Emergency contact numbers
NOCC incident notification
9427 0626
SOCC Terminal Stations and Zone Substations
1300 884 149
Executive summary

These rules outline the minimum electrical safety standards for switching and accessing Western Power’s transmission and distribution networks. They protect you, your colleagues and the public from injury and harm.

The ESSR is issued under the authority of the General Manager, System Management and replaces the 2009 Electrical System Safety Procedures (ESSP). It has been designed to be read in conjunction with the Work Practice Manual and other manuals.

The ESSR incorporates the learnings from switching incidents and bulletins since 2009. Many valuable contributions have been made to this document; gathered through cross-business workshops, safety meetings, independent reports, stakeholder reviews, and hazard, near hit and incident recommendations.

I urge you to read these rules carefully and understand them as they are issued for your safety. If you do not understand any part of these rules, seek clarification from your formal leader.

Have a safe day.

Shane Duryea
System Management
Acknowledgements

Many thanks to the following 2012 ESSR contributors:

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1 General provisions

1.1 ESSR scope and intent

The intention of the Electrical System Safety Rules (ESSR) is to provide Western Power with a standard set of rules and procedures that govern all access to the network.

The rules within the ESSR are intended for all persons who work on or near the Western Power Electrical System.

The Western Power Electrical System incorporates the transmission and distribution networks in their entirety, but specifically excludes extra low voltage (ELV) systems (as defined in AS/NZS 3000:2007 Wiring Rules), street lighting appliances and metering services.

1.2 Issue of the ESSR

The ESSR is issued to the network total workforce required to work on or near electrical apparatus and conductors. The ESSR must be issued to staff prior to any network authorisation being granted.

The ESSR, as well as any additional related documentation and amendments, must be kept in good condition so that they can be used as a reference.

The ESSR is a stock item with stock code 18817285.

All personnel have access to the ESSR electronically via the website http://busbar/essr.
1.3 Document hierarchy

Figure 1: Western Power’s Safety and Health Management System Document Framework

The ESSR is a Management Standard/Procedure within the overall Western Power Safety and Health management system (fig. 1).

Bulletins that are distributed after the ESSR supersede the relevant section of the ESSR. They clarify and/or update the information that they directly relate to.

The ESSR is to be read in conjunction with the Work Practice Manuals, work instructions, practices and procedures.

1.4 Right to refuse

Any safety related objections to carrying out these rules and procedures must be immediately reported. The matter will be investigated and if necessary, referred to System Management.
1.5 Incidents: reporting and emergency protocol

1.5.1 Reporting

Western Power is dedicated to improving incident investigation and debriefing, to create an environment where reporting is approached without fear of retribution or stigmatisation.

All switching incidents must be reported in accordance with Western Power’s incident reporting procedures. The vital lessons from incidents, near-misses and worksite hazards will be used to improve safety and these rules.

(Refer to Western Power’s Incident Reporting and Investigation Procedure for further information.)

1.5.2 Emergency protocol

Following a switching incident, the switching operator must immediately move outside the danger zone and contact the appropriate Operating Authority control centre. The Operating Authority will record the incident and provide further instructions on how to proceed.

(Refer to section 3.3 for the full emergency protocol.)

1.6 Work on other authorities’ apparatus

Occasionally Western Power employees are required to work on or near electrical systems and associated plant/apparatus that are not owned or controlled by Western Power. Prior to starting any such work there must be a clear agreement of the rules, documents and procedures that are to be used by all working parties. All staff concerned must be informed.

In the event that rules/policies are provided by a third party, these rules must be confirmed to at least comply with the ESSR (the ESSR is always the minimum standard).

In the case where no external-party rules, documents or procedures apply, Western Power’s ESSR and related documentation must be used.
## 2 Definitions

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved</td>
<td>Having appropriate Western Power endorsement in writing for a specific function.</td>
</tr>
<tr>
<td>Authorised person</td>
<td>A competent person with the delegated authority to perform the duty concerned on behalf of Western Power.</td>
</tr>
<tr>
<td>Brownfield site</td>
<td>An operational site undergoing enhancement and expansion work (that remains under the overall control of a primary system operating authority) that has sections made non-connectable under an Electrical Access Permit by the physical removal of conductors. Control of that non-connectable plant may be delegated by the primary operating authority to either a construction or a commissioning authority via a formal handover certificate.</td>
</tr>
<tr>
<td>Caution tag</td>
<td>An approved notice that reads 'CAUTION'.</td>
</tr>
<tr>
<td>Competent person</td>
<td>A person having the skills, knowledge and attributes needed to safely complete a task.</td>
</tr>
<tr>
<td>Conductor</td>
<td>A wire, cable or form of metal designed for carrying electric current (includes neutral and earth).</td>
</tr>
<tr>
<td>Connectable</td>
<td>Apparatus capable of being connected to the live system by the switching of an isolating device.</td>
</tr>
<tr>
<td>Connected</td>
<td>Joined together by a conductor capable of 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.</td>
</tr>
<tr>
<td>Word</td>
<td>Definition</td>
</tr>
<tr>
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</tr>
<tr>
<td>Control Authority</td>
<td>This is the representative authority responsible for the control of the apparatus. Typically this includes:</td>
</tr>
<tr>
<td></td>
<td>• Construction Authority</td>
</tr>
<tr>
<td></td>
<td>• Commissioning Authority</td>
</tr>
<tr>
<td></td>
<td>• Operating Authority</td>
</tr>
<tr>
<td></td>
<td>• third party</td>
</tr>
<tr>
<td>Controller</td>
<td>An authorised person who co-ordinates switching, performs switching by remote control, records and controls the issue of work permits.</td>
</tr>
<tr>
<td>Danger</td>
<td>The presence of risk to health and/or risk of bodily injury.</td>
</tr>
<tr>
<td>Danger tag</td>
<td>An approved notice that reads ‘DANGER – DO NOT OPERATE’.</td>
</tr>
<tr>
<td>Danger zone</td>
<td>The area surrounding live electrical equipment (such as powerlines) that ordinary persons, other equipment and materials must not enter</td>
</tr>
<tr>
<td>De-energised</td>
<td>The electrical supply to electrical apparatus has been switched off.</td>
</tr>
<tr>
<td>Discharged (electrical)</td>
<td>Conductors which have been connected to earth to remove any stored electrical energy.</td>
</tr>
<tr>
<td>Discharged (mechanical)</td>
<td>Mechanical, hydraulic, pneumatic or fuel energy apparatus which has had all stored energy removed.</td>
</tr>
<tr>
<td>Earth</td>
<td>The general conductive mass of the earth, the electric potential of which, at any point, is conventionally taken as zero.</td>
</tr>
<tr>
<td>Earthed</td>
<td>Electrically connected to earth in an approved manner by earthing conductors or switches.</td>
</tr>
<tr>
<td><strong>Word</strong></td>
<td><strong>Definition</strong></td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Electrical Access Permit (EAP)</td>
<td>Western Power's standard form that authorises access to, and work on, an electrical apparatus that has been made safe through isolating and earthing (HV) or short-circuiting (LV).</td>
</tr>
<tr>
<td>Electrical apparatus</td>
<td>An item of electrical machinery or equipment (including primary and secondary) in which conductors are used, supported, or are contained within.</td>
</tr>
<tr>
<td>Emergency service personnel</td>
<td>Trained personnel from organisations which ensure public safety and health. This includes police, ambulance and fire &amp; rescue services.</td>
</tr>
<tr>
<td>Equipotential bonding</td>
<td>Electrical connections intended to bring exposed conductive parts or extraneous conductive parts to the same or approximately the same potential, but not intended to carry current in normal service.</td>
</tr>
<tr>
<td>Extreme emergency</td>
<td>Situation that presents an immediate threat to life, property or the environment.</td>
</tr>
<tr>
<td>Greenfield site</td>
<td>A whole site that is not connectable to Western Power’s operational network.</td>
</tr>
<tr>
<td>Handover certificate</td>
<td>Is used when responsibility for control of one or more items of plant, or an entire site, is transferred from one Control Authority to another.</td>
</tr>
<tr>
<td>High voltage (HV)</td>
<td>A voltage exceeding 1000 volts AC or 1500 volts DC.</td>
</tr>
<tr>
<td>Incident</td>
<td>An unplanned event that causes or has the potential to cause harm to persons, the environment, assets or loss of supply. Incidents include near-hits and may include non-conformances.</td>
</tr>
<tr>
<td>Isolated</td>
<td>De-energised by an isolating device that prevents unintentional energisation of the electrical apparatus.</td>
</tr>
<tr>
<td>Isolating device</td>
<td>A device for rendering plant and electrical apparatus isolated.</td>
</tr>
<tr>
<td>Word</td>
<td>Definition</td>
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</tr>
<tr>
<td>Isolation point</td>
<td>An isolating device that has been positioned off, remote operation disabled, has a danger tag fitted and is assessed as a suitable step in the process of making safe for access purposes.</td>
</tr>
<tr>
<td>Issuing Officer (IO)</td>
<td>An authorised person who is responsible for issuing and cancelling work permits.</td>
</tr>
<tr>
<td>Label</td>
<td>Approved means of identification of circuit or apparatus.</td>
</tr>
<tr>
<td>Live</td>
<td>Energised or subject to hazardous induced or capacitive voltages.</td>
</tr>
<tr>
<td>Live work</td>
<td>All work performed on components of electrical apparatus not isolated, proved de-energised, short-circuited or earthed.</td>
</tr>
<tr>
<td>Low voltage (LV)</td>
<td>A voltage less than 1000 volts AC or 1500 volts DC</td>
</tr>
<tr>
<td>Minimum approach distance (MAD)</td>
<td>The minimum separation distance that must be maintained by a trained and competent person, mobile plant (including its load) or any object (other than insulated objects designed for contact with live conductors) from electrical apparatus. Formally replaces SAD.</td>
</tr>
<tr>
<td>Near</td>
<td>Outside the MAD where there is a reasonable possibility of a person, mobile plant or any object, either directly or through any conducting medium, coming within the MAD.</td>
</tr>
<tr>
<td>Network</td>
<td>An interconnected system of transmission and/or distribution conductors and electrical apparatus.</td>
</tr>
</tbody>
</table>

**Note:** “Network” and “system” can be used interchangeably.

<table>
<thead>
<tr>
<th>Network Operations Control Centre (NOCC)</th>
<th>See ‘Operating Authority’.</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Working anywhere inside the MAD.</td>
</tr>
<tr>
<td>Word</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Operating agreement (OA)</td>
<td>A formal agreement between two control authorities, which could include a customer owned and operated network, confirming that an electrical apparatus’ operational state will be held in an agreed state until the cancellation of the agreement. An OA is <strong>not</strong> a work permit and does not authorise work to be undertaken.</td>
</tr>
<tr>
<td>Operating Authority</td>
<td>The division responsible for the operation and control of the network. The transmission system is controlled by SOCC and the distribution system is controlled by NOCC.</td>
</tr>
<tr>
<td>Ordinary person</td>
<td>A person without sufficient training or experience to enable them to avoid the dangers that electrical apparatus may create. Any person who is not a competent or authorised person (as defined by the ESSR) is therefore an ordinary person.</td>
</tr>
<tr>
<td>Out of commission</td>
<td>Connected electrical apparatus that is unserviceable and not fit for its intended use/purpose/service in its current condition. A commissioning process is required before it can be returned to service.</td>
</tr>
<tr>
<td>Out of use</td>
<td>Electrical apparatus removed from its source of supply by the removal of a permanent length of conductor. No permit is required for access.</td>
</tr>
<tr>
<td>Note:</td>
<td>“Out of use” and “disconnected” can be used interchangeably.</td>
</tr>
</tbody>
</table>
| Permanently leaving site                  | **RIC/TIC:** the loss of control of a work site under a work permit, requiring the formal transfer of RIC/TIC responsibilities.  
**Recipient:** leaving a work site with the intention of no longer working on the relevant electrical apparatus’ under the work permit.                                                                                                                                                                                                                                                                                                           |
<p>| Person in charge                          | The person responsible for work being carried out by a work party.                                                                                                                                                                                                                                                                                                                                                                                                              |</p>
<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Protective Equipment &amp; Clothing (PPE &amp; PPC)</td>
<td>Approved clothing or similar items intended to protect a person from injury. Specifically approved for particular work types and/or work location.</td>
</tr>
<tr>
<td>Plant</td>
<td>Mechanical plant including all machinery and equipment not elsewhere defined as electrical apparatus.</td>
</tr>
<tr>
<td>Primary plant</td>
<td>Primary plant is all equipment which can be connected to HV levels (circuit breakers, isolators, and current transformers) and any equipment directly associated with the major plant (Buchholz relays on transformers, SF6 gas pressure switches on circuit breakers, etc).</td>
</tr>
<tr>
<td>Program earth</td>
<td>Earthing equipment of an approved type applied as part of an electrical switching program/schedule.</td>
</tr>
<tr>
<td>Rapid response spare transformer (RRST)</td>
<td>A mobile zone substation transformer deployed at times of transformer failure.</td>
</tr>
<tr>
<td>Recipient</td>
<td>A person authorised by Western Power to sign on and sign off work permits.</td>
</tr>
<tr>
<td>Recipient in charge (RIC)</td>
<td>The authorised person who is responsible for accepting and relinquishing EAPs and VA permits, managing work group activities to ensure compliance with the conditions of an EAP/VA, and monitoring work group activities to ensure compliance with the requirements of the ESSR.</td>
</tr>
<tr>
<td>Restricted Use tag (RUT)</td>
<td>An approved notice that reads ‘DANGER: RESTRICTED USE’.</td>
</tr>
<tr>
<td>Running earth</td>
<td>An additional aerial earthed conductor run, either above or below the active conductors.</td>
</tr>
<tr>
<td>Safety observer</td>
<td>A competent person (competent at safety observation) assigned by the person in charge whose sole function is to observe and warn against unsafe approach to live electrical apparatus or other unsafe conditions.</td>
</tr>
<tr>
<td>Word</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Sanction to Test (STT)</td>
<td>Western Power’s standard form which authorises the testing of electrical apparatus.</td>
</tr>
<tr>
<td>Supervisory Control &amp; Data Acquisition (SCADA)</td>
<td>A system of equipment that provides network operators at East Perth Control Centre real time remote visibility and control of the transmission and distribution electrical network. A SCADA system comprises of master station equipment installed at East Perth Control Centre, and remote equipment called Remote Terminal Units (RTUs) installed at terminals, zone and distribution substations.</td>
</tr>
<tr>
<td>Short-circuited low voltage</td>
<td>The bonding of all phase and neutral conductors using approved equipment and procedures.</td>
</tr>
<tr>
<td>Static charge</td>
<td>The build up of potential from the environment.</td>
</tr>
<tr>
<td>Substation</td>
<td>Any yard, terminal, switchyard, zone substation or facility that transforms or switches high voltage.</td>
</tr>
<tr>
<td>Switching</td>
<td>The operation of circuit breakers, isolators, disconnectors, fuses or other methods of making or breaking an electrical circuit. This also includes the application and removal of program earths.</td>
</tr>
<tr>
<td>Switching device</td>
<td>Any item on the network capable of connecting and disconnecting electrical apparatus.</td>
</tr>
<tr>
<td>Switching operator’s authority</td>
<td>An authority that has been issued to give approval to perform switching operations.</td>
</tr>
<tr>
<td>Switching operator</td>
<td>A person authorised by the Operating Authority to carry out switching operations within the limits of their authorisation.</td>
</tr>
<tr>
<td>Switching program/schedule</td>
<td>A list of switching operations that are placed in a logical sequence to ensure the operation of electrical apparatus is carried out in a safe sequence.</td>
</tr>
</tbody>
</table>

