be contacted directly by the Network Operations Centre (NOC) for the duration of the work.
- The RIC must ensure that vegetation management workers understand and comply with all requirements of the permit.
Vicinity Authority (VA)

- A VA is required when vegetation is, or is likely to be, within the vegetation clearances as described in Table 1 (VA requirements for insulated plant). This is a Western Power requirement, and is acknowledged to exceed the requirements described in the Code of Practice, section 6.6.
- The VA must be cancelled on completion of the work.
- Where MADs cannot be maintained, work must stop and alternative arrangements made, such as scheduling an Electrical Access Permit (see below).

Electrical Access Permit (EAP)

When vegetation management work is required within the MAD, an EAP must be issued from Network Operations Control (NOC). See Table 2 below for MADs.

The vegetation management RIC must sign on to the EAP.

General safety requirements

See General safety requirements in work practice 10.1 (Vegetation management near powerlines) in this manual.

Note:

The operator and observer must wear level 1 protective equipment as described in section 3 (Personal protective equipment) in this manual.

Specialised insulated plant key safety points

Work practice 2.6 (Mobile elevated work platform (EWP) safety) in this manual covers many points that are relevant to specialised insulated plant.

- Specialised insulated mobile plant must only be used on voltages equal to or less than the boom insulation rating indicated on the test certificate.
- The specialised insulated plant must be earthed.
- All personnel must maintain the ground approach distance (GAD) at all times when the specialised insulated plant is in operation. See Table 1 in work practice 2.6 (Mobile elevated work platform (EWP) safety) in this manual.
- The operator and safety observer must be trained and competent in the use of the relevant emergency retrieval systems.
Safety observer

In addition to the requirements described in work practice 2.2 (Safety observer role) in this manual, safety observers must:

- maintain effective communication with the specialised insulated plant operator at all times
- observe the operator’s blind spots at all times
- be able to observe the drop zone at all times
- prevent access to the drop zone unless access to the zone is prevented by some other method (e.g. a fence, wall or other effective barrier)

Testing

- Specialised insulated mobile plant must:
  - be electrically tested every six months
  - display a current electrical test sticker or carry an electrical test certificate

If the plant does not meet these requirements, it must not be used and is considered to be uninsulated.

- The mobile plant must be withdrawn from the worksite if the boom has been subjected to abnormal mechanical or electrical stresses. Before it can be returned to service, the mobile plant must:
  - be mechanically and structurally inspected
  - be repaired
  - pass a new electrical test

Instructions

Preparation prior to vegetation management work

- The boom must be cleaned before use according to the manufacturer’s specifications.
- Consider stay wires that may be a hazard when moving the plant onsite or cutting branches.
- Before starting vegetation work, visually inspect the work area and conductors for hazards, e.g. loose wires, hanging wires, burn marks, presence of LV spreaders between conductors, loose conductors sagging at different heights.
Working clearances for specialised insulated plant

In order to minimise the risks of working with vegetation near powerlines, MADs must be strictly followed. In addition, the distance between the vegetation and the powerline must also be taken into account.

- Maintain a ‘no contact’ work method, i.e. no intentional contact between the specialised insulated plant or branches and the live conductors. Any contact must be avoided at all times.

- Specialised insulated plant must be operated outside the MADs specified in Table 2 (MADs and vegetation clearance – specialised insulated plant) below.

**Table 1: VA requirements for insulated plant**

<table>
<thead>
<tr>
<th>Nominal phase to phase ac voltage</th>
<th>Vegetation within these clearances requires a VA (Vegetation that is below and beside the powerline) (mm) (A)</th>
<th>Vegetation requires a VA (Vegetation that is overhanging the powerline) (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV</td>
<td>No VA required</td>
<td>No VA required</td>
</tr>
<tr>
<td>1–33 kV</td>
<td>700</td>
<td>Mandatory</td>
</tr>
<tr>
<td>66 kV</td>
<td>3000</td>
<td>Mandatory</td>
</tr>
<tr>
<td>132 kV*</td>
<td>3000</td>
<td>Mandatory</td>
</tr>
</tbody>
</table>

* Obtain permission from NOC before planning 132 kV work

**Important**

Earth and neutral return wires must have the same VA applied to them as the phase conductor voltage it is associated.
Table 2: MADs and vegetation clearances for specialised insulated plant

<table>
<thead>
<tr>
<th>Nominal phase to phase ac voltage</th>
<th>Specialised insulated mobile plant MADs (mm) (A)</th>
<th>Vegetation below and beside the overhead line (mm) (B)</th>
<th>Vegetation overhanging the overhead line (mm) (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV</td>
<td>Physical clearance</td>
<td>Physical clearance</td>
<td>Physical clearance</td>
</tr>
<tr>
<td>1–33 kV</td>
<td>700</td>
<td>200</td>
<td>700</td>
</tr>
<tr>
<td>66 kV</td>
<td>1000</td>
<td>400</td>
<td>1000</td>
</tr>
<tr>
<td>132 kV*</td>
<td>1200</td>
<td>800</td>
<td>1200</td>
</tr>
<tr>
<td>220–330 kV</td>
<td>Not permitted</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Obtain permission from NOC before planning 132 kV work.

**Important**

Earth and neutral return wires must have the same MAD applied to them as the phase conductor voltage it is associated.

**Note:**

Specialised insulated plant can only be used on voltages up to and including 132 kV.

**Work methods**

- The boom must be parked at least twice the MAD distance from the line if the operator needs to leave the machine.
- The operator’s cab door must be closed when the boom is being moved or the cutting tool is in motion to protect the operator from falling vegetation and machine malfunctions.
- The specialised insulated plant must not be:
  - moved while the boom is elevated between conductors of the powerline
  - operated during the hours between sunset and sunrise
- When the cutting tool is rotating, it is not permitted to be closer to a live conductor than the distances stated in Table 2, column A, above.
• Specialised insulated mobile plant is permitted to cut beside, below, above or between live conductors.

• When cutting vegetation that is overhanging the powerline:
  o a VA is always required
  o conduct a risk assessment to ensure that the length of cuttings will be short enough so that they will not make contact with multiple conductors (i.e. short out). To achieve this, cut in lengths that are no longer than 200 mm.
  o the boom may only be extended through conductors to cut vegetation where:
    – the conductor separation is greater than 1200 mm in any direction
    – MADs are maintained by the boom and cutting tool, as indicated in Table 2, column A, above

• The cutting tool must be completely stationary and in a vertical position before passing between powerlines.

• Working through LV and HV at the same time is prohibited.

• Vegetation hanging on conductors may be removed using the machine, but only when:
  o the operator and safety observer agree that it is safe
  o the cutting tool is stationary

• All work must be suspended if:
  o wind causes vegetation to fall unpredictably and possibly collide with the conductors or apparatus
  o the boom movements cannot be controlled and are greater than 300 mm in any direction
  o there is an electrical storm, rain, mist, fog, snow or sleet
  o the wind speed is above 40 km/h (This is lower than the maximum wind speed for EWP’s.)
  o there are low light conditions
Unplanned events

- Any uncontrolled contact between vegetation, boom or cutting tool with live conductors must be immediately reported to:
  - NOC (include the time and location of contact) because a feeder may have tripped and/or conductor damage may have occurred
  - the Incident Hotline on 1300 CALL WP (1300 2255 97)
  - your formal leader
- If the specialised insulated plant becomes inoperable when in an extended position between, or through, conductors, the operator should initiate the plant’s recovery procedure. If this is not possible, the operator must:
  - shut the mobile plant off, leaving the boom as it is
  - remain in the operator’s cabin of the plant until the boom is moved outside of the MAD or the line has been declared safe by NOC
  - not attempt to make any unauthorised repairs to the plant
  - keep all persons at least three metres away from the plant

  **Note:**
  The RIC must inform the issuing officer of the situation.

- Cutting must be stopped immediately if a person or animal enters the work, cutting or drop zones. Work may only recommence when they have been removed.
- If a conductor has been damaged, all work must be stopped. All persons in the vicinity of the worksite must remain at least three metres away from any damaged conductor. NOC must be informed immediately of the situation and advised of the location and time of occurrence.

Cuttings

- Cuttings must not be left in a place that could cause a hazardous condition for the general public or other workers.
- Cuttings must be removed as the work progresses.
- Cuttings must not be allowed to accumulate on other branches as they could fall or be heavy enough to break a tree or branch.
References

- Work Practice Manual:
  - work practice 2.2 (Safety observer role)
  - work practice 2.6 (Mobile elevated work platform (EWP) safety)
  - section 3 (Clothing and personal protective equipment requirements)
  - work practice 10.1 (Vegetation management near powerlines)

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10.3 Tree felling

Purpose

This work practice outlines how to perform tree felling near Western Power powerlines of all voltage levels.

Training

Vegetation management workers who fell trees must:

- have a Network Authority Card (NAC) issued by Western Power
- be trained as a high voltage (HV) or low voltage (LV) vegetation management worker (relevant to the job), as defined by the Code of Practice for Personnel Electrical Safety for Vegetation Control Work Near Live Powerlines (July 2012, amended January 2013)
- have completed the national competency unit, AHCARB304A – Fell trees with advanced techniques

Safety

For information on:

- Western Power permits, see work practice 10.1 (Vegetation management near powerlines) in this manual
- general safety requirements, see work practice 10.1 (Vegetation management near powerlines) in this manual

Note:

The risk assessment for tree felling must include:

- working clearances from powerlines
- stay wires
- traffic management
- personnel and public safety
- mobile plant, tools and equipment safety
- suitable weather and ground conditions
- tree area fall zone
- terrain conditions
• working clearances for vegetation management, see work practices:
  o 10.1 (Vegetation management near powerlines)
  o 10.2 (Specialised insulated plant for vegetation management)

Instructions

The height of a tree and its potential to encroach the MADs (as listed in Table 2 (MADs and vegetation clearances for vegetation management workers) in work practice 10.1 (Vegetation management near powerlines)) will determine which of the following methods to use. If the tree is:

• not as tall as the lowest conductor and is:
  o outside the MADs – the tree may be felled in a controlled manner according to the risk assessment
  o inside the MADs:
    – a VA must be issued
    – the tree may be felled in a controlled manner according to the risk assessment

• equal to, or taller than, the lowest conductor and the tree has the potential to encroach the MADs, the following methods apply:

Preferred method

• Use elevated work platform (EWP), specialised insulated plant or climbing techniques to fell the tree in a controlled manner by reducing the tree height in sections until it is below the lowest conductor.

• The technique used is dependent on whether the tree is inside the MADs listed in Table 2 (MADs and vegetation clearances for vegetation management workers) in work practice 10.1 (Vegetation management near powerlines). If the tree is:
  o outside the MADs:
    – may be performed by EWP, specialised insulated plant or climbing techniques
    – the sections must not be longer than 1,000 mm in length
  o inside the MADs:
    – may only be performed by EWP or specialised insulated plant
    – a VA must be issued
the sections must not be longer than 200 mm in length

**Alternative method**

Where circumstances prevent the tree height from being reduced to below the lowest conductor, the tree may be felled from the ground according to the following method.

- The risk assessment must be updated, outlining why the EWP, specialised insulated plant or climber options cannot be used.
- Mechanical restraints (i.e. suitably rated ropes or cables) must be used to maintain control over the tree so that the direction of fall is away from the powerline.

**References**

- Work Practice Manual, work practices:
  - 10.1 (Vegetation management near powerlines)
  - 10.2 (Specialised insulated plant for vegetation management)
10.4 Line workers doing vegetation management work

Purpose

This work practice outlines how limited vegetation management work is performed by fully trained Cert. III line workers and high voltage (HV) live line workers near Western Power powerlines of all voltage levels.

Scope

This work practice is specifically for Cert. III and HV live line qualified line workers (or equivalent) doing vegetation management work.