**Note:** “Program” and “schedule” can be used interchangeably.

System  See ‘network’.
<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
</table>
| System Management Division (SMD) | Based at the East Perth Control Centre and consists of:  
  • Planning and Market Operations  
  • Network Operations  
  • System Operations Control  
  • SCADA & Information Systems |
<p>| System Operations Control Centre (SOCC) | See ‘Operating Authority’.                                                                                                                |
| Tester in charge (TIC)      | The authorised person who is responsible for accepting and relinquishing Sanction to Test (STT) permits, managing work group activities to ensure compliance with the conditions of an STT, and ensuring all work activities comply with the requirements of the ESSR. |
| Temporarily leaving site    | Departing a work site with the intention of returning to work on the relevant electrical apparatus under the same work permit within the same day. |
| Under direction (a ‘D’ restriction) | An authorised switching operator who can carry out switching on their own; however, each item of a schedule requires direction by telephone or radio from an authorised switching operator. |
| Vehicle                     | A non-living means of transportation for people and cargo, with steering and driving capability.                                           |
| Vicinity Authority (VA)     | Western Power’s standard form that authorises work near live electrical apparatus or electrical apparatus which must be treated as live. |
| Warning tag                 | An approved notice that reads ‘WARNING: DO NOT USE OR OPERATE’.                                                                          |
| Work                        | All construction, maintenance and trade based activities undertaken in a field environment.                                              |</p>
<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work area</td>
<td>The location between program earths where, once a work permit has been issued, work and/or switching can take place. In the case of terminal and zone substations, this defined work area would normally be flagged and barred.</td>
</tr>
<tr>
<td>Working earth</td>
<td>Applied during electrical access work to provide more obvious confirmation of program earths and/or to control induced and static voltages at the worksite.</td>
</tr>
<tr>
<td>Work permit</td>
<td>The formal document issued by an Operating Authority to grant access to equipment. The subsequent work to be undertaken within the restrictions and limitations specified by the Operating Authority is recorded on the permit.</td>
</tr>
<tr>
<td>Work site</td>
<td>The general location where work and/or switching is to take place. The worksite surrounds the work area, e.g., a zone substation yard.</td>
</tr>
</tbody>
</table>
3 General safety rules

Safety and health is the highest priority of Western Power. No activity is permitted to come before the safety and health of employees, contractors, and the public.

3.1 Safe switching

Switching can only be carried out by an authorised switching operator within the limits of that switching operator’s authority and authorised instructions.

Switching is a highly technical and demanding task. Potential errors are minimised by applying the STOP, THINK, CHECK rule prior to the start of each operation.

STOP... 

THINK: What are the existing conditions?

CHECK: Are there any other checks to be made before operation? E.g., permit status, earths to be removed and circuit breaker status.

Figure 2: An example using the protocol - what are the existing conditions?

The operator must take precautions in controlling hazards by adhering to approved procedures.
Take a minute before each item

STOP!
THINK!
CHECK!

Figure 3: Take a minute to stop, think and check.

3.2 Electrical hazards

Electrical hazards pose a significant threat to the safety and health of employees, contractors, and the general public.

Some common sources of electrical hazard include:

1. inadvertent contact with live equipment
2. unauthorised work within the danger zone
3. faults, breakdown in insulation systems and equipment defects
4. effects of direct and indirect lightning storms
5. equipment becoming inadvertently live due to induced voltages or interference
3.2.1 Shock

Shock is the unwanted flow of electricity through the body. Typically it occurs when the human body creates a path between a live conductor and an earth. Electrical shock can cause severe electrical burns, internal tissue damage and/or ventricular fibrillation. Shock can stop the human heart on impact and cause death. Small charges and induction from stray earths must not be underestimated. The threshold of let-go is generally considered to be 10 mA. For a typical person this is equivalent to 10 volts.

Electric shock hazards can occur through step and touch in the vicinity of faulty electrical apparatus (see section 3.2.4 and section 3.2.5).

3.2.2 Arc Flash

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.

3.2.3 Blast

A blast is an arc flash that yields an explosion (a massive amount of energy that rapidly vaporizes 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.
3.2.4 Step potential

Electricity always seeks the shortest and most direct conductive path to earth. In the case of a ground fault, for example a fallen conductor, electricity will pass into the soil/ground and fan outwards with diminishing voltages.

Step potential is a shock hazard that occurs when a person is close to or steps towards an energised contact site. The step voltage that passes through the body is calculated by the difference in voltage of the energised soil between their feet.

Figure 4: Step Potential - 22 kV System

In figure 4 fault current is travelling down a conductor to the ground. This conductor is energising the surrounding ground, diminishing in voltage as it moves from the contact site. Standing with one foot in the 8 kV voltage zone (determined by the distance from contact site), and a second foot within the 6 kV voltage zone, this person would experience a hazardous shock of 2 kV (2000 volts).
3.2.5 Touch potential

Touch voltage is experienced when contact is made with an energised object. The touch voltage that passes through the body is equal to the difference between the voltage of the energised object and the voltage of the zone where the feet are placed, remembering that voltages diminish in a radial pattern from the contact site.

Figure 5: Touch Potential - 22 kV System

In figure 5, touching the 12.7 kV conductor while standing within the 10 kV voltage zone (determined by the distance from contact site) would yield a hazardous shock of 2.7 kV.

(Refer to section 6 for further information on approaching hazards.)
3.3 Hazard identification, faults, emergencies & on-site response

3.3.1 Hazard identification

Fault operations and primary response procedures are high-priority activities that manage network hazards to make the network safe. All personnel must ensure that their own safety and the safety of others is not placed at risk.

Prior to commencing any work on or near electrical apparatus, hazards must be identified, risk assessed and controlled.

Factors that assist in the control of hazards include:

1. adhering to the minimum approach distance (MAD) rules
2. the work method employed, including the use of safety observer(s)
3. the skill and knowledge of the work team or individual
4. adequate and effective communication

The identification and control of other non-electrical hazards is outside the scope of these rules and is covered in other Western Power procedures and instructions.

3.3.2 Emergencies and on-site response

Any Western Power authorised person, whether on or off duty, who finds or is advised of a hazard to public safety caused by Western Power’s electrical supply system, must:

1. take immediate steps to protect the public
2. seek assistance
3. where possible, instruct a willing ordinary person to stand in a suitable position to warn the public of the hazard. This instructed ordinary person must be willing to remain until the return of the authorised person, or until other assistance arrives
4. set up a NO-GO zone¹
5. notify the Operating Authority

Note: ¹As a guide, emergency services personnel will set up a NO-GO zone of at least 8m from any electrical hazard source. (Refer to section 6 for further information on minimum approach distances.)
In extreme emergencies that present an immediate threat to life, property or the environment:

- switching to remove the threat can only be performed by an authorised person. Any emergency switching must be reported to the Operating Authority as soon as the switching has taken place
- switching can be performed by a person not authorised to switch when under instruction from an appropriately authorised switching operator or controller. This unauthorised person has the right to refuse this task.

De-energisation is mandatory if emergency services personnel have to attend the hazard.

No attempts to de-energise the hazard in the immediate vicinity of the reported hazard, for example within a common cubicle, can be made.

### 3.4 General switching requirements

Apart from the emergency exceptions described in 3.3.2, switching operations can only be performed by appropriately authorised switching operators and/or controllers within the limits of their authority and authorised instructions.

(Refer to appendix 2 for switching operator authority levels.)

### 3.4.1 Operating Authority

All HV switching is coordinated through the Operating Authority Control Centres of Western Power. Transmission switching is controlled by SOCC and distribution switching is controlled by NOCC.
3.4.2 Switching schedules

A switching schedule is a sequential, numbered list of precisely ordered switching operations (steps). A HV/LV Distribution Network Access Request (DNAR) or Notice of Intention to Work (NOIW) must be submitted to generate a switching schedule for planned work.

The process of creating, approving and executing HV and/or LV switching schedules must involve a minimum of two authorised persons. The first authorised person can complete more than one task in this process (if permitted to do so), but they must ensure that at least one step of the process is the responsibility of a second authorised person. This ensures program integrity.

In the event that amendments are required, all parties must agree to the additional changes prior to execution.

At the commencement of a schedule, the switching operator must verify the correct schedule version number with the Operating Authority. The switching operator must also refer to any current maps, schematics, diagrams and/or other operating instructions to confirm correct location and apparatus (see 3.1 STOP, THINK, CHECK protocol). When ready to commence, the switching operator must contact the Operating Authority for permission.

(For further information refer to document NWI-87: Operations requiring a switching programme.)
### 3.4.3 Switching vs. live work

| **Live work:** | All work performed on components of electrical apparatus not isolated, proved de-energised, short-circuited or earthed.  
| | The intent of live work is to keep equipment live through bridging and manipulation. All live work requires the upstream protection to be set to single shot operation or be inherently single shot operation. A VA is required for live work. |
| **Switching:** | The operation of circuit breakers, isolators, disconnectors, fuses and/or other methods of making or breaking an electrical circuit.  
| | Switching includes:  
| | • the application and removal of program earths  
| | • the application and removal of live line taps¹  
| | These will be declared as switching steps on a switching schedule. Switching can also involve the use of live line stick techniques.  
| | The Operating Authority must be contacted prior to any switching to authorise the relevant steps to proceed. |
| **Note:** | ¹"A switching operator requires ‘limited live line training’ to break live taps. Refer to the High Voltage Live Work Manual for further information" |
| **Note:** | The resetting of relay flags is not considered switching. |

Planned work, regardless of type, requires a DNAR to be submitted.
3.4.4 Switching

At each item on the switching schedule, and before performing an operation, the switching operator and/or controller must verify:

1. the correct item number on the schedule
2. the correct location
3. the correct apparatus
4. the apparatus is in the expected state prior to operation and is fit to be operated

Following the STOP, THINK, CHECK protocol is mandatory (see section 3.1).

After operating the electrical apparatus, the switching operator must:

1. confirm any visible contacts are in the final desired position on each phase
2. use mechanical or other positive indications to visually confirm circuit breakers are off before operating the associated disconnectors (isolators) or racking withdrawable switchgear
3. record the exact time a switching operation is executed for each step of the switching schedule

As a safety precaution the switching operator should give preference to operating/energising/de-energising equipment from a distance, or via a remote means. Where available, voltage and current indicators must be used by the controller and/or switching operator to confirm switching and the apparatus’ operational status.

When returning from a break, the switching operator must confirm with the Operating Authority that they are still working from the correct schedule version and are at the right step.

3.4.5 Separate HV and LV Schedules

When high voltage (HV) and low voltage (LV) switching is required, separate HV and LV switching schedules must be used.
3.4.6 Planned outages for life support equipment customers

Prior to any planned interruption, Western Power must provide at least 3 business days written notice to a life support equipment customer’s supply address (the 3 days to be counted from the date of receipt of the notice), and use best endeavours to obtain verbal or written acknowledgement from that customer that the notice has been received, as per the Western Power notification requirements.

Western Power must also use best endeavours to contact the customer just prior to the planned interruption.

The planned interruption may be avoided by the use of generators.

(Refer to section 11.2.2 for further information on planned LV switching & interruption.)

3.4.7 HV customer & customer owned networks

These are networks owned, controlled and switched by third-parties. The customer is considered the 'Operating Authority' of their own network. A Western Power Operating Authority or switching operator is not authorised to switch in a customer network unless trained and formally authorised to do so.

3.5 Controlling authorities and connectable equipment

The distribution Operating Authority, managed by NOCC, begins at the busbar side of the feeder circuit disconnectors for overhead circuits and includes the busbar shutters for indoor rackable switchgear. The transmission Operating Authority, managed by SOCC, extends to and includes the lower voltage busbar at a zone substation and associated bus section circuit breakers and disconnectors (see figure 6).

In transmission and secondary systems, the demarcation between construction, commissioning and operating authorities has distinct handover points.

In distribution, the concept of and demarcation between the construction, commissioning and operating authorities is more difficult to apply.
To maintain safe management of all connectable equipment, there must be a distinction between the construction/commissioning authority and the Operating Authority.
3.5.1 Connectable equipment

In order to achieve maximum safety for employees, contractors and the public, the Operating Authority must have an accurate network model at all times. Therefore, additions, amendments and/or the removal of components from the network must be captured in real time in controlled diagrams.

All connectable equipment is under Operating Authority control.

All electrical apparatus connected to the load side of a switch that is OFF is connectable. Any cables and network that are tapped into the network are also connectable.

3.5.2 Precautions for differing network and phase voltages

Where electrical apparatus have differing voltages or differing phases that can be interconnected, apparatus must be rendered incapable of switching and/or interconnection.

Where an out-of-phase point or differing voltage network exists either side of an open point, the open point must be locked in the open position with a warning tag and have adequate prominent signage posted to warn of the associated danger(s). The changed conditions must be communicated to the Operating Authority and corresponding signs/tags applied to controlled diagrams.
3.6 Handover certificates

A handover certificate is a formal document by which control and responsibility for equipment is transferred from one authority to another. All persons working on the electrical apparatus at the time of handover must sign the handover certificate. This is to acknowledge that they understand the change in responsibility for control of that electrical apparatus.

All permits issued for an electrical apparatus must be cancelled before the electrical apparatus is handed over to the Operating Authority.

On completion of the handover the electrical apparatus is under the responsibility of the Operating Authority and may be connected to Western Power’s electrical system.

3.6.1 Handover certificate requirement for transmission

Table 1: Handover certificate requirement for transmission

<table>
<thead>
<tr>
<th></th>
<th>Connectable</th>
<th>First Energisation</th>
<th>Normal Service</th>
<th>Disconnected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green or Brown field site</td>
<td>Yes – must list restrictions</td>
<td>Comment on cancellation of STT – OK to energise</td>
<td>Yes – Final handover with restrictions if applicable</td>
<td>Yes – from SMD to Construction/ Workgroup</td>
</tr>
<tr>
<td>RRST</td>
<td>Yes – must list restrictions</td>
<td>Comment on cancellation of STT – OK to energise</td>
<td>Yes – Final handover with restrictions if applicable</td>
<td>Yes – from SMD to Primary Maintenance</td>
</tr>
<tr>
<td>Asset Replacement</td>
<td>Not Normally as asset is already connected</td>
<td>Comment on cancellation of STT – OK to energise</td>
<td>Yes – Final handover with restrictions if applicable</td>
<td>Not Normally</td>
</tr>
</tbody>
</table>

An example of a handover certificate can be found in appendix 8.
3.7 Electrical apparatus labels

Electrical apparatus such as circuit breakers, isolators, disconnectors, fuses or other methods of making or breaking an electrical circuit must be clearly labelled by an approved means. This is to ensure that all electrical apparatus can be accurately identified and described.

All electrical apparatus must be legibly and permanently labelled to clearly identify the equipment. Where applicable a label should also identify what an apparatus is connected to, and the portion of the electrical installation that it controls.

Destination labels must be proved prior to equipment being handed over for connection.

3.8 Electrical tags

All personnel working with a danger, warning or caution tagged electrical apparatus must comply with any instruction or information on the tag prior to commencing any tasks associated with the apparatus.

There are four approved Western Power operational tags.

3.8.1 Danger tag

The danger tag is affixed to isolation and program earthing points to prevent their operation. These points are established prior to the issue of an EAP and are recorded on the EAP. The danger tag must not be used for non-work permit situations.

Figure 7: Danger tag - Do Not Operate
3.8.2 Warning tag

This tag prohibits the operation of an electrical apparatus. This is to prevent damage to the electrical apparatus, network, and/or person who may otherwise operate the electrical apparatus. It is affixed to the electrical apparatus and describes the physical condition of the apparatus and/or the network controlled by that apparatus.

Figure 8: Warning tag - Out of Service

3.8.3 Restricted Use (RUT) tag

This tag is affixed to an electrical apparatus and advises of the person who controls the operation (and state) of the electrical apparatus. It prohibits all personnel, other than that nominated on the tag, from operating the electrical apparatus.

Figure 9: Restricted Use tag

3.8.4 Caution tag

This is a general purpose information tag. The caution tag is used for conditions that do not require a danger, warning or restricted use tag, and provides information about changed or unusual network operating conditions.
3.8.5 Tag use

Only tags approved by Western Power are permitted for use. Metal Western Power tags must not be used under any circumstances. Changing the purpose, colour and/or wording of a tag is prohibited without the approval of the Operating Authority. When applying tags, the correct electrical tag must be used for the type of work being carried out.

Tags must contain adequate information to inform others of their purpose. It is the sole responsibility of the person applying the tag to comply with the following requirements:

- fill the tag out correctly with detailed information
- include their identity and contact details, e.g., name, pay number, two-way radio number, phone number etc.
- ensure the tag is clean and in good condition
- correctly attach the tag to the equipment or asset

The following details must be written on all tags:

- plant to be worked on or major plant name within isolation
- schedule/permit number or reason and reference (depending on tag type)
- contact name
- network authority card number (NAC)
- date
- contact phone
Tags associated with a work permit and/or JRA must be recorded on the corresponding work permit and/or JRA.

For all devices where the auto reclose has been disabled by telecontrol switching, a control inhibit would be applied by the controller and therefore no tag would need to be fitted on site.

Table 2: Role authority levels permitted to apply and remove tags

<table>
<thead>
<tr>
<th>Role / Function of Person</th>
<th>Applying tags</th>
<th>Removing tags</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Danger</td>
<td>Warning</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>

Note:  
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

Note:  
2 The Tester in Charge (TIC) can temporarily remove and then reapply earths associated with the restricted use 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 ESSR to allow a restricted number of activities where the RIC is also authorised to remove/reapply this tag, e.g., phase issuing colours, meggering and circuit breaker timing tests
3.8.6 Application and removal of tags

The application and removal of tags is a deliberate and planned activity. Some tags can only be applied and removed by specific authority levels.

Danger tags or restricted use tags on primary plant can only be fitted by switching operators. Issuing officers can replace tags on primary plant.

Danger tags and restricted use tags fitted by a switching operator under a switching schedule can be removed by another switching operator when approved by the Operating Authority.

Tags discovered in the field with no current schedule can be removed by the person who affixed the tag or other authorised person after contacting either:

- the Operating Authority
- 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

(Refer to section 12.4 for additional restricted use tag fitting and removing exemptions.)
All persons concerned must know that the tag has been removed. This process ensures that tag removal will not put any person or other work being performed at risk.

### 3.8.7 Tagging during emergency fault switching

During emergency fault switching where life or property is threatened by an electrical or physical hazard associated with Western Power’s network, temporary prefilled danger tags showing personal identification details can be used.

Once the threat has been removed the temporary danger tags must to be replaced with official tags that are correctly filled out.

### 3.8.8 Non-Western Power tags

Tags that are the property of other organisations must not be removed without direct consultation with the appropriate organisation.

### 3.9 Personal Protective Clothing and Equipment (PPC & PPE)

Wearing approved PPC and PPE specified for a task or work area is mandatory. Before undertaking any work, each person must check to ensure that their PPC and PPE is in satisfactory condition and is appropriate for the work being done. Any defective PPC and PPE must be immediately removed from use/service.

### 3.10 Operating plant, tools and equipment

Only approved plant, tools and equipment are to be used, unless otherwise authorised by the Operating Authority. All plant, tools and equipment must be operated and maintained in accordance with manufacturers’ recommendations. Defective plant, tools or equipment must not be used.

#### 3.10.1 Hot Sticks

Wooden hot sticks are not to be used. These have been replaced by fully rated, insulated non-wooden sticks.
3.11 Record retention and audit

All records must be safely stored and retrievable for legal and audit purposes. Records are also regularly used to analyse switching & network access occurrences for business and safety improvement.

Where possible records should be stored electronically.

Responsibilities for non-electronic records include:

- Switching operator copy of completed switching schedules - correct retention is the responsibility of the switching operator
- Control room copy of SOCC completed switching schedules - correct retention is the responsibility of the controller
- Original work permits after cancellation - correct retention is the responsibility of the Issuing Officer

Note: In many Western Power business units paper records are often scanned and retained electronically at a business unit level

It is a legal requirement to keep the abovementioned records for a minimum of seven years.

3.12 Site, terminal and substation security

Securing assets against unauthorised access and operation is critical for the safety of the public, personnel and operation of Western Power’s network.

All persons must phone SOCC to register in the Substation Access Tracker their entry or departure of a transmission site. This includes zone substations, terminal stations and associated relay/control rooms.

NOCC may require notification of entry or departure of specific distribution sites (CBD and remote controlled distribution HV substations).

Note: ‘All persons’ is inclusive of switching operators, personnel working on their own and work group representatives
3.12.1 Locks and Keys

Substation sites must be locked at all times to prevent inadvertent access by members of the public and/or unauthorised persons.

Only appropriately authorised personnel are permitted to be issued master keys for site access and equipment operation. Substation Entry Level 1 is a prerequisite in qualifying for distribution and transmission substation secure keys. All master key holders are registered. (Refer to appendix 4 table 9.)

Master keys are issued to a specific individual and cannot be transferred from person to person. If a master key needs to be transferred it must be returned and then formally reissued. Master keys cannot be allocated to a job role.

Master keys that are lost, stolen, broken or damaged must be reported to the relevant Operating Authority immediately.

Transmission and distribution have separate master key systems.

Earthing keys can only be issued to appropriately authorised switching operators by their formal leader. These keys must only be used for securing lockable earth switches and indoor zone substation busbar shutters.
4  Communication

4.1 General

It is essential that effective communication takes place between all personnel.

Adherence to the communication protocol is essential to maintain safety and prevent incidents.

The communication protocol involves three steps:

**Clear** – Ensure that what you say is easy to understand and is not confusing

**Concise** – Minimise banter and use proper operating terms

**Confirmed** – Operating messages must be repeated by the receiver for confirmation

4.2 Verbal communication protocol

It is essential to speak clearly, listen carefully, and thoroughly understand verbal communications. As a conversation progresses, the formality of the language and tone used must increase. The communication protocol is shown in figure 11.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Purpose / Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction:</td>
<td>Greeting</td>
</tr>
<tr>
<td>Confirm:</td>
<td>The scope of the work and that both parties are working on the same task</td>
</tr>
<tr>
<td>Context:</td>
<td>Establish the present status of the job/work</td>
</tr>
<tr>
<td><em>Communicate:</em></td>
<td>Clearly and concisely communicate and confirm the tasks are understood</td>
</tr>
<tr>
<td>Close Out Of Job:</td>
<td>Ensures that job is formally completed and that all parties acknowledge job status</td>
</tr>
</tbody>
</table>

**Figure 11: Clear, concise and confirmed communication protocol**

Verbal instructions and statements must be confirmed by repeating them back to the communicator. This prevents misunderstandings between parties.
Verbal communications with Operating Authority control rooms are recorded on all operational lines (phone and radio).

4.3 Communication protocol for tandem/remote teams

Switching schedules involving multiple switching operators or multiple locations must adhere to the same communication standard as described in the communication protocol. This includes:

- ensuring that one switching operator is responsible for phoning/speaking with NOCC/SOCC on behalf of the team
- ensuring all communications are clear, concise and confirmed between team members
- cross checking, verifying and challenging each other constructively while applying the STOP, THINK, CHECK principles

The switching operator in charge is solely responsible for checking and updating the field version of the schedule as steps are completed (by their switching counterpart). In multiple location situations it is important that steps are only marked as complete once the step has been communicated and confirmed as complete via phone or radio. The switching operator in charge and/or switching operators at the additional location(s) must not anticipate step completion. This ensures that field switching does not move ahead of the schedule.

A thorough scope, status and familiarisation must be provided when handing over switching responsibility.

4.4 Interruptions and distractions

Due to the safety critical nature of working on the network, the switching operator must not be interrupted or distracted, except to be warned of actual or potential danger.

4.5 Written communication

Written documents (such as switching schedules and work permits) must be clear and legible. They must be filled-in in accordance with Western Power’s official terminology and instructions. (Refer to section 3.11 for documentation storage.)
5 Training and authorisation

5.1 General

Persons who are required to work on or near Western Power’s electrical system must:

1. be appropriately trained for the work they intend to do
2. be authorised by Western Power to carry out that work

5.2 Switching operator authority levels

Refer to appendix 2 and 3.

5.2.1 Trainee path for switching authority

Switching trainees undergo the following in order to reach a new authority level:

1. the trainee must meet the necessary pre-requisites as prescribed by Western Power before undertaking any switching modules

2. the trainee must complete the appropriate switching module for the desired authority level and on-the-job workbook tasks under the direct and constant supervision of an authorised switching operator. Written authority for the new level is not required by Western Power trainees at this stage; however, external trainees will have ‘under supervision’ noted in their authorisation books

3. when the trainee has successfully completed the on-the-job requirements, their formal leader can request the new switching level from NOCC or SOCC. If the switching operator needs more time to gain local knowledge and/or experience, the switching level ‘under direction’ (D) can be issued (see section 5.4)
5.3 Supervision

5.3.1 Immediate supervision

Immediate supervision requires the authorised person supervising the trainee to be at the work position with the trainee on a one-to-one basis.

5.3.2 Direct (constant) supervision

Direct supervision requires the authorised person supervising the trainee to remain at the worksite and in close proximity to the trainee. The authorised person must be within sight of, and able to communicate directly with, the trainee; however, the authorised person does not necessarily have to be standing alongside the trainee.

For direct supervision, the ratio of network employee to trainee must not exceed a one-to-two ratio.

Note: ‘Direct’ and ‘constant’ supervision can be used interchangeably

5.3.3 General supervision

General supervision must be given by an authorised person; however, this does not need to be through constant attendance (effective supervision must be maintained). Tasks must be explained clearly to ensure the trainee understands what is to be carried out. The nature of the work and the competence of the trainee must be considered to ensure safe and satisfactory work practices are maintained.

5.4 Under direction

A switching operator who requires more time to gain local knowledge and/or confidence in switching can be issued the switching level 'under direction' (D). This allows the switching operator to carry out step-by-step switching under the direction of a switching operator in charge, communicating via telephone, radio or other remote communication method.

Once the D restricted switching operator has gained sufficient local knowledge and experience, an open authority for the desired level can then be issued.
5.5 Switching authority expiry, re-certification and transfer

Expiry and recertification of switching authorities is covered in NWI-074 Issue of switching operators authority on the Western Power network. Copies can be requested from nocc.switchingauthorities@westernpower.com.au.