Training

This work practice may only be used by personnel who have:

- a Network Authority Card (NAC)

and

- one of the following qualifications:
  - Cert. III line worker (or equivalent)
  - HV live line worker (or equivalent). For more on this, see High Voltage Live Work Manual, section 3 (Selection, authorisation and competency).

and

- completed the national competency unit, AHCARB205A – Operate and maintain chainsaws

Note:

Cert. III and HV live line workers are not trained as full vegetation management workers. This means that their role in cutting and removing vegetation should be kept to short duration work to assist in other tasks, such as:

- gaining access to a pole or equipment
- raising conductors from the ground
- removing vegetation from inside the MAD, to allow vegetation management workers to carry on cutting vegetation safely
Safety

- Carry out all work from an insulated EWP.
- Carry out all work using insulated live line sticks.
- A safety observer must be appointed when line workers are doing vegetation management work on or near live conductors. For more on this, see work practice 2.2 (Safety observer role) in this manual.

Instructions

See the corresponding sections in work practice 10.1 (Vegetation management near powerlines) in this manual for:

- Western Power permits
- general safety requirements

Cert. III line workers

Cert. III line workers performing vegetation management work must comply with the MADs shown in Table 1, below.

HV live line workers

- HV live line stick work is a specialised work technique used by trained line workers for working on live uninsulated HV conductors.

Note:

Personnel with the Limited Live Line Work authorisation can carry out limited vegetation management work on HV live lines according to their training.

- HV live line workers carrying out vegetation management work using live line stick work procedures are authorised to cut vegetation within the vegetation MAD distances shown in Table 1, below.
- The minimum number of workers required for vegetation management work is three when using live line stick methods:
  - two doing the live line vegetation work
  - one as safety observer
- HV live line workers **are** permitted to use work techniques (such as moving live HV conductors or vegetation to obtain the necessary vegetation clearances) that are prohibited to other vegetation management workers.
Note:
HV live line workers are permitted to move an LV or HV conductor to enable vegetation work to be carried out.

- When cutting vegetation, a physical clearance must be maintained at all times between the vegetation and the HV conductor.

Table 1: MADs and vegetation clearances – for Cert. III and HV live line workers doing vegetation management from EWP

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Insulated EWP (mm) (A)</th>
<th>Authorised Person (mm) (B)</th>
<th>Insulated Tool (mm) (C)</th>
<th>Vegetation below and beside overhead line* (mm) (D)</th>
<th>Vegetation Overhanging the overhead line (mm) (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulated LV</td>
<td>Physical clearance</td>
<td>Physical clearance</td>
<td>No clearance</td>
<td>No clearance</td>
<td>No clearance</td>
</tr>
<tr>
<td>Bare LV</td>
<td>Physical clearance</td>
<td>Physical clearance</td>
<td>Physical clearance</td>
<td>No clearance</td>
<td>No clearance</td>
</tr>
<tr>
<td>6,600 V</td>
<td>700</td>
<td>700</td>
<td>300</td>
<td>100</td>
<td>400</td>
</tr>
<tr>
<td>11 kV</td>
<td>700</td>
<td>700</td>
<td>300</td>
<td>100</td>
<td>400</td>
</tr>
<tr>
<td>22 kV</td>
<td>700</td>
<td>700</td>
<td>350</td>
<td>150</td>
<td>400</td>
</tr>
<tr>
<td>33 kV</td>
<td>700</td>
<td>1000</td>
<td>400</td>
<td>200</td>
<td>700</td>
</tr>
<tr>
<td>66 kV</td>
<td>1,000</td>
<td>1,200</td>
<td>600</td>
<td>400</td>
<td>1,000</td>
</tr>
<tr>
<td>132 kV</td>
<td>1,200</td>
<td>1,400</td>
<td>800</td>
<td>800</td>
<td>1,200</td>
</tr>
<tr>
<td>220 kV</td>
<td>3,000*</td>
<td>3,000*</td>
<td>3,000*</td>
<td>3,000</td>
<td>Not permitted</td>
</tr>
<tr>
<td>330 kV</td>
<td>4,000*</td>
<td>4,000*</td>
<td>4,000*</td>
<td>4,000</td>
<td>Not permitted</td>
</tr>
</tbody>
</table>

* No tool or EWP is classified as insulated at 220 and 330 kV.

Important

Earth and neutral return wires must have the same MAD applied to them as the voltage it is associated with for the method of vegetation management being used.
Figure 1: MADs when using insulated mobile plant (e.g. EWP) (see Table 1 above)
References

- Work Practice Manual, work practice 10.1 (Vegetation management near powerlines)
- High Voltage Live Work Manual, section 3 (Selection, authorisation and competency)
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10.5 This section has been left blank intentionally

For details on line workers doing vegetation management work, see field instruction 10.4 (Line workers doing vegetation management work) in this manual.
11.1 Leaking oil-filled electrical equipment

Purpose
This instruction outlines the minimum requirements for the removal of oil-filled electrical equipment, which includes but is not limited to, transformers, capacitors, pitch boxes and reclosers.
The instruction details leak treatment, handling, transportation, storage and disposal of oil-filled electrical equipment.

Scope
This instruction covers all Western Power personnel and contractors who handle, transport and store oil-filled electrical equipment.

Responsibilities
- It is the responsibility of the formal leader to ensure this instruction is read and understood by those persons that this instruction impacts.
- It is the responsibility of the onsite person in charge to ensure this instruction is complied with.
- It is the responsibility of all personnel who are required to handle, store and transport transformers to comply with this instruction.

Instructions

Personal protective equipment
- All personnel who are required to handle, transport and store oil-filled equipment that are leaking must wear the following personal protective equipment; as per Field instruction 3.1 (Clothing and personal protective equipment requirements) Level 0 requirements, and additional:
  - nitrile or PVC gloves.

Identifying PCB oil-filled electrical equipment
- Oil-filled electrical equipment dated pre-1980 or if the age is unknown shall be treated as suspected of containing PCBs. A ‘Contains suspected PCB’ sticker (sticker code: 18831391) shall be attached to oil-filled equipment when removed from service.
Repair of leaking oil-filled electrical equipment

- Leaking oil-filled electrical equipment must be repaired prior to transportation.
- The following steps shall be undertaken when repairing a oil-filled electrical equipment:
  - The leaking area shall be thoroughly cleaned and wiped dry using a cleaning wipe (stock code: GZ0100) prior to applying a sealing compound (‘PowerPatch’).
  - Using the patch repair epoxy kit (available from ADAPT Australia) the two parts shall be mixed and applied to the prepared surface.
  - The entire exterior surface of the oil-filled electrical equipment shall be cleaned to ensure it is free of any oil residue.
- The repaired oil-filled electrical equipment shall be placed on a spill tray (if available) or wrapped in heavy duty plastic.
- In circumstances where leaking oil-filled electrical equipment can not be fully repaired, it must be repaired as far as practicable and immediately transported on an empty spill tray to the nearest depot.

Note:
Refer to “Spill response” field instruction 11.7 "Oil and chemical spills” within this manual for guidance on how to respond to spills.
The draining of oil from oil-filled electrical equipment must not occur.
Transporting oil-filled electrical equipment

Note:
Refer to field instructions 5.6 (Transformers – handling and transport) and 5.7 (Transformer – return and refurbishment) in this manual.

In addition to the above instructions the following steps shall be undertaken:

- Oil-filled electrical equipment shall be placed on rubber mats and tied down during transportation. Repaired leaking oil-filled equipment shall also be placed on a spill tray – stock codes: OC0202 (1 m x 0.9 m); OC0203 (1.2 m x 1.3 m).

- In areas where spill trays are not available, the leak repaired oil-filled transformer shall be wrapped in heavy duty plastic, placed on rubber mats and tied down during transportation.

- Any unsuccessfully repaired oil-filled electrical equipment must be wrapped in heavy duty plastic and transported to the nearest depot on an empty spill tray. A licensed controlled waste carrier (Hansen Environmental Services 9470 9792 or Toxfree on 1300 869 373) shall be contacted by the person responsible for the delivery of the equipment as soon as possible to arrange the oil to be drained.

Storage of leak repaired oil-filled electrical equipment at depots

- Leak repaired oil-filled electrical equipment shall be stored on spill trays on a sealed surface under cover.

- In the event of a spill tray not being available and as temporary measure, the leak repaired oil-filled electrical equipment shall be placed on heavy duty plastic topped with absorbent material and stored on a sealed surface under cover. Facilities Management shall be contacted to ensure a spill tray is arranged for the transformer.

- PCB free and suspect PCB oil-filled equipment shall be clearly identifiable and labelled with ‘PCB free’ (sticker code: 18831369) and ‘Contains suspected PCB’ sticker (sticker code: 18831391), respectively.

- PCB free and suspect PCB oil-filled equipment shall be stored separately on a sealed surface under cover.
Disposal of oil-filled electrical equipment

- The store person is required to contact Supply Chain and complete a Reverse Logistics Transport Request Form to arrange disposal or refurbishment of oil-filled electrical equipment.

References

- Western Power policy for return and refurbishment of distribution transformers
- Material Safety Data Sheet for transformer oil
- Material Safety Data Sheet for Polychlorinated Biphenyls (PCBs)
- Western Power Incident Reporting Procedure
- 'Contains suspected PCB' sticker (sticker code: 18831391)

- 'PCB free' sticker (sticker code: 18831389)
11.2 Environmentally sensitive areas

Purpose

This instruction outlines the minimum requirements for any work undertaken in or near an environmentally sensitive area.

Scope

All Western Power personnel, Alliance Participants, contractors and subcontractors who are required to work in environmentally sensitive areas are responsible for complying with this work instruction.

Overview

The Western Power environmentally sensitive area program ensures employees and contractors are informed of areas that require special considerations or precautions to be taken prior to and during work at Western Power worksites, facilities or adjacent land and indicated by the red polygons in Western Power’s GIS systems.

Environmentally sensitive areas are clearly defined by the placement of reflective green signs and strips on poles and gates in or near those areas.

Environmentally sensitive areas include those containing:

- Rare fauna habitats.
- Declared rare and priority listed flora.
- Threatened ecological community.
- Declared weeds.
- Certified organic farms.
- Parks and conservation covenants.
Pre-planning

- If the work is to be carried out in an environmentally sensitive area and the site specific procedures have not been provided, contact Western Power's Environment Section to request procedures and provide:
  - details of the type of work.
  - the location of the work
  - the site-specific environmentally sensitive area number.
- If the procedures require consultation with the Department of Environment and Conservation, notify them as soon as possible to prevent work delays.
- For further information, contact Western Power’s Environment Section, environment@westernpower.com.au or 0419 987 954.

Note:
Written site-specific environmentally sensitive area procedures must be obtained prior to any work commencing in or near an environmentally sensitive area.

Entering and leaving environmentally sensitive areas

When entering an environmentally sensitive area

- Follow instructions issued by the Environment Section and the Department of Environmental and Conservation (when provided)
- Comply with all requirements for clean vehicles, equipment and footwear.
- Minimise disturbance of native vegetation.
- Minimise disturbance and movement of vegetation and soil.
- Avoid using any chemicals.
- If replacing a pole with an environmentally sensitive area sign attached, remove the sign and place on the new pole.
When leaving an environmentally sensitive area

- Follow instructions issued by the Environment Section and, when provided, the Department of Environment and Conservation.
- If the environmentally sensitive area contains declared weeds or dieback, clean down vehicles, equipment and footwear so that all soil and vegetation is removed.

Unplanned construction and maintenance

- When conducting unplanned construction or maintenance activities in an environmentally sensitive area, where possible:
  - Contact the Environment Section, 0419 987 954 or environment@westernpower.com.au, and request assistance.
  - Arrive with clean vehicles, equipment and footwear.
  - Minimise disturbance of native vegetation.
  - Minimise disturbance and movement of soil.
  - Avoid using any chemicals.
  - If replacing a pole with an environmentally sensitive area sign attached, remove the sign and place on the new pole.

Note:
Notify Western Power's Environment Section, 0419 987 954 or environment@westernpower.com.au, as soon as possible once the unplanned maintenance is completed and provide details of the work.

Incidents

- If a notifiable environmental incident occurs during work in or near an environmentally sensitive area, contact the Incident Hotline on 1300 225 597 (1300 CALL WP) within 60 minutes of the incident occurring.
- Notifiable environmental incidents include any incident which, as a consequence of Western Power's work, causes damage or has the potential to cause damage to the environment (e.g. oil spills, impact on rare plants).
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### 11.3 Dewatering

#### Purpose

This instruction provides guidance on groundwater extraction and discharge of water for dewatering purposes. It provides considerations for planning work and sets minimum requirements when dewatering for construction, including excavation work.

#### Responsibilities

Anyone who requests a dewatering service, or is involved with dewatering, must comply with this instruction.

#### Instructions

**Pre-construction check list**

A desktop assessment must be completed before starting a project to determine if dewatering is required. The desktop assessment must consider:

- presence of acid sulfate soils or a contaminated site
- identification of any Aboriginal heritage issues
- identification of Public Drinking Water Source Areas
- impact of water discharged on native vegetation

If assistance is needed with any of the above, contact the Environment, Community and Approvals branch for advice:

- environment@westernpower.com.au
- 9326 6294

**Note:**

A dewatering management plan is required where a project presents a risk to the environment and/or public safety. Contact the Environment, Community and Approvals branch if advice is required.

In addition to a desktop assessment, the following must be considered:

- project specific requirements (e.g. dewatering management plan, condition of a licence or approval)
discharge option and approval (see Dewatering discharge options, below)
inform local residents, landowners or businesses likely to be affected during dewatering

Groundwater extraction
Western Power is exempt from requiring a license to extract groundwater (including for dewatering purposes). However, groundwater extraction:
- must be kept to a minimum (time, extraction rate and total volume)
- is not permitted within river banks

Dewatering discharge options
Before discharging water:
- obtain approval from regulatory agencies, water treatment facility or landowner
- where possible, assess groundwater quality (groundwater sample taken and analysed at a laboratory) to ensure appropriate controls are in place

There are three recommended options for discharge (described in further detail below):
- onsite infiltration (preferred option)
- discharge into drains
- offsite disposal

Onsite infiltration (preferred option)
Onsite infiltration is discharging in the vicinity of the work area where the water can infiltrate in the surrounding soil after treatment and monitoring.

When planning for onsite infiltration, the following must be considered:
- approval from the property owner
- infiltration rates will be sufficient to avoid flooding
- site contours (if slope is present onsite, ensure controls are in place, e.g. build a bund or barrier)
- sediment controls are in place (e.g. geotextil barriers installed near drains, roads, pathways)
- any other aspects that can cause an incident (see ‘Management during construction’, below)
Discharge into drains

Where discharge is proposed into a drain, written approval is required from the relevant regulatory body or agency before starting works (see Table 1 (Regulatory body or agency approval requirements) below). Be aware that:

- at least a month must be allowed to obtain the approval
- baseline groundwater data and a treatment strategy (if required) is likely to be required as part of the approval process

Table 1: Regulatory body or agency approval requirements

<table>
<thead>
<tr>
<th>Discharge point</th>
<th>Regulatory body or agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stormwater drain</td>
<td>Water Corporation or designated water service provider</td>
</tr>
<tr>
<td>Local drain</td>
<td>Local Council</td>
</tr>
<tr>
<td>Sewer</td>
<td>Water Corporation</td>
</tr>
</tbody>
</table>

Note:
Discharge into water bodies (e.g. wetland, creek, river) is not supported as the approval process is extensive and requires post-construction monitoring.

Offsite disposal

Where extracted water is required to be disposed of offsite, approval from a licensed treatment facility must be obtained before works commence to ensure correct disposal.

Extracted water must be tanked onsite and disposed of at a licensed treatment facility as soon as possible.

Reuse of extracted water (e.g. dust suppression) is possible. However, extensive groundwater analysis must be done beforehand to ensure that the water quality is acceptable and does not present a risk to human health and the environment.

Management during construction

If a dewatering management plan is required, any conditions must be complied with before starting the works. The plan must also be retained onsite and communicated to site personnel.
Dewatering must be monitored to ensure that the following do not occur during discharge:

- local flooding
- erosion
- pollution (e.g. discharge of contaminated water)
- offsite impact (i.e. area outside the designated work area)
- water entering drains or water bodies (e.g. wetland, creek, river) without approval
- discharge onto any native vegetation
- sediment buildup in drains or water bodies
- discharge outside the water quality criteria as detailed in that specific project’s dewatering management plan

**IMPORTANT**

If any of the above is observed during construction, immediately:

1. call the Western Power Incident Hotline on 1300 CALL WP (1300 22 55 97)
2. request that the incident be escalated to the Environment, Community and Approvals branch

**References**

- Department of Water, Water Quality Protection Note 13 - Dewatering of Soil at Construction Sites
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Details on the safe use of dangerous and explosive goods have been moved and can now be found in field instruction 5.20 (Dangerous and explosive goods safety) in this manual.
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11.5 Handling of treated poles and contaminated soil around poles

Purpose

This instruction outlines the minimum requirements for the handling, transportation, storage and disposal of chemically treated wood poles, pole butts, cattle care collars, pole ash and associated contaminated soil.

Overview

To prevent wood rot and termite attacks, Western Power historically used or currently uses the following chemicals to treat wood poles:

- Tar – used from 1940s to 1976.
- Pole mix (aldrin/dieldrin, pentachlorophenol and diesel mixture) – used from mid 1970s to early 1980s.
- Creosote (coal tar) – used from 1980 to 1986.
- CCA (copper chromium arsenate) – used since early 1980s.
- Preschem polesaver rods – used since 1993.

As a result of treating poles with these chemicals, pole ash and soil around the base of wood poles may be contaminated.

Responsibilities

- It is the responsibility of the formal leader to ensure that this instruction is read and understood by those persons that this instruction impacts.
- It is the responsibility of the onsite person in charge to ensure that this instruction is complied with.
- It is the responsibility of all personnel who are required to handle, transport, store and dispose of wood pole, pole butts, pole ash and associated contaminated soils to comply with this instruction.

Instructions

- When removing a pole, a minimum PPE of Level 0 must be worn, as described in field instruction 3.1 (Clothing and personal protective equipment requirements).
Where possible, avoid the generation of wood or contaminated soil dust. If required by personal risk assessment, wear a FFP2 dust mask to avoid breathing in the dust.

Avoid skin contact with pole butts, pole ash and contaminated soil surrounding the poles.

Handling of wood poles and pole butts

- Cut off the butts of poles that have been treated with pole mix or Preschem polesaver rods 300 mm above the pole mix stain or rod holes.
- Remove excess soil attached to pole butt before transportation and place it in the bottom of the hole.
- If removal of excess soil is not possible, wrap the pole butt in heavy duty plastic prior to transportation.

**Note:**
If required by the landowner or Department of Parks and Wildlife, wood poles may be cut off at ground level and the pole butt left in the ground to avoid disturbing native vegetation. The height at which they are cut off will be determined by agreement with the landowner or Department of Parks and Wildlife.

**Transportation**

- Remove treated poles, including pole butts, from the site the same day that they are pulled out. If same day removal is not possible, ensure that access to pole butt is restricted.
- Transport poles and pole butts to the nearest depot for storage and disposal unless otherwise stated in the contractor’s contract or project-specific environmental management plan.

**Removal and disposal of steel stays**

- Steel stays must be detached from wood poles prior to disposal and placed in steel skip bins that are available at each depot for recycling, unless otherwise stated in the contractor’s contract or project-specific environmental management plan.

**Handling, storage and disposal at Western Power depots**

- Before handling and disposing of pole butts, remove excess soil and place it in dedicated drums labelled with a ‘Waste’ sticker (sticker code: 18831388, see Figure 1: ‘Waste’ sticker).
Cut treated poles into sections suitable for disposal in skip bins.
Place treated poles and pole butts in dedicated skip bins located at each depot.
Store the contaminated soil in a drum at the designated area in the depot.
Facilities Management provide pole butt skips and soil drums. If required, contact the Environmental Operation Advisor for your region or Facilities Management for advice.

Final disposal
Facilities Management manage waste disposal at Western Power depots in accordance with Disposing of General and Controlled Waste (DM# 7808253).
Contractors must dispose of wood poles, pole butts, pole ash, cattle care collars and potentially contaminated soils in accordance with the contract, or project-specific environmental management plan when specified.

Note:
Poles must not be burnt as inhalation of the smoke may present a health risk.

Removal and handling of pole ash
- Stay upwind of burning treated poles to avoid smoke inhalation.
- Do not touch or disturb burnt parts of treated poles, if possible.
- Do not drive or walk through pole ash, if possible.
- If it is necessary, make saw cuts on burnt pole in the unburnt sections, where possible.
- If pole ash is found in an environmentally sensitive area or where customer complaints are likely, lightly wet down the ash with water.
- Remove all pole ash and place it into a suitable sealed container.

Note:
Do not remove or handle the pole if it is still burning.

Transportation of pole ash
- Place pole ash in a suitable sealed container (i.e. 205 L drum).
- Transport the pole ash to the nearest Western Power depot unless otherwise stated in the contractor’s contract or project-specific environmental management plan.
Storage of pole ash at depots

- Place ash in a labelled drum.
- Store the drum in a designated area in the depot.
- Contact Facilities Management for appropriate disposal.
- Facilities Management provide drums and stickers. If required, contact the Environmental Operation Advisor for your region or Facilities Management for advice.

Disposal of pole ash

- Facilities Management manage waste disposal at Western Power depots in accordance with Disposing of General and Controlled Waste (DM# 7808253).
- Contractors must dispose of pole ash in accordance with the contract, or project-specific environmental management plan when specified.

Cattle care collars

- When safe to do so, cattle care collars must be removed from site when the pole butt is removed to allow the pole hole to be backfilled (see ‘Handling of associated contaminated soil after removing a pole’ below).
- Removed cattle care collars must be returned to the nearest depot unless otherwise stated in the contractor’s contract or project-specific environmental management plan.

Note:

If requested by the landowner, cattle care collars can be left on the ground provided the pole butt is not removed (see ‘Handling of wood poles and pole butts’ below) and collar is not relocated or disturbed.

Handling of associated contaminated soil after removing a pole

See Figure 1: Backfilling instruction after pole removal, for a visual depiction of the following steps.

- Dig out the soil immediately around the hole to a depth of 300 mm and to a width of:
  - distribution poles – 400 mm from the hole
  - transmission poles – 1000 mm from the hole
- Shovel the excavated soil back into the pole hole and compact every 300 mm to within 300 mm of the top.
- Fill the remaining 300 mm with clean soil (from elsewhere onsite if agreed with the landowner or from a warehouse that supplies certified clean fill) and compact it until the soil is slightly raised.
- If the excavated soil cannot be placed into the pole hole or could be reached by animals or humans:
  - place soil into a sealable container or plastic bag
  - transport the soil:
    - to the nearest depot and store it in the environmental shelter as described in ‘Final disposal of contaminated soil’ section, below
    - as stated in the contractor’s contract or project-specific environmental management plan

**Note:**
If removed pole is located within a (potential) wetland or water body, or removed pole location will became part of a future residential development, contact the Environmental Section at environment@westernpower.com.au.