5.5.1 Recertification

Sufficient switching schedules that contain the levels being renewed must be submitted via a Switching Authority Request (SAR) form. The applicant’s name, as the switching operator, and the times at which the relevant steps were performed must be obvious. Any EAPs that need to accompany the submission must meet Western Power’s standard of completion.

A field copy must be provided for LV (240/415V) schedules.

The switching schedules submitted must have been executed within 12 months of their level’s expiry date.

5.5.2 Lapse in recency

In most circumstances the applicant will undergo training and on-the-job assessment before being considered for authorisation/recertification. In extraordinary circumstances, and at the discretion of the Operating Authority, the recency criteria may be extended beyond 12 months to a maximum of 15 months.

In some circumstances the applicant may need to undergo a combination of Recognised Prior Learning (RPL), technical assessment and/or on-the-job assessment prior to being considered for certification/recertification. This is common in cases where a switching operator’s main experience has been on another authority’s network.

5.5.3 Transfer

Switching operators changing employers will have their switching authority registered as temporarily inactive.

In order to transfer authority, a letter of employment from the new employer needs to be submitted. This must be within a timeframe that supports the recency criteria.
5.6 Suspension and cancellation of switching authority

The Control Authority reserves the right to suspend a switching authority pending the outcome of an incident investigation.

Switching operators who are found to have knowingly breached these safety rules may, at the discretion of the Control Authority, have their authority suspended or have specific authority levels removed.

5.7 Network access levels

Western Power’s Network Access system consists of a range of functional levels. These levels are used to authorise individuals to work on or near the primary electrical system. All persons working on or near Western Power’s electrical system must be appropriately authorised for their function and work level.

The list of network access levels can be found in appendix 4.
6 Approach to electrical apparatus

The closer the apparatus, the greater the hazard.

A hazard is impacted by the following:

- skills and/or qualifications of the person(s) working on or near the electrical apparatus
- supervision of the work party and environment
- type of work activity being performed

6.1 Danger zone

A danger zone is a specific area surrounding live electrical apparatus that ordinary persons, equipment and materials must not enter. The size of the danger zone is determined by the voltage of the electrical apparatus.

Within the *Occupational Safety and Health Regulations 1996* reg 3.64, a danger zone means anywhere that:

1. is within 0.5 metres of a live insulated overhead power line or aerial bundled conductor line of a voltage of not more than 1,000 volts;
2. is within 1.0 metre of a live uninsulated overhead power line of a voltage of not more than 1,000 volts;
3. is within 3.0 metres of a live overhead power line whether insulated or not, of a voltage exceeding 1,000 volts but not more than 33,000 volts; or
4. is within 6.0 metres of a live overhead power line whether insulated or not, of a voltage exceeding 33,000 volts
Electrical System Safety Rules

The location/position of a danger zone is relevant to the position of the electrical apparatus. If an electrical apparatus, such as a live conductor, moves, the danger zone moves with it. This change of danger zone can place persons, tools, equipment, apparatus, branches and other items at risk if not carefully planned for.

The normal danger zone distances for HV underground insulated conductors are generally not appropriate unless the cores are exposed due to the cable sheath or insulation being damaged or removed. In cases where they are damaged or removed, standard danger zone rules and distances apply.

All cables must be treated as live, especially cables which are either damaged or have exposed conductors, until proved de-energised by an approved procedure. No person is to touch or work on any insulation which covers any HV conductor unless de-energised, isolated, earthed, and an appropriate work permit issued.

The danger zone also applies to overhead power lines, where plant or equipment such as scaffold components, roofing or other building materials, cranes or irrigation equipment are operated or moved under or in the vicinity of the lines.

6.2 Minimum approach distance (MAD)

MAD is the distance an authorised person, vehicle, mobile plant (including its load, controlling ropes and any other accessories) or object (other than insulated objects designed for contact with live conductors) must maintain when:

1. working on or near electrical apparatus
2. operating vehicles or mobile plant on or near electrical apparatus

Authorised persons may enter the danger zone; however, they must not enter the MAD zone. Only specially trained live line authorised personnel may enter the MAD zone while following the appropriate live line procedures.
6.2.1 Inadvertent movement into work zones

All care must be taken to ensure that the inadvertent movement of persons, tools, equipment, apparatus, branches and other items does not encroach a zone for which they do not have authorisation.

Figure 12 shows how inadvertent movement of persons, tools, equipment, apparatus, branches and other items into unauthorised zones can place a person in danger. Unauthorised entry into the MAD could result in death.

A safety observer must be appointed when persons are working on or operating a mobile plant near live electrical apparatus.

Figure 12: Working on or near electrical apparatus
6.2.2 Authorised persons

For network access, “authorised persons” includes issuing officers, RICs, TICs and recipients. For other electrical, non-network access work, “authorised persons” includes those with an electrical worker’s licence, ensuring regulatory or other relevant authority requirements are met.

6.2.3 Ordinary persons

Ordinary persons cannot enter a work site or sign onto a work permit unless under the direct supervision of an authorised person.

Ordinary persons must have an authorised RIC on site and being directly supervised when undertaking work inside a danger zone.

Note: Trained and authorised vegetation workers are not considered ordinary persons

6.2.4 Safety observer

A safety observer must be appointed when personnel are working on or operating mobile plant near live electrical apparatus. They are assigned by the person in charge and their sole function is to observe and warn against unsafe approach to live electrical apparatus and other unsafe conditions.

Work must cease if the safety observer’s view of the work is impaired.

(Refer to the work practice manuals for further information.)
6.3 Approach tables

6.3.1 Approach tables explanatory notes

There are a number of approach standards available in the industry, varying in terminology and value (where numerical rounding and estimation occurs). The tables contained in this document represent Western Power’s approach distances.

Western Power’s minimum approach distances determine the MAD zone around live bare conductors. There is no differentiation between horizontal clearance and vertical clearance.

Where other authorised clearance tables exist, and/or further approved engineering studies support variations to Western Power’s declared values, then alternative values are permitted to be used. This is most likely to occur where the electrical clearance value is reduced, but can also occur when a more conservative approach is preferred. Other authorised work procedures allow work and movement of plant and equipment nearer to the bare conductors than indicated. This authorised work procedure must be used in a way that is consistent with any other safety hazard assessment and control.

Common terminology used by Western Power when referring to electrical apparatus approach tables are: “minimum approach distance” (MAD), “safe working clearance”, “horizontal clearance” (H), “vertical clearance” (V) and “section clearance” (S).

Note: Occupational Safety and Health Regulations 1996 Section 3.64 prevail over Energy Network Association (ENA) NENS 03-2006 and ENA NENS 04-2003
6.3.2 MAD for authorised persons

Table 3: MAD for authorised persons

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Distance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1,000</td>
<td>Avoid contact</td>
</tr>
<tr>
<td>6,600</td>
<td>700</td>
</tr>
<tr>
<td>11,000</td>
<td>700</td>
</tr>
<tr>
<td>22,000</td>
<td>700</td>
</tr>
<tr>
<td>33,000</td>
<td>700</td>
</tr>
<tr>
<td>66,000</td>
<td>1,000</td>
</tr>
<tr>
<td>132,000</td>
<td>1,200</td>
</tr>
<tr>
<td>220,000</td>
<td>1,800</td>
</tr>
<tr>
<td>330,000</td>
<td>3,000</td>
</tr>
</tbody>
</table>

Note: These represent nominal minimum personal clearances. A reduction in the values shown in table 3 is permitted where authorised work methods and/or barriers and/or insulation may be in use. Increases in these values may be required when the risk assessment and work methods support it.

Note: For work in substations particular attention must be made to distances referred by AS2067-2008.

Note: For authorised live work refer to the clearances from Western Power’s High Voltage Live Work manual and AS5804 parts 1 – 4, 1 2010.
6.3.3 MAD for ordinary persons

Table 4: MAD for ordinary persons

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Distance (mm)¹</th>
<th>Distance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1,000</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>6,600</td>
<td>2,000</td>
<td>3,000</td>
</tr>
<tr>
<td>11,000</td>
<td>2,000</td>
<td>3,000</td>
</tr>
<tr>
<td>22,000</td>
<td>2,000</td>
<td>3,000</td>
</tr>
<tr>
<td>33,000</td>
<td>2,000</td>
<td>3,000</td>
</tr>
<tr>
<td>66,000</td>
<td>Not permitted</td>
<td>6,000</td>
</tr>
<tr>
<td>132,000</td>
<td>Not permitted</td>
<td>6,000</td>
</tr>
<tr>
<td>220,000</td>
<td>Not permitted</td>
<td>6,000</td>
</tr>
<tr>
<td>330,000</td>
<td>Not permitted</td>
<td>6,000</td>
</tr>
</tbody>
</table>

**Note:** ¹After consultation with Western Power, a risk assessment, and while under direct (constant) supervision of an authorised person
### 6.3.4 MAD for plant, equipment and vehicles operated by authorised persons

#### Table 5: MAD for mobile plant and vehicles operated by authorised persons with a safety observer

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Mobile Plant</th>
<th>Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Insulated distance (mm)</td>
<td>Uninsulated distance (mm)</td>
</tr>
<tr>
<td>Up to 1,000</td>
<td>Contact allowed</td>
<td>1,000</td>
</tr>
<tr>
<td>6,600</td>
<td>700</td>
<td>1,200</td>
</tr>
<tr>
<td>11,000</td>
<td>700</td>
<td>1,200</td>
</tr>
<tr>
<td>22,000</td>
<td>700</td>
<td>1,200</td>
</tr>
<tr>
<td>33,000</td>
<td>700</td>
<td>1,200</td>
</tr>
<tr>
<td>66,000</td>
<td>1,000</td>
<td>1,400</td>
</tr>
<tr>
<td>132,000</td>
<td>Not applicable</td>
<td>1,800</td>
</tr>
<tr>
<td>220,000</td>
<td>Not applicable</td>
<td>2,400</td>
</tr>
<tr>
<td>330,000</td>
<td>Not applicable</td>
<td>3,700</td>
</tr>
</tbody>
</table>

**Note:** A safety observer must be used according to approved procedures when working with vehicles and mobile plant on or near electrical apparatus (Refer to AS2067-2008.)

**Note:** For authorised live work refer to the clearances in Western Power’s High Voltage Live Work Manual, consistent with AS5804 parts 1 - 4, 1 2010.
### 6.3.5 MAD for plant, equipment and vehicles operated by ordinary persons

#### Table 6: MAD for mobile plant and vehicles operated by ordinary persons

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Mobile Plant</th>
<th>Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1,000</td>
<td>1,000</td>
<td>600</td>
</tr>
<tr>
<td>6,600</td>
<td>3,000</td>
<td>900</td>
</tr>
<tr>
<td>11,000</td>
<td>3,000</td>
<td>900</td>
</tr>
<tr>
<td>22,000</td>
<td>3,000</td>
<td>900</td>
</tr>
<tr>
<td>33,000</td>
<td>3,000</td>
<td>900</td>
</tr>
<tr>
<td>66,000</td>
<td>6,000</td>
<td>2,100</td>
</tr>
<tr>
<td>132,000</td>
<td>6,000</td>
<td>2,100</td>
</tr>
<tr>
<td>220,000</td>
<td>6,000</td>
<td>2,900</td>
</tr>
<tr>
<td>330,000</td>
<td>6,000</td>
<td>3,400</td>
</tr>
</tbody>
</table>
6.3.6 Approach to cables

In all circumstances cables must be treated as live unless proved otherwise using approved procedures.

A VA permit must be issued prior to excavating or physically moving the high voltage cable to ensure that the controller is aware of the risk to the system.

No person shall touch the insulation which covers any conductor of a high voltage cable/conductor unless that conductor is isolated, earthed and covered by an appropriate safety document.

(Refer to the work practice manuals for further information.)

Table 7: Minimum approach distances to underground cables

<table>
<thead>
<tr>
<th>Nominal voltage</th>
<th>Powered tool or plant</th>
<th>Un-powered hand-tool or person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to and including 1,000 V</td>
<td>300 mm</td>
<td>Avoid contact</td>
</tr>
<tr>
<td>1,000 V up to and including 33 kV(^1)</td>
<td>500 mm</td>
<td>Avoid contact</td>
</tr>
<tr>
<td>Greater than 33 kV up to and including 132 kV(^2)</td>
<td>3,000 mm</td>
<td>Avoid contact</td>
</tr>
</tbody>
</table>

Note: \(^1\)Less than 500 mm hand dig: Western Power representative to supervise the works

Note: \(^2\)Less than 3000 mm: Western Power representative to supervise the works (see note below)

Note: Powered tools may be used at distances of 1.0 metre or more from underground cables between 33 kV and 132 kV providing:

- a Western Power representative is supervising the works
- potholing has identified the relevant cable(s)
- non-powered hand tools can then be used from 1.0 metre to the relevant cable(s)
6.4 Work on or near de-energised equipment

6.4.1 Emergency Services Personnel

Under the direction of an authorised Western Power person, emergency service personnel are permitted to enter de-energised Western Power facilities, or extinguish de-energised line equipment fires.

In extreme emergencies, electrical fires can be extinguished by authorised emergency service personnel after the network has been proven to be de-energised, providing approved extinguishing techniques are used.

6.4.2 Public and third-party work near Western Power assets

As per Occupational Safety and Health Regulations 1996, sec. 3.143 and Worksafe Code of Practice 'Excavation', it is the responsibility of the site owner, company or contractor to ensure that all work near overhead powerlines and/or underground cables is carried out safely.

Work near powerlines and other electrical installations must be well planned to:

- comply with WorkSafe and electrical clearance requirements
- ensure adequate separation between the work and the adjacent line. Western Power can provide assistance to determine whether there will be adequate separation between the work and any adjacent powerlines

No public or third-party person, material or equipment can enter the danger zone surrounding powerlines at any time. Serious penalties apply.

(Refer to Occupational Safety & Health Act 1984, sec. 22 for further information.)
7 Safety rules for work on high voltage (HV) networks

7.1 Permit to work

A work permit is required when accessing operational plant/equipment for work purposes. The permit to work process allows the authorisation of work to be performed on Western Power’s electrical network.