**Final disposal of contaminated soil**
- At the Western Power depot, store soil in a sealed drum labelled with a ‘Waste’ sticker (sticker code: 18831388, see Figure 2: ‘Waste’ sticker) and contact Facilities Management for disposal.
- Facilities Management manage waste disposal at Western Power depots in accordance with *Disposing of General and Controlled Waste* (DM# 7808253).
- Contractors must dispose of contaminated soil in accordance with the contract, or project-specific environmental management plan when specified.

**References**
- *Disposing of General and Controlled Waste* (DM# 7808253)
- ‘Waste’ sticker (sticker code: 18831388)
Figure 1: Backfilling instruction after pole removal

Figure 2: ‘Waste’ sticker
11.6  Lamp and fluorescent tube disposal

Purpose

This instruction provides the minimum requirements for the handling, packaging and storage of globes, lamps and fluorescent tubes. This includes but is not limited to, mercury vapour globes, high pressure sodium lamps, metal halide lamps, fluorescent tubes and compact fluorescent lights (CFL). For the purposes of the Environmental Protection (Controlled Waste) Regulations 2004, globes, lamps and fluorescents tubes are considered controlled waste.

Instructions

• All personnel who are required to handle fluorescent lamps and tubes must wear the following personal protective equipment; as per Field instruction 3.1 (Clothing and personal protective equipment requirements) level 0 requirements,

Packaging

• Waste lamps, globes and fluorescent tubes shall be placed in the box supplied with the replacement or the original package.
• If the original package is not available or if the globe, lamp or fluorescent tube is broken, it shall be placed into a plastic globe bag and sealed (stock code: OC3107).
• The boxed or bagged globes, lamps and fluorescent tubes shall be secured for transportation.

Storage at depot

• Excluding Streetlight Services Section, all bagged globes, lamps or fluorescent tubes shall be stored in a labelled ‘Globes, Lamps and Fluorescent Tubes’ drum (sticker code: 18831934) located within the environmental shelter at the depot.
• All four and five feet fluorescent tubes shall be stored in cardboard boxes (stock code: UA3163) within the environmental shelter at the depot.
Disposal

- When the designated globe recycling drum within the environmental shelter at the depot is three-quarters full, Facilities Management must be contacted to arrange pick up and recycling of the content.
- Streetlight Services Section are responsible for the removal of bulk quantities of globes, lamps and fluorescent tubes and shall facilitate the transport of globes, lamps and fluorescent tubes to an approved Recovery Centre as soon as practicable.

Reference

- ‘Globes, lamps and fluorescent tubes’ sticker (sticker code: 18831394)
11.7 Oil and chemical spills

Purpose

This instruction provides guidance on how to respond to oil and chemical spills and leaking oil-filled electrical equipment to minimise harm to the environment, risk to public safety and human health.

Instructions

Step one – Personal protective equipment

The following personal protective equipment must be worn when responding to a spill, as per Field instruction 3.1 (Clothing and personal protective equipment requirements) Level 0 requirements, and additional:

- nitrile or PVC gloves.

Step two – Immediate actions

- Make the area as safe as possible.
- Control the spill (i.e. stop or isolate the source).
- Contain the spill (follow spill kit instruction for guidance). Spill kits and instructions are located in depots, substations and selected vehicles.

Step three – Report the spill

- All spills and leaks shall be logged into Guardian by the Customer Service Centre as an environmental incident – refer to ‘Environmental Incident Classification’ guidance note (DM# 9493683).
• For all network related spills and leaks, the Customer Service Centre shall also log the incident into TCS.
• An ESEN Alert shall be sent by the Customer Service Centre if the incident is considered an emergency.

Step four – Spill clean-up, waste disposal and spill kit content replacement

• Specific spill kit instructions are available within the vehicle, depot and substation spill kits.
• Used absorbent material (e.g. peat, booms/pads) must be collected, removed from site and disposed of into an appropriate labelled drum (sticker code: 18831393) available at the nearest depot.
• Do not remove the resulting contaminated soil from site unless advised by a Western Power environmental advisor.
• Contact Facilities Management if appropriate a dedicated bin/drum is not available.
• Spill kit contents must be reordered and replaced once used. Relevant contents and stock codes are available in the spill kit instructions.

Note:
Do NOT mix used peat with other used absorbent material. Used absorbent material must be placed in dedicated labelled drums and stored in the environmental shelter.

Reference
• ‘Contaminated absorbent material from spill clean-up’ sticker (sticker code: 18831393)
11.8   Aboriginal artefacts

Purpose

This instruction outlines the appropriate steps to take when, during ground and excavation activities, objects are discovered which might be Aboriginal in origin.

Instructions

• When an object which may be Aboriginal in origin is discovered, immediately inform the onsite person in charge.

• The onsite person in charge must establish a no work zone around the site, large enough to ensure the discovery will not be disturbed.

Note:

Work may continue outside the no work zone.

• The onsite person in charge must contact the Incident Hotline on 1300 225 597 (1300 CALL WP) to advise of the discovery.

• In turn, the Customer Service Centre must contact the ECA Branch who will take over management of the discovery and provide the onsite person in charge with the appropriate management procedures to follow.

• The onsite person in charge must inform all personnel onsite of the ECA Branch procedures to follow.
11.9 PCBs in lighting capacitors and chokes

Purpose

These instructions provide the minimum requirements for the handling, packaging and storage of lighting capacitors and chokes. All capacitors and chokes are considered to contain polychlorinated biphenyls (PCBs). For the purposes of the Environmental Protection (Controlled Waste) Regulations 2004 all capacitors and chokes are considered controlled waste.

Instructions

Personal protective equipment (PPE)

When removing, handling and/or storing capacitors and chokes containing PCBs the following PPE must be worn, as per Field instruction 3.1 (Clothing and personal protective equipment requirements) Level 0 requirements, and additional:

• nitrile or PVC gloves.

Packaging

• When removing capacitors and chokes from service, the capacitor and choke shall be placed into a heavy duty plastic bag and sealed. The bag must be labelled with 'Contains Suspected PCB' (sticker code: 18831391).

• The plastic bag containing the capacitors and/or chokes shall be secured for transportation.

Storage at depot

• All plastic bags containing capacitors and chokes shall be stored in the dedicated ‘Contains Suspected PCB’ labelled drum (sticker code: 18831391) located within the environmental shelter at the depot.

• The PCB labelled drum shall be pre-lined with a plastic bag and kept sealed and secure after use.

Disposal

• When the PCB labelled drum is three-quarters full, Facilities Management must be contacted to arrange pick up and disposal of the contents.
Reference

- ‘Contains suspected PCB’ sticker (sticker code: 18831391)
11.10 Fauna

Purpose

This instruction outlines the requirements for dealing with fauna encountered during field activities.

Scope

This work instruction has been written for Western Power employees, contractors and alliance partners who undertake construction and maintenance activities.

Instructions

Field Activities

Note:

When undertaking work in the field, perform surrounding area checks prior to starting work to determine if any fauna and/or habitats may be encountered. This can be documented in the risk assessment process.

Nesting and dwelling places

- If nesting or dwelling places are identified that may be impacted by the work, stop the activity and contact Western Power’s Environment Section.

- Before relocating a bird’s nest check to see if it has eggs or chicks. If either is present wait until the chicks have left the nest. If the nest is unoccupied, place it on the ground so that the bird can rebuild the nest in another area.

Possums, bats and other nesting fauna

- Large peppermint trees are a habitat for the threatened Western Ringtail Possum and should not be removed if possible. Trees can be selectively pruned to meet the electrical safety clearances. If a peppermint tree is to be pruned or removed, inspect for possums. Shaking the tree is acceptable to encourage the possum to evacuate.

- For possums, bats and other nesting fauna, if the nest is unoccupied it may be removed. If young are present, stop the activity and contact Western Power’s Environment Section.

- Remove stockpiled vegetation regularly as wildlife may shelter in it. Field staff should be prepared for any wildlife encounters.
Bird nests

- If a bird nest reappears on Western Power infrastructure, a bird spike installation may be an alternative. For advice on this, contact Western Power's Environment Section.

Malleefowl

- When travelling in the Wheatbelt region, take care to avoid running over Malleefowl nests. If you encounter Malleefowl or their nests, contact Western Power’s Environment Section.

Snake encounters

- If you encounter a snake, do not aggravate it in anyway as this is when snake bites occur. Step away slowly to allow the snake as much room as possible to escape. Snakes are sensitive to ground vibration so stamping your feet may assist in sending them away from you. Snakes are more active in the summer months so take care when working in grassy and bushland areas and wear enclosed shoes and long trousers.

- If a snake is found in a substation or confined area, contact the Wildcare hotline or Department of Environment and Conservation to arrange removal.

Note:
Remember all snakes are protected.

Emergency response

- If a bird’s nest is discovered during an emergency response or unplanned maintenance and it contains eggs or chicks and the work cannot be delayed, contact the Wildcare hotline to organise for a wildlife carer to remove the eggs/chicks.

Reporting fauna incidents

- For sick, injured or stranded native fauna, contact the Wildcare hotline.

- Report injured fauna to the Incident hotline. This does not include vehicle collisions with native fauna on public roads.

- If a known or suspected threatened fauna species has been injured or killed notify the Incident hotline or Western Power’s Environment Section.
• If fauna deterrents such as bird diverters or pole guards are perished or damaged notify Western Power’s Environment Section.

Contact details

• Western Power’s Environment Section: 0419 987 954
  environment@westernpower.com.au
• Wildcare hotline (24 hours, 7 days) (08) 9474 9055
• Department of Environment and Conservation (08) 9334 0292
• Incident hotline 1300 225 597

References

• Work Practice Manual, field instruction 5.10 (Land access – private property)
• Environmental Field Guide – for photos and further guidance on fauna issues related to field activities. This guide is available on DM (DM# 9900082) and Depot Pack (on the Safety and Standards page).
11.11  Erosion

Purpose

This instruction outlines how to minimise erosion and soil disturbance for planned or unplanned construction or maintenance works.

Overview

Erosion occurs when soil becomes unstable and is mobilised. This mostly occurs on steep slopes or unstable soil. Environmental harm can occur in the area where soil is eroded and in the area where the mobilised soil is deposited.

Instructions

- Follow an approved environmental management plan for new transmission or distribution works.
- For works that do not require an environmental management plan, such as some maintenance activities:
  - Keep the area of disturbance as small as possible.
  - Reinstate all excavations immediately following completion of works.
  - Only use established tracks for site access.
  - If there is no established vehicular track, use a four-wheel drive for site access and avoid areas where vehicle may be susceptible to bogging.
  - Do not disturb existing vegetation.
  - Minimise vehicle movements to avoid soil compaction.
  - Drive slowly and consistently and avoid excessive wheel rotations.
  - Avoid visibly eroded areas, particularly embankments.
  - If erosion could affect Western Power assets or stakeholder properties, notify the Environment, Community and Approvals Branch at environment@westernpower.com.au as soon as possible.
  - Do not light or cause fires to be lit.
  - Follow any extra requirements for erosion control issued by a Western Power environmental officer.
Work near water bodies

When conducting works around water bodies:

- Be extra cautious when working close to the edge of the water body, as soils in these areas are less stable.
- Avoid areas where vehicles may be susceptible to bogging.
- Cross all rivers and streams via existing bridges.
- Drive slowly and avoid excessive wheel rotations.
- If crossing a water body by vehicle is unavoidable, use existing vehicle track crossings.

References

- Work Practice Manual ([DM# 6999451](#)), field instruction 5.10 (Land access – private property)
11.12 Native vegetation clearing and maintenance

Purpose

This work instruction provides information to ensure all regulatory and statutory obligations are met when doing work that may cause vegetation disturbance or removal. This includes vegetation maintenance work that is not specifically covered by a Western Power approved Environmental Management Plan (EMP) or approved environmental conditions.

Overview

- Vegetation clearing is any removal, damage or destruction of WA native vegetation or non-native vegetation which is considered to be a habitat for threatened species. Clearing can include activities such as driving on vegetation or any other activities that disturb vegetation.
- Unauthorised clearing of native vegetation can result in prosecution under the Environmental Protection Act 1986, the Environment Protection and Biodiversity Conservation Act 1999 and the Wildlife Conservation Act 1950.
- ‘Vegetation maintenance’ is work that keeps vegetation clear of powerlines and other assets.

Instructions

Read the works package and distribution design documents

- Familiarise yourself with the work required and the area in which the work is to be carried out.

Note:
A clearing permit must be obtained before native vegetation clearing can commence.

Obtain a permit

- A clearing permit is required for all new works affecting native vegetation. Exemptions cover vegetation maintenance around existing powerlines and facilities. If the work has the potential to cause removal, substantial damage or destruction of vegetation, including driving over vegetation, severing or ringbarking of trunks or stems, ensure advice has been sought from the
Environment Section of the Environment, Community and Approvals (ECA) Branch and a clearing permit has been obtained if necessary.

- In some areas special conditions require the protection of black cockatoo nesting sites or rare flora.
- If work is subject to a Western Power approved EMP and/or other agreed environmental conditions, ensure all activities are conducted in accordance with these.
- Clearing must not exceed the approved area described in the relevant documentation including: line maps; design diagrams; EMP or the clearing permit.
- Any changes to the proposed clearing area must be approved by the Environment Section and the relevant changes made to the line maps, design diagrams, EMP or the clearing permit prior to the clearing being undertaken.
- All personnel must abide by Western Power’s demarcation of the working areas. Demarcation will be by way of flagging tape in the field or by another agreed method. Significant plants/areas may be demarcated with flagging tape prior to clearing operations to exclude them from clearing or access.

**Vegetation maintenance work**

- A clearing permit is not required for maintaining safety clearances of vegetation to existing infrastructure that has live electrical conductors, equipment, facilities and access routes.
- Damage to rare plants or Black Cockatoo habitat trees is not exempted but these are managed through the Environmentally Sensitive Area (ESA) process (see below) or special conditions.
- If vegetation is required to be cleared outside of the Vegetation Management Zone or outside of the established access routes, the Environment Section must be contacted prior to clearing occurring, as a clearing permit may be necessary for these areas.

**Environmentally Sensitive Areas (ESA)**

- Where there are important environmental attributes near existing assets Western Power employs an Environmentally Sensitive Area (ESA) system.
- Assets within ESAs are demarcated in Western Power’s GIS, asset databases and through signage in the field. It is necessary to gain the procedures for operating within an ESA prior to entering it and complying with
those procedures. See field instruction 11.2 (Environmentally sensitive areas) in this manual.

**Conduct field activities**

- Prior to working within road reserves, consultation may be required with Main Roads WA, the local government authority and/or the Department of Parks and Wildlife (DPaW) for the location of any protected environmental sites, in particular where threatened flora exists.
- These areas are termed Special Environmental Areas (SEAs) and are often delineated by yellow markers (Figure 1) but this may not be the case and any information identifying a SEA must be verified before proceeding with the work. Advice on locations and requirements can be obtained from DPaW or Main Roads WA.

![Figure 1: SEA markers](image)

- Any disturbance of these areas can result in prosecution under the *Environmental Protection Act 1986, Environment Protection and Biodiversity Conservation Act 1999* and the *Wildlife Conservation Act 1950*.
- Topsoil and rootstock present within all cleared areas is to be left as undisturbed as possible to help in regeneration of native vegetation.
- Trees should be left untouched whenever possible. Do not remove old debris as standing and fallen dead trees and branches can provide significant fauna habitats.
Do not dispose of vegetation debris in such a way that it may smother or crush existing vegetation. Each work package should define how cuttings are to be treated. In the absence of this, the local authority and/or the Environment Section must be consulted as the disposal method must consider local conditions and environmental implications such as dieback and smoke pollution.

Do not park or drive vehicles, plant or machinery on non-designated access tracks or areas that contain native vegetation at any time. Equipment and materials must not be stored outside the approved clearing areas or within native vegetation.

Where required, comply with the EMP or instructions on the design drawing or within the clearing permit, such as reporting the period when the clearing was undertaken, before and after photographs and whether the clearing met or exceeded the permit bounds.

**Incidents**

For any of the following situations, call the Incident Hotline 1300 2255 97 (1300 CALL WP).

- Clearing without a clearing permit.
- Clearing rare plants within the Vegetation Management Zone protected by the Environmentally Sensitive Area system.
- Clearing outside of the designated area.
- Clearing that does not follow a Western Power EMP or agreed environmental conditions.
- Actions that do not follow this instruction.

**Obtain help**

- Assistance with clearing permits or compiling with procedures, email or contact the numbers below.

<table>
<thead>
<tr>
<th>Incident Hotline</th>
<th>1300 2255 97 (1300 CALL WP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment, Community and Approvals Branch</td>
<td><a href="mailto:environment@westernpower.com.au">environment@westernpower.com.au</a></td>
</tr>
<tr>
<td>Environmentally Sensitive Area</td>
<td>0419 987 954</td>
</tr>
</tbody>
</table>
11.13 Biosecurity

Purpose

This work practice identifies biosecurity mitigation activities to reduce the risk of moving weeds or plant diseases. These are the minimum requirements for biosecurity as prescribed by the Biosecurity and Agricultural Management Act 2007 when working on agricultural properties, and in and around native vegetation and water bodies.

This work practice also provides the minimum requirements when entering land managed by the Department of Parks and Wildlife (DPaW), referred to as conservation estate. These areas include special areas known as Disease Risk Areas (DRA).

Overview

When Western Power staff and contractors move through agricultural regions and the conservation estate, vehicles and equipment have the potential to move seeds, plant, soil and animal material. As a result, weeds and plant diseases can be moved between, or introduced to, agricultural properties or across the conservation estate. The objective of this work practice is to prevent the spread of declared plants, weeds and plant disease.

Biosecurity threats to agriculture and natural environments include:
- weeds
- declared plants
- plant diseases (e.g. dieback)
- pests
- stock disease including ticks, lice and other parasites
- genetically modified crops (e.g. canola)

Instructions

- If assistance is needed with using this work practice, contact your Safety, Health and Environment Business Partner for advice (see the Contact details section at the end of this work practice).
### Planning and scheduling

<table>
<thead>
<tr>
<th>Agricultural property</th>
<th>Conservation estate / Disease Risk Area (DRA)</th>
</tr>
</thead>
</table>
| Plan work located within crops to occur after the harvest and not during the growing season (late July-December) where possible. | • Plan work to occur under dry soil conditions where possible.  
• Some forest areas can only be accessed under dry soil conditions and with a clean vehicle and equipment. Liaise with the DPaW to plan work in these areas. Consult with your Safety, Health and Environment Business Partner for advice.  
• Schedule works in dieback susceptible areas during the dry season (November to April) to prevent movement of plant diseases. |

If work cannot be rescheduled and is planned to occur during wet soil conditions, mobile washdown equipment should be utilised, if available.

### Implementing biosecurity

<table>
<thead>
<tr>
<th>Agricultural property</th>
<th>Conservation estate / Disease Risk Area (DRA)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before leaving the depot (Planned Work)</strong></td>
<td></td>
</tr>
</tbody>
</table>
Notify the landholder/manager of proposed access. |  
• Notify the local DPaW office of entry into conservation estate or DRA at least 10 working days before entry. |
<table>
<thead>
<tr>
<th><strong>Agricultural property</strong></th>
<th><strong>Conservation estate / Disease Risk Area (DRA)</strong></th>
</tr>
</thead>
</table>
| Ask if there are any biosecurity issues. | • Assess if you will be travelling through dieback-free forest.  
• Plan inspection and cleandown locations with DPaW.  
• Determine if mobile washdown equipment will be required to complete the work.  
• To access DRA, obtain DRA permits for all vehicles/trailers and retain while onsite. |
| Inspect vehicle/equipment for plant, animal and soil material before leaving the depot. If required, clean vehicle/equipment to ensure they are free of plant, animal and soil material. | Inspect vehicle/equipment for plant, animal and soil material prior to leaving the depot. If required, clean vehicle/equipment to ensure that they are free of plant, animal and soil material. |
| Dispose of plant seeds into a sealed container or sealable plastic bag and place in the general waste bin at the depot. | |
| **Upon arrival at job site** | **Upon arrival at worksite, inspect and clean the vehicle/equipment as required to ensure that it is free of plant, animal and soil material.** |
| Upon arrival at worksite/agricultural property, inspect and clean the vehicle/equipment as required before entering to ensure that it is free of plant, animal and soil material. | |
### Before leaving job site

<table>
<thead>
<tr>
<th>Agricultural property</th>
<th>Conservation estate / Disease Risk Area (DRA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>If working in a genetically modified crop (e.g. canola), ensure the vehicle/equipment is free of all plant material (e.g. flowers, roots, leaves) on exiting the property.</td>
<td>Clean vehicle/equipment on exiting conservation estate and DRA worksites.</td>
</tr>
<tr>
<td>If you will be moving on to another property, ensure vehicle/equipment will be clean on entry for the next property.</td>
<td>Clean vehicle/equipment at the depot ready for the next shift, if time permits.</td>
</tr>
<tr>
<td>Report any biosecurity incidents on Western Power’s Incident Hotline: 1300 225 597</td>
<td></td>
</tr>
</tbody>
</table>

### Important

Vehicles and equipment entering an agricultural property, conservation estate or DRA must be clean on entry, i.e. free of plant, animal and soil material. Vehicles and equipment must also be clean on exiting the work site.

### Inspect and clean down for weeds

Upon arrival at the job site, inspect your vehicle/equipment and if plant, animal or soil material is found, clean it by using the following methods.

- If seeds such as doublegees or caltrop are found in vehicle tyres:
  1. hand pick or use the scraper tool to pick all the seeds out of the tyres, and brush/collect into dustpan (use gloves to avoid prickles)
  2. roll the tyres forward just enough to pick out the remainder of seeds stuck in the tyres and brush/collect into dustpan
  3. put all seeds collected in the dustpan into a seed container or sealable plastic bag
  4. dispose of the sealed container in a general waste bin at the depot
If seeds such as doublegees or caltrop are found on the cab floor, underbody, trays or stabilisers:

1. use a dust pan and brush to collect the seeds or handpick the seeds and dispose of them in a sealed container/plastic bag. Check boots for seeds too.
2. put all seeds collected in the dustpan into a seed container or sealable plastic bag
3. dispose of the sealed container in a general waste bin at the depot

If plant, animal or soil material is found on the tyres or underbody, or on your footwear, use a stiff brush to remove it.

Note:

- During wet conditions, a washdown will make it easier to ensure that equipment is free of plant, animal and soil material.
- As access to environmentally sensitive areas and organic farms should only be done during dry conditions, such work should be planned to avoid wet conditions.

Inspect and cleandown for dieback

Before leaving the depot

Use the washdown bay to remove all plant, animal or soil material from tyres, wheel arches, underbody, trays and equipment such as augers.

Before entry to site

- Inspect your vehicle/equipment. If you have picked up plant, animal or soil material, brush down with a stiff brush. Where available, use existing washdown stations. Pay particular attention to tyres, wheel arches, underbody, trays, and equipment such as augers.
- Check footwear for plant and soil material. Brush footwear with a stiff brush from the biosecurity kit.

During wet conditions

Works in dieback susceptible areas of native vegetation should only be scheduled during the dry season (November–April) to prevent movement of this soil-borne plant disease. Where this is not possible, washdown is required to ensure that vehicles and equipment are free of soil and plant material.
Fault and emergency work

- When working in fault and emergency conditions, make the best effort to:
  - work in dry conditions
  - follow the requirements of this work practice
- Conservation estate – attempt to contact DPaW before entry. Where this is not possible, contact DPaW after the work has been done.