7.2 Work permit types

Table 8: Work permit types

<table>
<thead>
<tr>
<th>Authority to work in the Vicinity of Electrical Apparatus (VA)</th>
<th>A VA permit is issued to a RIC to authorise:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• work within the MAD using approved live line techniques</td>
</tr>
<tr>
<td></td>
<td>• work outside the MAD (but within the danger zone) on motor drives and/or operating mechanisms of energised electrical apparatus</td>
</tr>
<tr>
<td></td>
<td>• work near live conductors or electrical apparatus by authorised persons where there is a possibility of encroachment into the MAD$^1$</td>
</tr>
</tbody>
</table>

A VA cannot be issued until all auto-reclosing features on electrical apparatus are made inoperative and tagged appropriately. SCADA controlled electrical apparatus must be tagged on the SCADA. Non-SCADA controlled electrical apparatus must be tagged directly on the field electrical apparatus.

All personnel working under a VA must sign onto the VA. This includes the issuing officer and/or switching operator. Once completed, work can then take place under the control of the RIC$^2$. 
| **Electrical Access Permit (EAP)** | An EAP authorises access to electrical apparatus or conductors that have been made safe by isolation and earthing.  
All personnel issuing, receiving and managing EAPs must be qualified through the Network Authority Card (NAC) process.  
All personnel working under an EAP must sign onto the EAP. This includes the issuing officer and/or switching operator. Once completed, work can then take place under the control of the recipient in charge (RIC)\(^2\). |
| **Sanction to Test (STT)** | An STT permit authorises access to electrical apparatus and/or conductors for testing and commissioning. Only one STT can be issued on an electrical apparatus at any time.  
All personnel working under an STT must sign onto the STT. Once in place, work can commence under the control of the Tester in Charge (TIC)\(^2\). |

**Note:**  
\(^1\)Initial planning and the Job Risk Assessment (JRA) will determine whether encroachment is likely (the JRA is being phased out and will be replaced by WRAPS)  

**Note:**  
\(^2\)The RIC/TIC must be on site at all times for work to take place

(Appendix 10 contains a complete list of the roles involved in the permit to work process.)
7.3 Permit to work process

Figure 13 illustrates the permit to work process from issue to cancellation.

(Appendix 10 contains a complete list of the roles involved in the permit to work process.)
7.3.1 Working under a permit

To gain access to a piece of electrical apparatus, all persons must understand the conditions of, and sign on to, an appropriate work permit before commencing work. Similarly, they must sign off the work permit when access to the electrical apparatus is no longer required. When permit conditions need to change, the existing work permit must be relinquished and cancelled, and a new work permit must be issued. This does not apply to the application and removal of working earths which are under the control of the RIC.

The issuing officer must carry out a face-to-face transfer of the work permit from the issuing officer to the RIC/TIC, except in exceptional circumstances where the remote permit issue process can be used (see section 7.3.7).

All work permits under the control of the Operating Authority must be registered with the Operating Authority at the time of issue and cancellation. The Operating Authority must maintain a log of all permits over the entire lifecycle of the permit. This includes 240V/415V LV permits.

All relinquished work permits must be confirmed cancelled with the Operating Authority before the Operating Authority will approve the return of the electrical apparatus to normal operation.

7.3.2 Right to refuse a work permit

A RIC/TIC/recipient has the right to refuse a work permit if they have any safety concerns. These issues are to be resolved on site or referred to a higher authority for review (see section 1.4).

7.3.3 Change/transfer of RIC or TIC

A RIC/TIC can transfer a work permit to a replacement RIC/TIC if the work permit has this provision. This must be carried out face-to-face, except for in exceptional circumstances where remote permit transfer can be used (see section 7.3.7).
Electrical System Safety Rules

To complete the transfer:

1. the departing RIC/TIC signs off the permit
2. prior to the departing RIC/TIC leaving site, the departing RIC/TIC shows the replacement RIC/TIC the isolations and earths
3. the replacement RIC/TIC closely reads and understands the work permit conditions
4. once understood, the replacement RIC/TIC signs on to the permit
5. the replacement RIC/TIC informs all recipients of the transfer
6. the replacement RIC/TIC informs the Operating Authority of the transfer and provides the Operating Authority with their contact details¹

Note: ¹This applies to distribution (NOCC) only

Recipients cannot remain signed on to a work permit that does not have a signed on RIC/TIC.

7.3.4 Multiple work sites

The decision to split a work site into multiple smaller work sites is best determined through pre-job planning. Whether a job needs to be split up into a series of sites is determined by the level of supervision required for the activities to be undertaken and the risks associated with those activities.

The degree to which safety control and supervision is maintained is influenced by:

- the proximity of the RIC/TIC to the work party
- how well defined the site boundaries are through the use of secure fencing, gates, or other prominent temporary limits marked by barriers and/or signs
- whether the worksite has mixed live, de-energised and earthed equipment that may or may not have their limits made prominent through barriers and/or signs
- the levels and degrees of compliance, competence and experience within the work party. This will be subject to the RIC/TIC’s own judgement and situational awareness
Pre-job planning will assist to determine whether the work is best conducted concurrently, or in stages, and this must be declared on the network access request (DNAR/NOIW).

A roving RIC/TIC can be used for access work that is staged. When direct access work is involved, each site must have a dedicated RIC/TIC at all times.

When direct access work is not involved, safety can be controlled in other ways. If there is any doubt about the safety of the work being completed at any site, a dedicated RIC/TIC must be assigned to that site.

In the event that a single work party will work at multiple locations on the same single circuit, one work permit is sufficient to cover all of the individual work sites. The RIC/TIC is responsible for local safety and the issuing of working earths at each site as appropriate.

When a site is split and separate work parties are to undertake the work, a separate permit must be issued for each newly determined site.

On many occasions a testing work team is split across multiple locations. This is safely managed by having one master STT and a coordinating TIC at the main test site (STT permit safety does not allow concurrent permits on the same electrical apparatus).

At each worksite there must be a mirrored copy of the master STT. There must also be another authorised TIC who manages the work of the local work party and maintains communication with the coordinating TIC. All personnel, including the additional TIC, must sign onto the mirrored copy of the STT as recipients.

The coordinating TIC is accountable for all work at all test sites associated with the testing.
7.3.5 Concurrent work permits

An EAP and STT cannot exist on the same primary electrical apparatus at the same time.

An STT can be issued on the secondary equipment associated with the primary electrical apparatus under an EAP, providing:

1. the two work parties communicate, understand and agree to the extent of each other’s work and the isolation/precautions taken
2. adequate secondary isolations have been carried out
3. the work does not interfere with the conditions of the EAP that is associated with the primary plant

7.3.6 Work permits that run for more than one day

Recipients must not recommence work without the approval of the RIC/TIC. Prior to the commencement of any work, the RIC/TIC must ensure:

1. the conditions of the work permit haven't changed
2. isolation and earthing points are still intact and as described on the work permit. In the event that the isolation and/or earthing integrity has been compromised, work must not recommence until the integrity has been restored
3. site conditions are suitable for the work to recommence
4. all recipients are advised of any changes to conditions. This includes explaining to recipients face-to-face any new risks associated with the changes
7.3.7 Remote permit issue

Face-to-face work permit issue and receipt is always preferred to remote permit issue and receipt.

Whilst it is preferred that permit issuing is completed face-to-face between the issuing officer and RIC/TIC, a work permit can be issued (in some circumstances) remotely using the remote issue process. The circumstances that allow remote permit issue include:

- where distance/weather conditions inhibit face-to-face contact
- line patrol and line washing by helicopter, providing the RIC has a full copy of the permit (VA) prepared in advance of the remote permit issue
- where a permit change is required
- under emergency situations
- where multiple VA issue is required at different work sites (for example vegetation work)

Note: For the distribution network, remote permit issue is restricted to VA permits only

During the remote permit issue process the issuing officer has a duty of care to ensure that the RIC/TIC thoroughly understands the terms and conditions of the work permit. An RIC/TIC is not permitted to sign on to a work permit without first interacting with the issuing officer. The RIC/TIC has the power of veto to decide if remote issue of the work permit is acceptable.
The process for the remote issue of a work permit is:

1. the off-site issuing officer writes out his copy of the work permit
2. the issuing officer verbally relays the details of the work permit to the on-site RIC, who writes out the field copy of the work permit

   OR

the issuing officer forwards an advanced written copy of details that are transcribed by the RIC on to the field copy of the work permit

3. the RIC reads back the contents of the on site work permit to the issuing officer who confirms the accuracy of all details on the RIC’s copy
4. the off-site and on-site work permit numbers are exchanged and recorded on the work permits
5. the issuing officer registers the on-site copy permit number with the Operating Authority
6. the RIC signs the field copy on behalf of the issuing officer, and then receives the work permit as the signed on RIC

7.3.8 Accommodating extra recipients on permits

If the recipient ‘sign on’ section is full and cannot accommodate all of the recipients at a work site, further permit(s) must be issued. The following rules apply to all additional permits:

1. the same RIC must be used where multiple permits are in force at a work site
2. the permit forms need to be of the same type, e.g., all EAPs, VAs or STTs etc. and completed with the same conditions as the existing permit. Simply cross-referencing the initial permit is prohibited. The additional permit forms must be completed by the issuing officer
3. the RIC/TIC is to notify the issuing officer of the additional permit(s) and the new permit number(s). If the issuing officer agrees to the new permit(s), the RIC/TIC must notify the Operating Authority to log the new permit details
7.3.9 Accommodating extra isolation points, shorting, earthing and conditions on permits

If permit sections are full and cannot accommodate all isolation points, shorting, earthing and condition information, further permits must be used. The following rules apply to all additional permits:

1. the first permit is considered 'the master permit'. It is to be filled in as per standard procedure

2. subsequent permits must have their reference numbers crossed-out and replaced with the 'master permit's' reference number

3. on each subsequent permit, continue to fill in only the overflow information. Do not duplicate information except for the permit number. Cross out the Sign on/sign off section on all subsequent permits. In cases where the recipient sign on section is full and cannot accommodate all recipients at a work site, see section 7.3.8

4. the total number of permits used must be recorded on the 'master permit'. For example ‘page 1 of 3’ should be written on the first or three permits

5. each subsequent permit must then be given a page number, and this must be written on the front of each subsequent permit. For example, if using two subsequent permits, write ‘page 2 of 3’ on the second permit and ‘page 3 of 3’ on the third permit

6. upon completion, the collection of all permits are to be treated as one permit by the work party

7. if there are any attachments, these must be in permit format. Diagrams of the LV network that assist with physical identification of isolation points are acceptable

Note: Recipients must look at all conditions on all permit sheets, but limiting recipient information to 'the master permit' will make the sign on and sign off process safer and easier to reconcile
Electrical System Safety Rules

7.3.10 Leaving a work site while under a work permit

Recipients

• A recipient who is temporarily leaving the work site is not required to sign off the work permit

• A recipient returning to a work site from a temporary departure must alert their RIC/TIC immediately and reconfirm all work permit conditions before starting work

RIC/TIC

• An RIC/TIC who is temporarily leaving the work site is not required to sign off the work permit

• When an RIC/TIC returns to site after a departure they must reconfirm all work permit conditions before starting work

• An RIC/TIC who is permanently ceasing work and departing a work site must handover or relinquish the permit prior to their departure (see section 7.3.3)

Note: ₁All recipients must stop all work on electrical apparatus under the control of a work permit if the RIC/TIC departs the work site. This includes short term (anticipating a return) departures. The RIC/TIC must ensure all recipients have stopped work before they depart

7.3.11 Signing off an absent/unavailable RIC/TIC/recipient after cancelling a permit

In extreme circumstances an RIC/TIC or recipient that is absent or unavailable can be signed off a permit after:

1. prominent signs have been posted on the site to warn of the permit cancellation and that the area has been re-energised

2. reasonable attempts to notify the RIC/TIC or recipient are made. This includes multiple phone calls to home phone and mobile numbers with voicemail messages left, and home address visits if the address is local.
If all reasonable attempts have been made without success, follow normal escalation processes to speak to their formal leader

3. the relevant Workgroup Manager has been notified. This can be done via the controller

4. the controller has been notified and approval has been granted

7.3.12 Recall of work permits

For operational reasons the Operating Authority may require an electrical apparatus to be returned to service earlier than the time indicated on the work permit. When this occurs, the RIC/TIC will be notified by the Operating Authority to follow normal work permit procedures to relinquish the permit and return the electrical apparatus to a serviceable condition.

In after-hour situations, the RIC/TIC must make arrangements to ensure that the returning work party are informed of the changed condition(s). This must be through verbal contact and visual notification at the point of entry to the site.

7.3.13 Return equipment to service without permit cancellation<sup>1</sup>

The Operating Authority may require an electrical apparatus and/or plant to be returned to service for operational reasons, without relinquishing recipients.

The Operating Authority must ensure that the RIC/TIC is immediately informed of the changed conditions. The RIC/TIC must make arrangements to ensure that the returning work party is informed of the changed condition(s). This must be through verbal contact and visual notification at the point of entry to the site.

Note:  
<sup>1</sup>This situation is limited to transmission apparatus where there is a recall condition available at the end of each day

7.3.14 Transmission lines that cross over overhead distribution lines

Regardless of clearance distances, work and permit requirements must be approved by SOCC. SOCC will determine one of the following outcomes:

1. the work is not allowed to proceed
2. a VA permit is required as a precaution
3. an EAP is required
4. no permit is required

Regardless of outcome, being aware that work is occurring at a crossover enables SOCC to coordinate all work safely.

### 7.4 Operating agreements (OA)

An operating agreement (OA) is a formal agreement between two Operating Authorities. It is used to confirm that an electrical apparatus’ operational state will be held in an agreed state until the OA is cancelled.

An OA is used when:

- one party needs to work on an item of plant or electrical apparatus which requires isolation and/or earthing from an adjacent Operating Authority
- work on secondary systems or mechanisms of primary electrical apparatus requires the apparatus to be held in a particular state for safety reasons.