Contacts

For advice on how to use this work practice, contact:

- your formal leader
- the relevant Safety, Health and Environment Business Partner for your area
  or
- the Safety, Health and Environment Function:
  
  T: 9326 7900
  E: she@westernpower.com.au

References

- Biosecurity and Agricultural Management Act 2007
11.14  This section has been left blank intentionally

Details on the use of pesticides and herbicides have been moved and can now be found in field instruction 5.21 (Use of pesticides and herbicides) in this manual.
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Appendix 1 – Tags and signs

Danger tags

“Do not operate” danger tag

Staples reorder numbers: 18697727 (thick), 18697728 (thin)

“Restricted use” danger tag

Staples reorder number: 18697732

Warning tags

“Out of service” warning tag

Staples reorder numbers: 18697730 (thick), 18697731 (thin)
“Do not access or alter” warning tag

Staples reorder numbers: 18899933 (140 x 50 mm sticker), 18899934 (300 x 100 mm large sticker), 18899935 (300 x 100 mm magnet)

Caution tag

“Information” caution tag

Staples reorder number: 18697729

High visibility danger label*

Stock code: CZ5012

*This image shows a high visibility danger label with a “Do Not Operate” danger tag
Scaffolding tags

General inspection tags

Stock code: UA1609

Stock code: HG2102
Ladder inspection tags

 Transformer tagging/identification tags

Orange ‘Faulty’ tag – UA 3013

Yellow ‘Removed’ tag – UA 3014

Stock code: 87115396

Stock code: 87115397
Evidence tag

Staples reorder number: 87222421

Evidence tag information holder

Stock code: CZ5013
Temporary disconnection tag

Signs

LV transposed sign

Stock code: CZ5007

Treated against termites sign

Stock code: CZ0327
Appendix 2 – Standard forms

Important

Once a form is filled out, it must be kept and controlled in order to comply to quality control requirements, auditing and aid in future investigations. Methods of control include:

- saving or scanning into an electronic system (e.g. Western Power’s DM)
- filing the hardcopy

Contact Records Management for more information (records.management@westernpower.com.au.)

<table>
<thead>
<tr>
<th>Form</th>
<th>DM#/ UA#/ NetXpress code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain of Custody Record for Evidence</td>
<td>DM# 1934352</td>
</tr>
<tr>
<td>Confined Space Entry Permit</td>
<td>DM# 6460100</td>
</tr>
<tr>
<td>Disconnected for Demolition Notice</td>
<td>UA# UA3150 Order through Jandakot Distribution Centre</td>
</tr>
<tr>
<td>Electrical Access Permit (EAP)</td>
<td>NetXpress code 87074751</td>
</tr>
<tr>
<td>Emergency Response Generator Request Form</td>
<td>DM# 6262035</td>
</tr>
<tr>
<td>Fall arrest system inspection checklist</td>
<td>DM# 6783836</td>
</tr>
<tr>
<td>Fault note</td>
<td>NetXpress code 87274480</td>
</tr>
<tr>
<td>Hydraulic tamper pre-start check sheet</td>
<td>DM# 8026431</td>
</tr>
<tr>
<td>Intent to carry out works notice to local government form</td>
<td>DM# 7701624</td>
</tr>
<tr>
<td>Ladder inspection checklist</td>
<td>DM# 12034207</td>
</tr>
<tr>
<td>LV board numbers/quote/material list for EWS</td>
<td>DM# 5586486</td>
</tr>
<tr>
<td>Meter panel replacement test form for licensed electricians</td>
<td>DM# 8683487</td>
</tr>
<tr>
<td>Operating agreement</td>
<td>NetXpress code 18719578</td>
</tr>
<tr>
<td>Form</td>
<td>DM# / UA# / NetXpress code</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Planned Interruptions Process – LSE Customer</td>
<td>DM# 9610351</td>
</tr>
<tr>
<td>Contact Information</td>
<td></td>
</tr>
<tr>
<td>Plant hire sheet for contractor use – combined</td>
<td>DM# 6617609</td>
</tr>
<tr>
<td>elevated work platform and crane/borer external</td>
<td></td>
</tr>
<tr>
<td>hire checklist</td>
<td></td>
</tr>
<tr>
<td>Pole top fire and pole failure report form</td>
<td>DM# 2292347</td>
</tr>
<tr>
<td>Pole top rescue kits inspection checklist</td>
<td>DM# 6783459</td>
</tr>
<tr>
<td>Reverse Logistics Transport Request Form</td>
<td>DM# 8182831</td>
</tr>
<tr>
<td>Sanction to Test (STT) permit</td>
<td>NetXpress code 86881918</td>
</tr>
<tr>
<td>Scaffold inspection checklist</td>
<td>DM# 5236891</td>
</tr>
<tr>
<td>Service Commissioning Form to Suit Metrel</td>
<td>DM# 4700316</td>
</tr>
<tr>
<td>Device with CUSA</td>
<td></td>
</tr>
<tr>
<td>Substation Entry Induction Form</td>
<td>DM# 6036654</td>
</tr>
<tr>
<td>Telstra notification of new high voltage earth</td>
<td>DM# 5237319</td>
</tr>
<tr>
<td>installation</td>
<td></td>
</tr>
<tr>
<td>Vicinity Authority (VA) permit</td>
<td>NetXpress code 86879279</td>
</tr>
<tr>
<td>Western Power Public Notice</td>
<td>DM# 5237308</td>
</tr>
<tr>
<td>Worker Authorisation Application Form</td>
<td>DM# 8190052</td>
</tr>
<tr>
<td>Workplace Risk Assessment Plan</td>
<td>NetXpress code 18641873</td>
</tr>
</tbody>
</table>
Brookfield Rail contact details

In case of Emergency
Call 000 from a landline
Call 112 from your mobile phone

Brookfield Rail Head Office
2-10 Adams Drive, Welshpool WA 6106
GPO Box S1411, Perth WA 6845
Phone: (08) 9212 2800
Email: info@brookfieldrail.com

Kalgoorlie
Kalgoorlie WA 6430
Phone: (08) 9022 0632
Fax: (08) 9022 0647

Kewdale
12 Aitken Way
Kewdale WA 6105
Phone: (08) 6274 4444
Fax: (08) 6274 4459

Kwinana
Butcher Street
Kwinana WA 6167
Phone: (08) 9419 0936
Fax: (08) 9419 0934

Merredin
Merredin Rail Complex
Great Eastern Highway
Merredin WA 6415
Phone: (08) 9041 0651
Fax: (08) 9041 0699

Midland
Brookfield Rail Depot
Yelverton Drive
Midland WA 6056
Phone: (08) 9274 9733
Fax: (08) 9274 9734

Narrogin
1 Francis Street
Narrogin WA 6312
Phone: (08) 9881 3063
Fax: (08) 9881 0137

Northam
Brookfield Rail Administration Building
Peel Terrace
Northam WA 6401
Phone: (08) 9622 4632
Fax: (08) 9621 2475

Narngulu
510 Edward Road
Narngulu WA 6530
Phone: (08) 9964 0332
Fax: (08) 9964 0346

Picton
Picton Rail Complex
South West Highway
Picton WA 6229
Phone: (08) 9725 5532
Fax: (08) 9725 5599

References

• Brookfield Rail website: www.brookfieldrail.com
Appendix 4 – Emergency contact information

**Important**

- If dialling from an internal phone, remember to dial 0 first.
- Numbers beginning with 1300/1800 and the 132 500 number for SES assistance are not available through all satellite phone service providers. Contact your service provider for more information.

**Note:**

<table>
<thead>
<tr>
<th>Service</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency – Fire, Police, Ambulance</td>
<td>000</td>
</tr>
<tr>
<td>Police switchboard (non-emergency)</td>
<td>131 444</td>
</tr>
<tr>
<td>Poisons Information Centre (24 hours)</td>
<td>131 126</td>
</tr>
<tr>
<td>Department of Fire &amp; Emergency Services (DFES)</td>
<td>9395 9300</td>
</tr>
<tr>
<td>DFES public information line</td>
<td>1300 657 209</td>
</tr>
<tr>
<td>State Emergency Service (SES) assistance</td>
<td>132 500</td>
</tr>
<tr>
<td>One Call (Dial Before You Dig)</td>
<td>1100</td>
</tr>
<tr>
<td>Alinta Gas</td>
<td>13 13 52</td>
</tr>
<tr>
<td>Main Roads Western Australia</td>
<td>138 138</td>
</tr>
<tr>
<td>Telstra</td>
<td>13 22 03</td>
</tr>
<tr>
<td>Water Corporation</td>
<td>13 13 75</td>
</tr>
</tbody>
</table>
### Government departments

<table>
<thead>
<tr>
<th>Department</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bureau of Meteorology (BoM)</td>
<td>1300 659 213</td>
</tr>
<tr>
<td>DFES head office</td>
<td>9323 9300</td>
</tr>
<tr>
<td>Department of Parks and Wildlife</td>
<td>9219 9000</td>
</tr>
<tr>
<td>Wildcare helpline (for sick, injured or orphaned native animals, or snake removal)</td>
<td>9474 9055</td>
</tr>
<tr>
<td>Wildcare watch (to report illegal wildlife activity)</td>
<td>1800 449 453</td>
</tr>
</tbody>
</table>

### Network Operations Control (NOC) (previously known as NOCC/SOCC)

| For emergency switching to stop injury or damage – *during the emergency* Network Operations | 9427 0626 |
| To report an incident – *after the emergency has passed* Incident Hotline | 1300 CALL WP (1300 2255 97) |
## Emergency – Metro depots

<table>
<thead>
<tr>
<th>Depot</th>
<th>Doctor</th>
<th>Hospital</th>
<th>Police</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bentley</strong></td>
<td>Cannington Medical Centre</td>
<td>Royal Perth Hospital</td>
<td>1325 Albany Hwy, Cannington 9451 0000</td>
</tr>
<tr>
<td></td>
<td>8-10 Hamilton Street Cannington WA 6107</td>
<td>(Public) Wellington St</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(08) 6298 9999</td>
<td>Perth</td>
<td></td>
</tr>
<tr>
<td><strong>East Perth (Network</strong></td>
<td>East Perth Medical Centre</td>
<td>Royal Perth Hospital</td>
<td>2 Adelaide Terrace East Perth WA 6004</td>
</tr>
<tr>
<td><strong>Operations Control</strong></td>
<td>168 Adelaide Terrace</td>
<td>(Public) Wellington St</td>
<td>Get directions</td>
</tr>
<tr>
<td></td>
<td>East Perth WA 6004</td>
<td>Perth</td>
<td>(08) 9222 1111</td>
</tr>
<tr>
<td></td>
<td>Get directions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(08) 9221 4242</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Forrestfield</strong></td>
<td>Forrestfield Medical Centre</td>
<td>Royal Perth Hospital</td>
<td>40 Strelitzia Ave</td>
</tr>
<tr>
<td></td>
<td>1/76 Hale Rd</td>
<td>(Public) Wellington St</td>
<td>Forrestfield</td>
</tr>
<tr>
<td></td>
<td>Forrestfield</td>
<td>Perth</td>
<td>9359 1033</td>
</tr>
<tr>
<td></td>
<td>9359 1822</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fremantle</strong></td>
<td>Fremantle Family Doctors</td>
<td>Fremantle Hospital</td>
<td>88 High Street</td>
</tr>
<tr>
<td></td>
<td>15/115 Lefroy Road</td>
<td>Alma Street</td>
<td>Fremantle WA 6160</td>
</tr>
<tr>
<td></td>
<td>Beaconsfield WA 6162 (08) 9331 7479</td>
<td>(08) 9431 3333</td>
<td>(08) 9430 1222</td>
</tr>
<tr>
<td><strong>Jandakot (Hope Road)</strong></td>
<td>Jandakot Medical Centre</td>
<td>St John Of God Health Care</td>
<td>120 Murdoch Drv</td>
</tr>
<tr>
<td></td>
<td>1/5 Berrigan Drv South Lake</td>
<td>Murdoch (Private) 100 Murdoch Drv Murdoch</td>
<td>Murdoch 9313 9000</td>
</tr>
<tr>
<td></td>
<td>9417 3233</td>
<td>9366 1111</td>
<td></td>
</tr>
<tr>
<td><strong>Jandakot (Prinsep Road)</strong></td>
<td>Jandakot Medical Centre</td>
<td>St John Of God Health Care</td>
<td>120 Murdoch Drv</td>
</tr>
<tr>
<td></td>
<td>1/5 Berrigan Drv South Lake</td>
<td>Murdoch (Private) 100 Murdoch Drv Murdoch</td>
<td>Murdoch 9313 9000</td>
</tr>
<tr>
<td></td>
<td>9417 3233</td>
<td>9366 1111</td>
<td></td>
</tr>
<tr>
<td><strong>Kewdale</strong></td>
<td>Healthpoint Belmont Medical Centre</td>
<td>Royal Perth Hospital</td>
<td>273 Abernethy Rd</td>
</tr>
<tr>
<td></td>
<td>4/321 Abernethy Rd Cloverdale</td>
<td>(Public) Wellington St</td>
<td>Belmont 9424 2700</td>
</tr>
<tr>
<td></td>
<td>9479 1555</td>
<td>Perth</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9224 2244</td>
<td></td>
</tr>
<tr>
<td><strong>Mandurah</strong></td>
<td>Dudley Park Medical Centre</td>
<td>Peel Health Campus</td>
<td>333 Pinjarra Rd</td>
</tr>
<tr>
<td></td>
<td>265 Pinjarra Rd Mandurah</td>
<td>(Private &amp; Public) 110 Lakes Rd Mandurah</td>
<td>Mandurah 9581 0222</td>
</tr>
<tr>
<td></td>
<td>9535 4644</td>
<td>9531 8000</td>
<td></td>
</tr>
</tbody>
</table>
# Operational work practice standards

<table>
<thead>
<tr>
<th>Depot</th>
<th>Doctor</th>
<th>Hospital</th>
<th>Police</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mount Claremont</td>
<td>Mt Claremont Medical Centre</td>
<td>Sir Charles Gairdner Hospital (Private)</td>
<td>166 Curtin Ave Cottosloes</td>
</tr>
<tr>
<td></td>
<td>32 Strickland St Mt Claremont 9384 0950</td>
<td>Hospital Ave Nedlands 9346 3333</td>
<td>9286 7777</td>
</tr>
<tr>
<td>Perth International Airport (Fleet Services)</td>
<td>Stirk Medical Group 32 Newburn Road High Wycombe WA 6057 (08) 9454 7981</td>
<td>Royal Perth Hospital (Public) Wellington St Perth 9224 2244</td>
<td>273 Abemethy Road Cloverdale WA 6105 (08) 9424 2700</td>
</tr>
<tr>
<td>Power Training Services</td>
<td>Jandakot Medical Centre 1/5 Berrigan Drv South Lake 9417 3233</td>
<td>St John Of God Health Care Murdoch (Private) 100 Murdoch Drv Murdoch 9366 1111</td>
<td>120 Murdoch Drv Murdoch 9313 9000</td>
</tr>
<tr>
<td>Stirling / Balcatta</td>
<td>Stirling Central Medical Group Victoria Rd (cnr Wanneroo Rd) Balcatta 9440 5300</td>
<td>Royal Perth Hospital (Public) Wellington St Perth 9224 2244</td>
<td>50 Chesterfield Rd Mirrabooka 9345 9000</td>
</tr>
<tr>
<td>Waroona Depot</td>
<td>Waroona Doctor Surgery 10 Henning St Waroona 9733 1461</td>
<td>Murray Hospital McKay St Pinjarra 9531 7222</td>
<td>9 Recreation Rd Waroona 9733 7400</td>
</tr>
</tbody>
</table>

### Emergency – North Country depots

<table>
<thead>
<tr>
<th>Depot</th>
<th>Doctor</th>
<th>Hospital</th>
<th>Police</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geraldton</td>
<td>Geraldton Medical Group 233 Lester Ave Geraldton 9920 8111</td>
<td>Geraldton Regional Hospital Shenton St Geraldton 9956 2222</td>
<td>21 Marine Terrace Geraldton 9923 4555</td>
</tr>
<tr>
<td>Jurien depot</td>
<td>Jurien Bay Medical Centre 96 Whitfield Rd Jurien Bay 9652 1484</td>
<td>Closest hospitals are:</td>
<td>2 Batt St Jurien Bay 9652 1017</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Moora (see below)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Three Springs (see below)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Dongara-Eneabba-Mingenew Public</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital 48 Blenheim Rd Dongara</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9927 0200</td>
<td></td>
</tr>
<tr>
<td>Depot</td>
<td>Doctor</td>
<td>Hospital</td>
<td>Police</td>
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<tr>
<td>-----------</td>
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<td>-----------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Kalbarri</td>
<td>Kalbarri Doctors Surgery</td>
<td>Kaiber Street</td>
<td>48 Grey Street</td>
</tr>
<tr>
<td></td>
<td>24 Hackney Street</td>
<td>Kalbarri WA 6536</td>
<td>Kalbarri WA 6536</td>
</tr>
<tr>
<td></td>
<td>Kalbarri WA 6536</td>
<td>(08) 9937 0100</td>
<td>(08) 9936 3000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collins Street Surgery</td>
<td>Kalgoorlie Hospital</td>
<td>Lot 4911 Brookman St</td>
</tr>
<tr>
<td></td>
<td>65 Collins St</td>
<td>Piccadilly St</td>
<td>Kalgoorlie</td>
</tr>
<tr>
<td></td>
<td>Kalgoorlie</td>
<td>Kalgoorlie 9080 5888</td>
<td>9021 9777</td>
</tr>
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### Local Government authorities (Metro) – reinstatement contacts

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Appendix 5 – Western Power facilities information

This appendix contains the following tables:

- SOCC and NOCC phone numbers
- Depot locations
- Substation locations
- Substation arc flash PPE guidelines

SOCC and NOCC phone numbers

<table>
<thead>
<tr>
<th>Description</th>
<th>Phone</th>
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<tr>
<td>NOCC Coordinator</td>
<td>9427 0637</td>
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<td>NOCC North Country General</td>
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<td>NOCC South Metro General</td>
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<td>NOCC South Country General</td>
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<td>SOCC Bulk Transmission Desk</td>
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<td>SOCC Regional Transmission Desk</td>
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## Depot locations

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<td>32 Cook St, Busselton WA 6229</td>
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<td>Collie</td>
<td>1347 Patstone Rd, Collie WA 6225</td>
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<td>Forrestfield</td>
<td>6 Hillary Place, Forrestfield WA 6058</td>
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<td>Geraldton</td>
<td>350 Eighth St, Woorree WA 6531</td>
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<td>Jandakot</td>
<td>85 Prinsep Rd, Jandakot WA 6164</td>
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<td>Newton St, Jerramungup WA 6337</td>
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<td>Stirling</td>
<td>Corner Wanneroo Rd and Balcatta Rd, Balcatta WA 6021</td>
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## Substation locations (see DM# 1189644)

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<td>Aloca Pinjarra</td>
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<td>Golden Grove</td>
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<td>Hazelmere</td>
<td>(941) 27445</td>
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<td>Henley Brook 132/22kv</td>
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<td>Herdsman Pde 66/6.6kv</td>
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<td>9411 7878</td>
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<td>Joel Terrace 132/11 Kv</td>
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<td>(633) 27124</td>
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<td>Alexander Dr</td>
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<td>Muchea 132/22kv</td>
<td>(633) 27170</td>
<td>Byrne Rd</td>
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<tr>
<td>Muja 220kv Switchyard</td>
<td>(941) 27562</td>
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<td>Muja 132kv R &amp; M</td>
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<td>(941) 27556</td>
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<td>Muja 330kv No.2 Switchyard</td>
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<td>Muja 66kv Switchyard</td>
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<td>Mullaloo 132/22kv</td>
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<td>0429 883 167</td>
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<td>Nowergup 132kv</td>
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<td>Faddbury</td>
<td>(633) 27114</td>
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<td>9091 0150</td>
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<td>Parklands</td>
<td>(941) 27486</td>
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<td>9021 6099</td>
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<td>Pinjar 11/132kv</td>
<td>(633) 27116</td>
<td>Perry Rd</td>
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<td>Pinjar Gas Turbine 132/22kv</td>
<td>(941) 27461</td>
<td>Paterson Rd</td>
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<td>Rangeway 13/11kv</td>
<td>(633) 27768</td>
<td>Hutchinson St</td>
<td>Geraldton</td>
<td>North-West Hwy</td>
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## Substation arc flash PPE guidelines

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<td></td>
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<td></td>
</tr>
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<td>Schneider</td>
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<td>1.19</td>
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<tr>
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<td>900</td>
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<td>5.25</td>
<td>10.79</td>
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<td>No</td>
<td>6.64</td>
<td>13.63</td>
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<td>ABB</td>
<td>950</td>
<td>Yes</td>
<td>4.71</td>
<td>9.68</td>
</tr>
</tbody>
</table>
Appendix 6 – First aid information

Instructions

First aid

When possible, the person with the best first aid knowledge should stay with the casualty while someone else calls for emergency assistance.

- To call for the Ambulance, Police or Fire Service, use 000 from all phones (including mobiles). If you are using a digital mobile phone and 000 fails, call 112 unless your service provider has advised otherwise.
- When the emergency operator answers, state clearly which service is required.
- Stay calm and speak clearly to convey the message. Be ready to answer any questions.
- State the following:
  - the exact address or location with any clear landmarks or closest street cross reference
  - an outline of the emergency
  - the number of victims involved
  - any information about the condition of the victims
  - any hazards relevant to the area, such as fire, chemical, spills, fumes
  - the telephone number where the caller can be contacted in case further information is needed.
- Wait until the operator tells you to hang up.
- Ask someone to stay in a prominent position to direct the emergency service vehicle to the correct area.

Secondary survey

Once a primary survey has been carried out and the breathing, circulation and severe bleeding has been controlled, a secondary survey is required.

A secondary survey is designed to determine if the casualty is suffering from any other injuries that require treatment. Complete a full secondary survey of a casualty before treating the injuries so that injuries may be prioritised.

- Always wear rubber gloves and check hands regularly for blood or fluid.
- Do not allow the casualty to move during the survey.
• Speak calmly and reassuringly to the casualty and find out:
  o what happened and enquire if the casualty has any previous injuries
  o if they have any allergies (check for medical alert bracelet/necklace).
  o if they are on any medication
  o check the pulse rate and note the breathing rate and characteristics
  o check the casualty’s back for injuries and/or bleeding

**Recovery position**

The recovery position helps a semiconscious or unconscious person breathe and permits fluids to drain from the nose and throat. If a casualty is unconscious or semi-conscious, move them into the recovery position while waiting for help to arrive.

1. Kneel next to the person. Place the arm closest to you straight out from the body. Position the far arm with the back of the hand against the near cheek.
2. Grab and bend the person's far knee.
3. Protecting the head with one hand, gently roll the person toward you by pulling the far knee over and to the ground.
4. Tilt the head up slightly so that the airway is open. Make sure that the hand is under the cheek. Place a blanket or coat over the person (unless he or she has a heat illness or fever) and stay close until help arrives.