An OA is **not** a work permit. It does not authorise work to be undertaken. A work permit must be issued to allow work to take place. The conditions stated on the work permit must reference the OA.

An OA is issued by a switching operator or issuing officer. An example of an OA can be found in appendix 9.

### 7.5 Transition from a live HV state to an earthed state for the EAP process

For the network to transition from a live (hazardous) state, to a de-energised (OFF) state (see fig. 14 in appendix 11), there must be a gap (air or other rated insulation) inserted. This is typically achieved by opening a switch. To progress to an isolated network state, a barrier, lock or other means of rendering the network incapable of being inadvertently energised must be put into place. A danger tag is also required.

An earthed state is then achieved following testing procedures and applying program earths.
7.6 Isolation of electrical apparatus

The purpose of isolation is to safely disconnect electrical apparatus from all possible sources of electrical supply.

7.6.1 Isolation points

Only approved electrical apparatus and methods of isolation can be used as isolation points. The following cannot be used as isolation points in both planned switching or fault schedules: zone substation circuit breakers (non-rackable), reclosers, load break switches and sectionalisers (without a visible break).

Isolation can be achieved by one or more of the following methods:

1. fully opening the contacts of an approved device to create a visible gap (air or other rated insulation) or operating a non-rackable switching device to the OFF position, using the mechanical indicator as proof of the opening operation, applying a lock where locking facilities are available, and danger tagging\(^1\)

2. creating a visible gap (air or other rated insulation) by operating a rackable switching device to the OFF position and then RACKING IT OUT to the fully withdrawn position, and locking the shutter(s) closed and applying danger tag(s)

\textbf{OR}

racking to isolated position then locking and applying danger tag(s)

3. creating a visible gap (air or other rated insulation) by the removal of fuses, links and/or connections, danger tagging and applying barriers as appropriate

\textbf{Note:} \(^1\)Where shutters (or other apparatus) that are required as isolation points are rendered inaccessible by virtue of the positioning of circuit breakers (or other apparatus) which is in service in an alternative position, locked and danger tagged in that position, the shutters (or other apparatus) are considered isolated
Isolation points must be rendered incapable of being energised unintentionally.

Where a locking facility is available it must be used to lock the electrical apparatus in the isolated position and a danger tag fitted. If barriers are required to prevent unsafe access to live parts, only Western Power approved barriers can be used.

If an isolation point is used as a common isolation point, a tag must be fitted for each isolated area (each danger tag must contain the permit number associated with the isolated area if two EAPs exist on the same isolation point). Situations where this may occur include line maintenance, line disconnector maintenance and circuit breaker maintenance.

7.7 Earthing

The purpose of earthing is to:

1. limit the rise in potential difference in the work area and trigger the protection equipment to disconnect supply if supply is inadvertently restored
2. safely discharge induced or residual voltages
3. safely discharge electrical charges caused by lightning, wind, changes in ambient conditions or altitude

Before electrical apparatus is earthed it must first be tested for de-energisation with an approved instrument.

The de-energised test is performed using the following sequence:

1. the instrument is proved to be working
2. the instrument is used to prove the circuit under test is de-energised
3. the instrument is proved to be working

Earths must be applied immediately after the tests have proven de-energisation. This process must be repeated at all earthing points.
7.7.1 Program earths

Program earthing must be applied to protect the work site against inadvertent energisation from all possible sources of supply. (The work site is the area inside the isolation points between the program earths.)

The switching operator is accountable for the application and removal of program earths. The switching operator can not delegate this responsibility but may directly and continuously supervise another authorised person required to perform this task.

When a program earth is applied, a danger tag must be prominently and robustly fitted. This includes portable and fixed program earths. A restricted use tag can be attached in lieu of a danger tag when the program earths need to be temporarily removed for approved purposes.

Where a running earth is available, program or working earths must be applied by bonding each conductor to the running earth and earthing point. Earth switches must be used as program earths wherever possible.

The removal of program earths under a switching program, immediately following the cancellation of an EAP, must be signed-off on the EAP in the ‘Removed by’ column. This serves as an additional safety precaution and double-check that all program earths have been removed.

7.7.2 Working earths

Working earths are used as required to ensure earths covering all sources of possible supply are visible from the work site. A working earth is not required when a program earth is visible from the worksite.

The RIC is accountable for the application and removal of working earths. Recipients must not apply working earths without the approval of the RIC. All working earths fitted or removed must be noted on the work permit.

Working earths can also be used to control induced and static voltages at the worksite.
7.7.3 Portable earths

A portable earth can be a program earth or a working earth. Where a permanently installed earth point is available, it must be used. Portable earthing apparatus must be appropriately fault rated for the location of their installation. The neutral conductor of the 415V LV system must not be used as a HV earth. When placing earth leads, the connection to the main earth must be made first and removed last.

7.7.4 Location of earths

Earths must be placed so that they remain effective even if the electrical apparatus covered by the permit is disconnected.

Working earths should be installed as close as possible to either side of the work being carried out, preferably to a common working earthing point.

Lines and substation work areas must be earthed from all points of supply.

Permission must be granted by the Control Authority before program earths can be placed in locations that are different to those written on the switching schedule.

7.7.5 Earthing equipment check

Prior to commencing/recommencing work, the RIC must inspect the earthing equipment in use to make sure it is still correctly installed, particularly those installed on previous days.

7.7.6 Electromagnetic induction

In situations where it is considered that program earths do not provide adequate protection from electromagnetic induction, additional working earths must be used.
7.7.7 Equipotential bonding

Equipotential bonding is the practice of intentionally electrically connecting all exposed metallic non-current carrying items together as protection from earth potential rise or stray voltage. Even if the connection to a distant earth ground is lost, protection from hazardous voltage differences is provided by creating an equal potential.

7.7.8 Earthing lines under construction

Due regard is to be given to conductor earthing on power lines under construction (both connectable and non connectable to the network) due to the risk of electric shock associated with electromagnetic induction, static induction or lightning.

Where necessary formal control (such as a construction work permit) must be introduced.
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8 Safety rules for high voltage (HV) live work

HV live work is any work (excluding switching) that is performed inside the MAD on any plant or electrical apparatus that is not de-energised, isolated and earthed as per EAP requirements.

8.1 Minimum requirements for live work

The following procedures for undertaking live work are mandatory:

1. all staff engaged on HV live work must be competent and must possess Western Power authorisation to undertake HV live work
2. all live work must be completed under a VA permit and in accordance with the High Voltage Live Work Manual
3. all tools and equipment must be approved, appropriately rated and tested for live work
4. all protection must be enabled and auto reclose disabled
5. approved and appropriate PPC and PPE must be worn

Prior to commencement a risk assessment must be completed. The factors that are to be included in the risk assessment are:

1. condition of the electrical apparatus
2. proximity of other electrical apparatus
3. proximity of earthed electrical apparatus and plant
4. protection and control settings
5. appointment of a safety observer
6. removing a tap
Electrical System Safety Rules

The safety observer must be authorised to carry out the work being observed, and have the authority to stop the work if required. Multiple safety observers may be required in some circumstances. The safety observer(s) must be positioned to view the work being done and must suspend work if their view of the activities becomes obscured.

HV live work must not be undertaken concurrently with other work on or near the same plant or electrical apparatus covered by another work permit.

8.2 Weather

HV live work must not take place in unfavourable weather (as defined by the HV Live Work Manual). If unfavourable weather develops, all work must stop.

If work is stopped, the HV line and equipment must be left in a safe condition, and the controller must be informed.
9  Safety rules for testing and/or commissioning high voltage (HV) apparatus

9.1 Minimum requirements

Approved and appropriate PPC and PPE must be worn when carrying out testing and commissioning.

The issuing officer of the STT has a duty to ensure that the condition of the equipment covered by the permit is safe for the proposed work to be undertaken.

Upon receiving the STT, the TIC has the duty to avoid danger during testing by:

- undertaking a risk assessment
- identifying the appropriate control measures to implement
- ensuring the electrical apparatus, and associated test equipment, leads and connections, are adequately guarded to prevent danger
- limiting accessibility to the electrical apparatus for unauthorised persons and members of the public
- posting relevant signs in obvious positions (throughout the entire period that the electrical apparatus may be subject to voltage).
- ensuring all cables and capacitors are discharged before and after the application of test voltage
- ensuring temporary conductors used for testing purposes must be of an adequate size and be easily visible
- ensuring effective communication within the work party

The risk assessment must take proper account of:

- the types of tests being carried out
- the location of the electrical apparatus being tested
9.2 Testing

All test equipment must be approved and the work party must use approved procedures.

Any electrical apparatus that has been isolated and earthed for testing under the terms of an STT must not be connected to the system until it has passed all approved tests, declared fit for return and the STT has been relinquished.

9.3 Identification and spiking of cables

Spiking is the process of creating a short circuit between a cable core(s) and the neutral/earth. It is completed using an approved spiking device to verify that the cable has no hazardous voltage present.

Before a cable is spiked the following measures must be taken:

1. where practical the electrical condition of the remote ends of the cable must be confirmed as isolated and earthed

2. the person in charge must personally select the cable to be spiked after careful reference to the appropriate records and use of approved tests to verify location

3. both in service and abandoned cables must be positively identified through existing records and authorised tests

Spiking of cables can be undertaken as part of a switching schedule, or prior to cutting or moving abandoned or unidentified cables.

Spiking may not be required where the entire length of the cable can be positively identified by some other means, and the ends are verified as de-energised.

Only a person trained to operate a spiking device can operate a spiking device in accordance with approved procedures. An STT is required if the spiking requires a third party to conduct tests and/or remove earths.
9.4 Commissioning/re-commissioning

All new and repaired/maintained electrical apparatus connected to Western Power’s HV and LV networks must be commissioned/re-commissioned using approved procedures. This process is necessary to:

- check workmanship
- check the condition of the new or repaired electrical apparatus, including labelling accuracy
- ensure that the electrical apparatus is safe
- ensure correct operation of the electrical apparatus

Commissioning includes:

- phasing out. If using neon phase indicator test points or other indirect methods to indicate cross phasing, then an alternative test method must be used to confirm that the phases are indeed crossed. (For an RMU, repeating the cable core identification test, phasing out across a PTS)
- phase rotation checking
- commissioning of new plant (Energise from a remote source and disable auto reclosing, or implement temporary improvement in protection sensitivity)
- no load soaking
- on-load measurements
- function checks (indication and interlocks)
- physical inspection for leaks, strange noises, odours and clearances
- checking that any remote indication and alarms are accurate
- verifying labelling accuracy
- ensuring the handover process has been complied with
- checking data sheets and as-built drawings
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10 Safety rules for vegetation work

Vegetation work must be done in accordance with approved vegetation management procedures. It can only be undertaken by persons who have the appropriate training and authorisation.

As a minimum, the risk assessment for vegetation management must include:

1. the likelihood of encroaching the MAD
2. site weather conditions
3. traffic management
4. appointment of a safety observer
5. positive identification of the electrical apparatus and location on Western Power’s network

10.1 Limits of work area

The limits of the work area(s) defined on the permit must be clearly understood by the work group and complied with at all times.

If the vegetation is within the MAD (see section 6), approved procedures must be followed.
11 Safety rules for work on low voltage (LV) networks

11.1 General

Safe working procedures must be established for work on or near LV electrical apparatus. All LV electrical apparatus must be treated as live unless it is isolated and short-circuited by an approved means.

Persons required to work on or near LV network assets must be appropriately trained and authorised. All switching operations must be performed by appropriately authorised switching operators using a switching schedule that has been created and checked by an authorised switching operator and/or controller (see section 3.4.3).

The description and location of the electrical apparatus to be worked on, and the safety measures to be taken, must be clearly understood by all authorised persons intending to work on the electrical apparatus.

11.2 Procedure for LV switching

The operation of the LV network is not co-ordinated or controlled in real time by NOCC. The switching operator is responsible for the local co-ordination and control of the LV network.

Switching schedules are required for all LV network switching and must be kept for audit purposes. (See section 3.11 for documentation procedures and storage.)

11.2.1 Electrical Access Permits (LV)

The permit to work process (see section 7.3) applies to gain access to the LV network.

LV EAPs are logged by NOCC.
11.2.2 Planned LV switching & interruption

Planned LV switching, including life support equipment customers, requires:

1. customers are notified as per the requirements of the Electricity Industry (Network Quality and Reliability of Supply) Code 2005 and Code of Conduct for the Supply of Electricity to Small Use Customers
2. a LV Distribution Network Access Request (DNAR) to be submitted
3. an EAP to be submitted and logged

11.2.3 Transition from live state to short-circuited LV network status for the EAP process

EAP techniques cannot be used unless the network meets the requirements of an EAP (isolated and short-circuited by an approved means).

For the network to transition from a live, hazardous state, to a de-energised state, there must be a gap (air or other rated insulation) inserted. This is typically achieved by opening a switch. To progress to an isolated network state, a barrier, lock or other means of rendering the network incapable of being inadvertently energised must be put into place. A danger tag is also required. A short-circuited state is then achieved by following the appropriate testing procedures and short-circuiting. Once completed, an EAP can be issued (see fig. 15 in appendix 12).

11.2.4 LV isolation points

Only approved electrical apparatus and methods of isolation can be used as isolation points. This is achieved by creating any of the following:

- a visible gap (air or other rated insulation) by the removal of fuses and/or links, and ensuring a barrier across the gap
- a visible gap (air or other rated insulation) by the removal of fuses and links (where equipment does not allow a barrier to be fitted)
- a visible gap (air or other rated insulation) removing 150mm of conductor

Isolation points must be rendered incapable of being energised unintentionally. Where a locking facility is available it must be used to lock the electrical apparatus in the isolated position.
When barriers must be used to prevent unsafe access to live parts, only Western Power approved barriers are permitted for use.

When isolating equipment for an EAP, a danger tag must be fitted to each isolation point. When isolating equipment that is not available for service, a warning tag must be fitted to each isolation point. If an isolation point is used as a common isolation point, a tag must be fitted for each isolated area.