**Note:**

If rolling a casualty into the recovery position, ensure that keys and other objects from pockets have been removed so that further damage or injury is not caused.
Chain of survival

The Chain of Survival describes the sequence of critical intervention stages in the initial care of a cardiac arrest patient. A cardiac arrest patient’s chance of survival increases dramatically with each stage.

The critical stages are:

1. **Early recognition and call for help**
   - Recognise the symptoms of cardiac arrest, attend to the casualty and call for help as soon as possible.

2. **Early access**
   - Access emergency care by calling **000** and asking for an ambulance immediately.

3. **Early cardiopulmonary resuscitation (CPR)**
   - Provide CPR (the emphasis should be on chest compressions). This will increase the casualty's chance of survival by encouraging oxygenated blood to flow to the brain and other vital organs.

4. **Early defibrillation**
   - An electronic device known as a defibrillator should be used to deliver a shock to the heart. The restoration of an adequate heart rhythm is necessary a casualty to survive a cardiac arrest.

5. **Post-resuscitation care**
   - Ensure that the casualty is transported to hospital by an ambulance as soon as possible so that the patient can receive further treatment and their condition can be monitored by healthcare professionals.
DRSABCD action plan

**DRSABCD action plan**
In an emergency call triple zero (000) for an ambulance

**D**
DANGER
Ensure the area is safe for yourself, others and the patient.

**R**
RESPONSE
Check for response—ask name—squeeze shoulders
No response
• Send for help.

**S**
SEND for help
Call Triple Zero (000) for an ambulance or ask another person to make the call.

**A**
AIRWAY
Open mouth—if foreign material is present:
• place in the recovery position
• clear airway with fingers.
Open airway by tilting head with chin lift.

**B**
BREATHING
Check for breathing—look, listen and feel.
Not normal breathing
• Start CPR.

**C**
Normal breathing
• place in recovery position
• monitor breathing
• manage injuries
• treat for shock.

CPR
Start CPR—30 chest compressions : 2 breaths
Continue CPR until help arrives or patient recovers.

**D**
DEFIBRILLATION
Apply defibrillator if available and follow voice prompts.

Learn First Aid | 1300 360 455 | www.stjohn.org.au
Appendix 7 – Blank

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Appendix 8 – Conductor weights

The following conductor weights are based on a structure in the horizontal plane and exclude poles with an angle greater than 10 degrees. They also exclude poles with downward pressure caused by the structure being elevated higher than both adjacent poles.

Table 1: Vertical force of conductor flat terrain (kg)

<table>
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<tr>
<th>Size</th>
<th>Type</th>
<th>Sum of the spans each side of the pole (metres)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>100 200 250 300 350 400 450 500 550 600</td>
</tr>
<tr>
<td>7/2.50</td>
<td>AAC</td>
<td>5  9  12  14  17  19  21  24  26  28</td>
</tr>
<tr>
<td>7/3.00</td>
<td>AAC</td>
<td>7  14  17  20  24  27  30  34  37  41</td>
</tr>
<tr>
<td>7/3.75</td>
<td>AAC</td>
<td>11 21  27  32  37  42  48  53  58  64</td>
</tr>
<tr>
<td>7/4.50</td>
<td>AAC</td>
<td>15 31  38  46  53  61  69  76  84  92</td>
</tr>
<tr>
<td>7/4.75</td>
<td>AAC</td>
<td>17 34  43  51  60  68  77  85  94 102</td>
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<tr>
<td>19/3.25</td>
<td>AAC</td>
<td>22 43  54  65  76  87  97 108 119 130</td>
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<tr>
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<td>5  9  12  14  17  19  21  24  26  28</td>
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<tr>
<td>7/3.00</td>
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<tr>
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<td>17 34  42  51  59  68  76  85  93 102</td>
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<td>19/3.25</td>
<td>AAAC</td>
<td>22 43  54  65  76  87  97 108 119 130</td>
</tr>
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<td>HDBC</td>
<td>7  13  16  20  23  26  29  33  36  39</td>
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</tr>
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<td>HDBC</td>
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<tr>
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<td>ACSR/GZ</td>
<td>6 12  15  18  21  24  27  30  33  36</td>
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<tr>
<td>Size</td>
<td>Type</td>
<td>Sum of the spans each side of the pole (metres)</td>
</tr>
<tr>
<td>------------</td>
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<tr>
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<td>9</td>
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</tr>
<tr>
<td>7/3.75</td>
<td>SC/GZ</td>
<td>30</td>
</tr>
</tbody>
</table>

**Note:** Bay length is the TOTAL distance of unsupported single conductor.
Appendix 9 – Kwinana industrial strip emergency response procedure

Instructions

Staff check-in to area

Staff attending uncontrolled access sites or in near vicinity

- On arrival (preferably prior to alighting from vehicle) personnel must check-in via the Check In – Check out system. For more on this, see work practice 9.2 (Substation entry requirements).
- Confirm that it is safe to enter the site (i.e. there is no danger to personnel if they enter the site or are in the vicinity) by using the Check In – Check out system. If checking in by:
  - smart phone app – a warning message (in the web browser) will be displayed if danger is present
  - phone call (via the Western Power Contact Centre) – ask if it is safe to enter the site

Important

If there is danger present:
- remain in, or return to, the vehicle
- wind up the windows
- place vehicle air controls in recirculation mode
- depart to either Medina or Rockingham substations
- make contact on arrival and await further instruction

- On departure, check-out using the Check In – Check out system.
Advising field staff of an incident

Alerting field staff of an incident
Alerting Network Operations Control (NOC) of an incident will usually be done by the Tiwest Cogen Operator (TCO) but could be via a third party.

NOC alerting field staff of an incident
- NOC is to confirm which staff, if any, are checked in.
- NOC is to advise all staff of the incident.
- The Network Coordinator will declare a Western Power Internal Level One Emergency stating that an emergency or incident (briefly describing the emergency/incident) exists in the Kwinana Industrial Strip.
- All staff that are logged in must be advised of the incident and instructed with the appropriate response.

Alerting field staff that all is clear
- When the emergency/incident no longer exists the TCO will contact NOC to advise that all is clear.
- NOC will advise all staff in the affected locations that the emergency/incident no longer exists.
- Confirm with field staff that previous contact arrangements are still correct.
- The Network Coordinator will relinquish the Western Power Internal Level One Emergency when advised by NOC that the emergency or incident no longer exists.
## Work Practices

### Uncontrolled Access Sites

1. British Petroleum Substation (BP)
2. Broken Hill Substation (BHK)
3. Hismelt Substation (HIS)
4. Kwinana 132/66 kV Substation (kW 8/7) substation only
5. Mason Road Substation (MSR)
6. Western Mining Substation (WM)

### Controlled access sites required through site security

7. Alcoa Kwinana Substation (AKW)
8. Australia Fused Metals Substation (AFM)
9. BP Refinery Substation (BPR)
10. CSBP Kwinana Substation (CBP)
11. Kwinana Power Partners Substation (KPP) – including Cogen Power Station site
12. Kwinana Power Station Site
13. Kwinana Power Station Site – microwave site
14. Kwinana 330 kV Substation (KW9)
15. Kerr McGee Kwinana Substation (KMK), including Cogen Power Site
16. Tiwest Pigment Plant (TPP)

![Map of Kwinana Industrial Strip](image)
References

- Work Practice Manual, work practice 9.2 (Substation entry requirements)
- Network Operations Control Room Instruction 00-11 – Kwinana industrial strip emergency response procedure (DM# 1190718)
## Appendix 10 – Portable Earth Inspection Sheet (DM# 10772616)

<table>
<thead>
<tr>
<th>Portable Earth serial number: (found on manufacturers label)</th>
<th></th>
</tr>
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- Inspect portable earth according to criteria listed overleaf.
- Record data for items 1 – 9, below.
- If any of the parts are in poor condition, then the portable earth must be tagged 'out of service' pending repair.

1. Earth leads
   - Condition acceptable
     - Yes [ ]
     - No [ ]
   - Cracked/poroforated
     - Yes [ ]
     - No [ ]
   - Internal damaged
     - Yes [ ]
     - No [ ]

2. Phase and earth clamps
   - Thread in good condition
     - Yes [ ]
     - No [ ]
   - Jaws in good condition and grooves clean
     - Yes [ ]
     - No [ ]
   - Lubricated
     - Yes [ ]
     - No [ ]

3. Crimped lugs
   - Cracked or damaged
     - Yes [ ]
     - No [ ]
   - Correct crimp method
     - Yes [ ]
     - No [ ]

4. Bolted connections
   - Tight
     - Yes [ ]
     - No [ ]

5. Mechanical stress
   - Condition acceptable
     - Yes [ ]
     - No [ ]
   - Cracked/poroforated
     - Yes [ ]
     - No [ ]

6. Conductor strands
   - 89% intact
     - Yes [ ]
     - No [ ]

7. General: Use a moist cloth to remove dust and clean the portable earth.
   - Yes [ ]

8. Recording: Attach an inspection tag showing the date of next inspection close to the ground clamp. For phase shorting leads, attach the tag near to one end.
   - Yes [ ]

9. Filling: File this completed sheet in the Portable Earth Register
   - Yes [ ]

**Comments:**

```

```

<table>
<thead>
<tr>
<th>Date of Inspection</th>
<th>[<strong>] / [</strong>] / [__]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of inspector</td>
<td>[________________]</td>
</tr>
<tr>
<td>Signature</td>
<td>[________________]</td>
</tr>
<tr>
<td>Date of next inspection</td>
<td>[<strong>] / [</strong>] / [__]</td>
</tr>
</tbody>
</table>

See overleaf for detailed instructions
Perform the following inspections and checks and record findings on the Portable Earth Inspection Sheet, overleaf.

<table>
<thead>
<tr>
<th>Earth leads</th>
<th>Inspect entire length of each lead. Insulation must not be cut, cracked or perforated. Inspect and replace if there is internal damage to the conductor strands, evidence of distillation or bird-caging. Replace damaged leads.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase and earth clamps</td>
<td>Clamp mechanism and thread must operate smoothly and freely through full travel. Spindle threads must not be damaged or show signs of binding. Remove dirt and scale from grooves of jaw faces. Lightly lubricate threads with general-purpose lubricant. Clean off excess and ensure clamp jaws are dry. Replace clamp if threads or jaws are seized, misaligned or damaged.</td>
</tr>
<tr>
<td>Crimped lugs</td>
<td>Check for physical damage or cracks. If damaged, indent or v-crimped, or incorrectly crimped, replace. If replacement of lugs is necessary, ensure that the correct sized lugs and crimping dies for cable size are used.</td>
</tr>
<tr>
<td>Bolted connections</td>
<td>Must be solidly bolted. If loose, dismantle, clean contact faces and apply aluminox paste. Re-bolt to correct torque (50 kN).</td>
</tr>
<tr>
<td>Mechanical stress</td>
<td>Check that the joint connections between the earth-leads and lugs are firm and infusable. If damaged, remove the heat-shrink, check for damage to stands and repair. Apply new heat-shrink.</td>
</tr>
<tr>
<td>Conductor strands</td>
<td>Must be at least 95% intact, not kinked or bird-caged, check for fatigue and corrosion. Pay special attention to the cable-lug junction.</td>
</tr>
</tbody>
</table>

**Notes:**
- NO unapproved modifications may be made to portable earths – components of the portable earth must not deviate from the portable earth specification.
- Inspection records must be maintained in the depot filing system. If no repair work is required and the earth is to be put back into service, the next inspection date must be clearly written with indelible pen on a new tag to be affixed near one end of the earth lead.
- Repair work may result in the shortening of earth leads. Manufacturer advice is for the earth lead to be ≥20% longer than the distance between the two points of attachment.
- Portable earths that are beyond repair must be destroyed.