11.2.5 Short-circuited LV

The purpose of LV shorting/bonding is to:

- safely discharge induced or residual voltages
- safely discharge electrical charges caused by lightning, wind, changes in ambient conditions or altitude
- limit the rise in potential difference in the work area if any connected weak energy sources are inadvertently energised (for example PV installations, small generators)

Short-circuited LV is achieved by bonding all phase and neutral conductors together using approved equipment and procedures.

Before electrical apparatus is short-circuited it must first be tested for de-energisation with an approved instrument.

The de-energised test is performed using the following sequence:

1. the instrument is proved to be working
2. the instrument is used to prove the circuit under test is de-energised
3. the instrument is proved to be working

Short circuiting must be applied immediately after the test has proved de-energised. This process must be repeated for all short-circuited points.

Underground LV cable terminals that are unable to be shorted must be treated as live.
11.2.6 Work on isolated and short-circuited LV

No person can commence work on any isolated and short-circuited LV electrical apparatus until they have signed onto an EAP. All short-circuited or isolation points must be noted on the EAP.

Working on de-energised LV can still be a hazard. This hazard can be reduced when the circuit has been isolated, barriered off and tested before touched. This reduced hazard will not possess the same level of energy as an inadvertent or incorrect network connection. When the LV electrical apparatus cannot be isolated and short circuited, the electrical apparatus must be treated as live.

There are a number of options available to ensure the safety of the work party:

- shorting between phases, and where possible, earth. This can be achieved using approved shorting equipment
- where shorting is considered hazardous or not a practical solution, the area must be treated as live. Approved work methods and insulating precautions must be taken
- isolating further towards the supply and extra shorting leads in the immediate work site may be required where it is hazardous to fit barriers and shorting equipment at the immediate work site. This option could result in extended customer outage and needs to be factored into outage planning

11.2.7 Interconnecting LV circuits

When a distribution transformer is taken out of service for replacement or maintenance, the LV circuit normally supplied by that transformer may be fed from another source.

Before interconnecting LV circuits:

1. check whether two substation HV feeders are being paralleled together via the LV circuits. A feeder could become overloaded when trying to carry the full load in an interconnected LV system if the second feeder trips. This may cause major damage to transformers and LV conductors
2. check the load on both the transformer being taken out and the transformers being used. Determine if there is enough capacity available from the adjacent transformers. If not, consider alternatives such as generators or customer outages.

3. check for incorrect conductor size and long route lengths, as these may cause a volt drop or overload problems. Use the largest conductor(s) available and the shortest route length possible.

4. plan to interconnect the minimum number of transformers. The more transformers interconnected, the greater the fault current if a fault occurs in the interconnected area. Each connected transformer will share the fault current. The drop-out fuses protecting these transformers may not grade, as they may not ‘see’ the full overload current. This creates a potential hazard to personnel and can damage plant in the fault area.

When a HV feeder experiences an auto reclose, the transformers used within the interconnected area may be disconnected through drop-out fuse operation. Interconnecting two feeders through the LV network should be avoided. If paralleling feeders cannot be avoided, the operator must be aware of these potential outage risks.

Where the distribution transformers on the same HV circuit breaker have a recloser or protection device interspaced between them, and where they are being paralleled through the LV network interconnection, LV fused jumpers must be used.

Where the distribution transformers on different HV circuit breakers are paralleled through the LV overhead network interconnection, LV fused jumpers must be used.
Electrical System Safety Rules

The use of LV fused jumpers can be avoided in the following situations:

1. if LV fuses exist at one or both of the sources of LV supply
2. reconfiguring the HV network such that the distribution transformers then paralleled through the network interconnections are on the same HV circuit breaker and are not interspaced by a recloser or protection operated device. This is good operational practice and is the preferred option
3. a planned outage on the LV
4. if, during switching, the risk is considered to be for a short period only

After interconnection check whether the voltage is within the statutory voltage limits at all interconnection points.

After restoration ensure that all disconnectors that were closed as part of the LV switching schedule have opened. LV switches that remain in an abnormal state after the completion of the LV switching schedule must be recorded by approved procedures.

11.2.8 LV generators

NOCC must be notified before connecting or disconnecting LV generators to the LV network.

11.3 Minimum rules for work on live LV

For all live LV work, strict live work techniques apply.

Approved precautions must be taken to prevent simultaneous contact with conductors or conducting objects at different potentials.

Approved insulating covers must be used to prevent inadvertent contact with live LV electrical apparatus, or conducting surfaces of different voltages, except where approved methods permit otherwise.

A VA is not required or applicable to LV.
11.3.1 Live LV safety observer

When work is being carried out on live LV electrical apparatus, a safety observer must be appointed. Exceptions to this rule are:

- testing, removal and installation of meters and load loggers
- inspection and replacement of fuses or links
- maintenance of control circuits
- work carried out with operating sticks

Prior to commencing any work, a risk assessment must be completed. The risk assessment will determine whether the work is classified as high-risk or low-risk. If the risk assessment determines that LV switching/pillar link work is low-risk, the work can proceed without a safety observer. If the risk assessment deems the switching/pillar link work to be high-risk, a safety observer must be present.
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12 Safety rules for work on particular items of plant, apparatus & conductors

12.1 Electrical apparatus and conductors declared out-of-use

The Operating Authority may declare electrical apparatus out-of-use by removing a permanent length of conductor from each source of electrical supply.

For HV, the length of conductor must be at least equal to the MAD for the voltage concerned. For LV, the minimum length of conductor needed is 150 mm.

Note: Fuses, links, live line taps, switches or isolators must not be regarded as a permanent length of conductor.

Note: Removal of taps is not considered out-of-use.

Electrical apparatus declared out-of-use may be worked on without a work permit.

Even though an electrical apparatus is declared out-of-use, consideration must be given to induction, private generation backfeed, lightning strikes, static charges and the proximity of other live equipment.

NOCC and SOCC are not the Operating Authority for equipment declared out-of-use. The holder of the handover certificate is the Control Authority of the equipment.

12.2 Remote control electrical apparatus

Prior to the issue of a permit to work on or near live electrical apparatus, remote or automatic function(s) must be made inoperative. This may include putting the device into local control and/or the Control Authority placing a control inhibit on the apparatus.
12.3 Rackable withdrawable circuit breakers

- ensure spout shutters are unlocked before racking circuit breaker in
- ensure circuit breaker is OFF using approved procedures before racking in or out
- ensure racking circuit breaker into correct position
- ensure remote control is disabled
- where the incoming circuit is live, disable auto reclose prior to racking in or out
- where a circuit breaker is removed from service and is to be transported away from the switchyard for maintenance, a handover certificate must be issued from the Operating Authority to the Maintenance Authority
- where a circuit breaker is delivered to a switchyard for return to operational service, a handover certificate must be issued from the Maintenance Authority to the Operating Authority. The handover certificate or supplementary documentation must record the results of pre-commissioning tests and support the recommissioning of the circuit breaker

12.3.1 Access to withdrawable circuit breakers for maintenance

An EAP must be issued for work on withdrawable circuit breakers when racked out. Busbar and circuit shutters must also be locked closed and danger tagged. Due to the electrical separation and physical barrier provided by the busbar and circuit shutters, the fitting of program earths to the circuit breaker is not required. On the EAP, within the “program earth” section, the switching operator is to write "program earth not fitted as per ESSR clause 12.3.1".

In the event that further invasive testing is required, an STT may be more appropriate. This may be a primary systems STT or a secondary systems STT.
12.4 Testing under an EAP for zone substation maintenance

A range of simple tests – circuit breaker timing tests and insulation integrity tests requiring the removal of program earths fitted with restricted use tags for example - can be performed under an EAP only after:

1. the issuing officer has granted permission
2. all recipients of the EAP are notified by the RIC and have stopped work
3. the RIC of the EAP, or a competent person under their immediate direction, is responsible for the removal and reapplication of the program earths
4. work must not restart until the earths are reapplied (and restricted use tag reapplied if they were removed)
5. all recipients of the EAP are notified by the RIC that work can safely recommence

(Refer to the Transmission Substation Manual for further information.)

12.5 Distribution regulators

When it is necessary to bypass a regulator, the regulator must be set to manual and the neutral tap selected to equalise the input and output voltages. Failure to do so is likely to result in permanent damage to the regulator.

12.6 Spout shutters on HV switchgear

Spout shutters that are accessible and are not required for immediate work/operation must be locked shut. If the spout shutters are inaccessible in normal circumstances, these spout shutters can remain unlocked. Where busbar shutters in dual busbar substations are inaccessible due to a circuit breaker being in service and on load, it is acceptable to lock (if possible) and danger tag the selector mechanism, or as a minimum, caution tag the selector mechanism to advise others of danger.

The danger tag on site must be appropriately secured to the selector mechanism in the event that it cannot be locked in place.
12.7 Transformers

When working on the connections to, or the windings of, a transformer, the transformer must be isolated from all sources of supply, proven de-energised and earthed, and have an appropriate work permit issued. Winding and connections include ratio selectors and tap changers.

To prevent the possibility of the transformer being made live by back feed, all LV fuses or links on associated voltage transformers, auxiliary transformers and from low voltage networks, must be withdrawn.

A disconnected transmission system transformer primary terminal must be discharged to earth using approval procedures before being touched.

When it is necessary to carry out a tap change on a distribution transformer, it must be isolated, earthed and have a VA issued on a nearby apparatus.

12.8 HV capacitors

Before any person touches de-energised capacitors, all conductors, including neutral conductors, must be discharged and earthed using approved procedures.

The same precautions must be taken with capacitors that are part of any electrical apparatus.

12.9 HV cables

Before any person commences work on cables, all conductors, including screen conductors, must be discharged and earthed.

(See section 6.3.6 for information on approaching cables.)
12.10 Ferro resonance

Ferro resonance may occur in three phase underground distribution systems when an unloaded delta/star distribution transformer becomes energised or de-energised by single phase switching.

Ferro resonance is a problem only when the length of cable exceeds the critical length for a given transformer.

The following methods are used to prevent ferro resonance:

- three phase rather than single phase devices must be used for switching
- a transformer may be energised using a single phase device provided that the actual load or simulated load is connected to that transformer

12.11 Double circuit lines

Where work is carried out on a double circuit line, the electrical apparatus to be worked on must be clearly and continuously identified in the approved manner to all persons covered by the permit.

(Refer to the Transmission Substation Manual for further information.)

12.12 Street lighting and other non-network equipment

Street lighting circuits and un-metered supply circuits are considered part of the LV network; however, the appliances connected to them are not governed by the ESSR.
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13 Transmission protection and control systems (protection control and automation)

Field Services are the controlling authority and issue protection control permits. They are also the controlling authority for the pilot cable network.

Protection, control and automation include but are not limited to station LV supply, batteries and battery chargers, protection circuits, pilot cables, control and alarm circuits, SCADA and communications equipment.

13.1 Minimum rules for protection and automation work

The following procedure for undertaking protection, control and automation work must be followed:

1. all staff engaged to undertake protection, control and automation work must have received appropriate training and must possess authorisation from Western Power

2. protection, control and automation work must be done in accordance with approved procedures

3. application of work permits apply to protection, control and automation work

4. for any access to protection, control and automation that has operational impact, the Operating Authority must be notified and give approval according to approved procedures

5. approved engineering controls, procedures and instructions must be in place to prohibit inadvertent operation and energisation of the protection, control and automation being accessed (ensure safe isolation)

Note: \(^1\) Refer to the Transmission Substations Work Practice Manual.
Appendix 1: Switching authority levels

**Note:** Numbers indicate switching level required.
Appendices

Appendix 1: Switching authority levels
## Appendix 2: Switching operator authority levels

### Table 10: Switching operator authority levels

<table>
<thead>
<tr>
<th>System</th>
<th>Level</th>
<th>Description</th>
<th>Detail</th>
<th>Pts Course</th>
<th>Course Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Overhead LV &amp; HV Drop-out Fuses</td>
<td>Switch on the Overhead System from the load side of Drop-Out Fuses. This includes interconnect LV and operate HV drop-out fuses to allow isolation of single pole top transformers.</td>
<td>PTS138</td>
<td>1 &amp; 4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Overhead HV</td>
<td>Switch on the Overhead HV System. Level 2 includes:</td>
<td>PTS139</td>
<td>2</td>
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<td></td>
<td></td>
<td></td>
<td>• pole top switches, HV line fuses, HV isolator blades (DISO), reclosers and sectionalisers</td>
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<td>• paralleling HV feeders (where transformer taps need to be set or adjusted, the switching operator also needs Level 6)</td>
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<td></td>
<td></td>
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<td>• operation of ground mounted transformers with overhead connections at both HV and LV&lt;sup&gt;1&lt;/sup&gt;</td>
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<td></td>
<td></td>
<td></td>
<td>• operation of Zone Substation feeder circuit breaker auto/manual and earth fault switches</td>
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<td></td>
<td>• field regulators</td>
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<td></td>
<td><strong>Note:</strong></td>
<td>&lt;sup&gt;1&lt;/sup&gt;Taps included</td>
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<td>System</td>
<td>Level</td>
<td>Level Description</td>
<td>Detail</td>
<td>Pts Course</td>
<td>Course Level</td>
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<tr>
<td></td>
<td>3&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Limited Underground HV &amp; LV Systems</td>
<td>Limited Switching on the Underground HV and LV System. This level allows HV switching at ring main substations, compounds and padmounts, where HV cables are supplied from the Overhead HV System. It allows the operator to test that the cable is de-energised at the aerial connection before applying a ring main earth. Level 3 also allows switching on the LV board in substations, compounds and padmounts, where the LV cable runs directly to the overhead system and/or directly to a customer. <strong>Note:</strong> &lt;sup&gt;1&lt;/sup&gt;This level is currently under review</td>
<td>PTS140</td>
<td>3, 4 &amp; 5</td>
</tr>
<tr>
<td>Distribution</td>
<td>4</td>
<td>Underground LV Systems</td>
<td>Switch in concentrated underground areas on the LV System. Allows switching on the underground system where a cable loops to one or more feeder pillars, underground residential distribution pillars or substation LV board. Detailed local knowledge of loading is required.</td>
<td>PTS138 or PTS140</td>
<td>1 &amp; 4 3, 4 &amp; 5</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Concentrated Underground HV</td>
<td>Switch in concentrated underground areas on the HV System. This allows switching on ring main substations where any HV cable runs between ring main substations. There is often no provision available to test the cable for de-energisation before earthing. Detailed local knowledge is required. This also permits the issuing of cable colours and HV cable testing (e.g. hipot).</td>
<td>PTS140</td>
<td>3, 4 &amp; 5</td>
</tr>
</tbody>
</table>
# Electrical System Safety Rules

<table>
<thead>
<tr>
<th>System</th>
<th>Level</th>
<th>Level Description</th>
<th>Detail</th>
<th>Pts Course</th>
<th>Course Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>This allows switching on feeders and associated equipment in zone substations. Level 6 includes: • feeder circuit breakers • manual/auto reclose selector switches • earth fault 'in/out' selection • feeder disconnector (isolator) operation • zone substation local LV supplies within the zone substation(^1) • switching (not isolation or earthing) of zone substation capacitors • earthing feeder spouts for indoor switchgear</td>
<td>PTS141</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Distribution Feeders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)LV supplies external to the zone substation switched at the level appropriate to the apparatus being switched

<table>
<thead>
<tr>
<th>Transmission</th>
<th>Level</th>
<th>Level Description</th>
<th>Detail</th>
<th>Pts Course</th>
<th>Course Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Zone Sub-Transmission</td>
<td>This allows operation of 66kV and 132kV circuit breakers, line disconnectors (also called line isolators) and line earth switches.</td>
<td>PTS142 or PTS143</td>
<td>7, 8, 9 &amp; 10</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Zone Substations</td>
<td>This allows switching operations on all transmission equipment.</td>
<td>PTS143</td>
<td>7, 8, 9 &amp; 10</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Terminal Substation Zone Substation Circuits</td>
<td>This allows switching operations on transmission lines that run between terminal substations and zone substations.</td>
<td>PTS143</td>
<td>7, 8, 9 &amp; 10</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Terminal Substation All Circuits</td>
<td>This allows switching on all transmission circuits and all equipment in a terminal substation.</td>
<td>PTS143</td>
<td>7, 8, 9 &amp; 10</td>
<td></td>
</tr>
</tbody>
</table>
## Electrical System Safety Rules

<table>
<thead>
<tr>
<th>System</th>
<th>Level</th>
<th>Level Description</th>
<th>Detail</th>
<th>Pts Course</th>
<th>Course Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Room</td>
<td>11</td>
<td>Distribution Control Room Operations</td>
<td>Control Room Operations NOCC</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Transmission Control Room Operations</td>
<td>Control Room Operations SOCC</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Note:** *Switching authority levels are not hierarchical*
### Appendix 3: Restrictions

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
</table>
| **D** | Under direction  
This means the trainee operator may carry out switching by themselves; however, each item of the schedule requires direction by telephone or radio from the switching operator in charge. |
| **G** | Excluding operation of GIS  
This excludes the operation of zone or terminal substation gas insulated switchgear. Exclusion also applies to CBD substations. |
| **N** | Excluding commissioning of ring main switchgear  
This excludes the commissioning of ring main switchgear (that is, switching on for the first time). |
| **b** | Excluding writing and checking of switching schedules.  
Stands alone. |
| **X** | Excludes earthing of ring main units and/or zone substation indoor switchgear spouts.  
Level 6X allows switching on feeder circuit breakers at zone substations, but excludes earthing of zone substation indoor switchgear spouts. |
| **Z** | Pending re-assessment. |

The above restrictions can be applied either separately or in combination as follows:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
</table>
| **B** | DXN: direction, excludes earthing and commissioning of ring main switchgear.  
This means that the operator is under direction and cannot apply fixed earths and cannot commission ring main switchgear. |
| **DN** | Under direction, excludes commissioning of ring main switchgear.  
This means that the operator is under direction and cannot commission ring main switchgear. |
| **DX** | Under direction, excludes earthing.  
This means that the operator is under direction and cannot apply fixed earths. |
| **NX** | Excluding earthing and commissioning of ring main switchgear.  
This means that the operator cannot apply fixed earths or commission ring main switchgear. |
| **T** | Transmission only |
| **V** | Special category for Verve |
## Appendix 4: Network access levels

### Table 9: Network access levels

<table>
<thead>
<tr>
<th>Control</th>
<th>Level</th>
<th>Within the Work Permit Systems</th>
<th>Eligible for restricted profile keys</th>
<th>Network authority (NAC)</th>
<th>Substation entry (SEA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA0</td>
<td>Can sign on to permits provided they are directly supervised by an authorised person.</td>
<td>No</td>
<td>Not mandatory. Note: As a construction work site visitor they must be inducted &amp; directly supervised by an authorised person.</td>
<td>Not mandatory</td>
<td>Not mandatory. Note: As a substation visitor they must be inducted &amp; directly supervised by an authorised person.</td>
</tr>
<tr>
<td>NA1</td>
<td>Can sign on to permits provided they are directly supervised by an authorised person.</td>
<td>Yes</td>
<td>Not mandatory. NAC may be required depending upon work activity and proximity to under construction and/or live apparatus.</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>NA2</td>
<td>Entry level of authorisation for permit recipient.</td>
<td>No</td>
<td>Required</td>
<td>Not mandatory. Note: Substation entry authority is mandatory for permit work within substations.</td>
<td></td>
</tr>
<tr>
<td>NA3V</td>
<td>RIC – VA only vegetation control, approach to cables and lines.</td>
<td>No</td>
<td>Required</td>
<td>Not mandatory. Note: Substation entry authority is mandatory for permit work within substations.</td>
<td></td>
</tr>
</tbody>
</table>
## Electrical System Safety Rules

<table>
<thead>
<tr>
<th>Control</th>
<th>Level</th>
<th>Within the Work Permit Systems</th>
<th>Eligible for restricted profile keys</th>
<th>Network authority (NAC)</th>
<th>Substation entry (SEA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA3T</td>
<td>RIC - T</td>
<td>Yes</td>
<td>Required</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>NA3D</td>
<td>RIC - D</td>
<td>Yes</td>
<td>Required</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>NA4T</td>
<td>TIC - T</td>
<td>Yes</td>
<td>Required</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>NA4D</td>
<td>TIC - D</td>
<td>Yes</td>
<td>Required</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>NA5V</td>
<td>IO - VA only vegetation control, approach to cables and lines.</td>
<td>No Yes when SEA is authorised</td>
<td>Required</td>
<td>Not mandatory</td>
<td></td>
</tr>
<tr>
<td>NA5T</td>
<td>IO - T</td>
<td>Yes</td>
<td>Required</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>NA5D</td>
<td>IO - D</td>
<td>Yes</td>
<td>Required</td>
<td>Required</td>
<td></td>
</tr>
</tbody>
</table>

T = Transmission  D = Distribution

**Note:**  *Construction Work used in the context of WA Occupational Health and Safety Standards Regulations 1996.*

(Refer to *Network Authority Card Rules* for further information on levels of supervision, NAC inclusions, NAC exclusions and NAC exemptions.)
Appendix 5: Electrical Access Permit (EAP)

Electrical Access Permit (EAP)

This EAP refers to program no. 

INNMAC / EAP Permit no. 

(Delete which is not applicable)

1. Purpose of EAP:

This EAP is for work on: 

At location: 

2. Isolation points:

The EAP is issued only for the work specified. It must be kept in the possession of the Recipient in Charge or displayed at the entrance to the work area while work is being carried out.

3. Program HV earth/LV short: 

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<tr>
<th>Location</th>
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<tbody>
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<td>P8</td>
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</tbody>
</table>

4. Working HV earth/LV short: 

<table>
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<tr>
<th>Location</th>
<th>Placed by</th>
<th>Removed by</th>
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</thead>
<tbody>
<tr>
<td>W1</td>
<td></td>
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<td>W2</td>
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<tr>
<td>W3</td>
<td></td>
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</tr>
<tr>
<td>W4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. 

(a) Warnings (electrical or mechanical)

Details: 

☐ Yes  ☐ No

(b) Temporary screens or barriers used?

Details: 

☐ Yes  ☐ No

(c) Local precautions or secondary isolation

Details: 

☐ Yes  ☐ No

(d) Secondary access only ☐  Earthing required for secondary access?

☐ Yes  ☐ No

6. Issue - statement by the Issuing Officer of this EAP

I hereby certify: 

1) this EAP has been registered with the Operating Authority controlling the apparatus, and 

2) the above requirements have been completed according to Western Power's Electrical System Safety Procedures (ESSP).

Name (Print)  Signed  ID  Date  Time

(Issuing Officer)  (Issuing Officer or if issued remotely Recipient in Charge)

Mobile

7. Acceptance - statement by the Recipient in Charge receiving this EAP

I fully understand my duties and hereby acknowledge receipt of this EAP or work in accordance with the conditions stated herein. I am aware of the nature and position of conductors and apparatus involved by this EAP. I undertake conductors and apparatus not involved to ignore in this EAP and to be treated as being live.

Name (Print)  Signed  ID  Date  Time

(Issuing Officer)  (Recipient in Charge)

Mobile
8. Transfer of EAP

I hereby state that this EAP is transferred.

<table>
<thead>
<tr>
<th>8.1 From Recipient in Charge</th>
<th>8.2 To Recipient in Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Time</td>
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</tbody>
</table>

9. Sign on/sign off - statement by the Recipients in the working party

1) By signing on the EAP in section 9.1 - I acknowledge I have read and understand the conditions of the EAP.
2) After signing on - I can commence work under the direction of the Recipient in Charge.
3) By signing off the EAP in section 9.2 - I acknowledge I have finished work and understand I am no longer permitted to access the conductors and apparatus covered by this EAP.

<table>
<thead>
<tr>
<th>9.1 Sign on</th>
<th>9.2 Sign off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print name</td>
<td>Mobile or ID</td>
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<td>1</td>
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<td>19</td>
<td>/  /</td>
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<tr>
<td>20</td>
<td>/  /</td>
</tr>
</tbody>
</table>

10. Relinquishment - statement by the Recipient in Charge relinquishing this EAP

All members of the working party have signed section 9.2 (if no explain).

All members of the working party are clear of the equipment if NO STOP.
Working HV earth/LV shorts marked in section 4 have been removed and signed off if NO STOP.
Work on the equipment is now complete.
The equipment is available to be returned to service.
I/r (or others) regard this equipment as being live and in service.

Comments:

<table>
<thead>
<tr>
<th>(Print)</th>
<th>Signed</th>
<th>ID</th>
<th>Date</th>
<th>Time</th>
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</thead>
<tbody>
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</tr>
</tbody>
</table>

11. Cancellation - statement by the Issuing Officer cancelling this EAP

(a) Working HV earth/LV shorts are removed and signed off (section 4).
(b) Secondary isolations restored (section 5).

I hereby certify this EAP has been cancelled with the Operating Authority controlling the apparatus.

<table>
<thead>
<tr>
<th>(Print)</th>
<th>Signed</th>
<th>ID</th>
<th>Date</th>
<th>Time</th>
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</tbody>
</table>
Appendix 6: Vicinity Authority (VA) work permit

Vicinity Authority (VA)

This VA refers to program no. ____________________ (if required)
ENMAC / VA21 Permit no. ____________________
(Date(s) which is not applicable)

1. Purpose of VA:
This VA authorises the following work in the vicinity of electrical apparatus:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

At (location)

________________________________________________________________________

2. The following precautions have been taken and instructions to be observed by the Recipients:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3. The following are the live apparatus and limits of approach to be maintained:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

4. Issue - statement by the Issuing Officer of this VA
1) this VA has been registered with the Operating Authority controlling the apparatus, and
2) the above requirements have been completed according to Western Power’s Electrical System Safety Procedures (ESSP).

<table>
<thead>
<tr>
<th>Name (Print)</th>
<th>Signed</th>
<th>ID</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Issuing Officer)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mobile</td>
<td></td>
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</tbody>
</table>

5. Acceptance - statement by the Recipient in Charge receiving this VA
I fully understand my duties and hereby acknowledge receipt of this VA for work in accordance with the conditions stated herein.

<table>
<thead>
<tr>
<th>Name (Print)</th>
<th>Signed</th>
<th>ID</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Recipient in Charge)</td>
<td></td>
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<tr>
<td>Mobile</td>
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</tbody>
</table>

Product Code: 88879279   05/11
6. Transfer of VA
I hereby state that this VA is transferred.

6.1 From Recipient in Charge

<table>
<thead>
<tr>
<th>Name</th>
<th>ID</th>
<th>Time</th>
<th>Date</th>
</tr>
</thead>
</table>

6.2 To Recipient in Charge

<table>
<thead>
<tr>
<th>Name</th>
<th>ID</th>
<th>Time</th>
<th>Date</th>
</tr>
</thead>
</table>

7. Sign on/sign off - statement by the Recipients in the working party

1) By “signing on” this VA in section 7.1 I acknowledge I have read and understand the conditions of this VA.
2) After “signing on” I can commence work under the direction of the Recipient in Charge.
3) By “signing off” this VA in section 7.2 I acknowledge I have finished work and I understand I am no longer permitted to work in the vicinity of the conductor and apparatus covered by this VA.

<table>
<thead>
<tr>
<th>7.1 Sign on</th>
<th>7.2 Sign off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print name</td>
<td>Mobile or ID</td>
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</tbody>
</table>

8. Relinquishment - statement by the Recipient in Charge relinquishing this VA
I hereby relinquish this VA and state that I have instructed all members of the work party accordingly.

<table>
<thead>
<tr>
<th>Name</th>
<th>Signed</th>
<th>ID</th>
<th>Date</th>
<th>Time</th>
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</thead>
<tbody>
<tr>
<td>(Print)</td>
<td>(Recipient in Charge)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

9. Cancellation - statement by the Issuing Office cancelling this VA
I hereby certify this VA has been cancelled with the Operating Authority controlling the apparatus.

<table>
<thead>
<tr>
<th>Name</th>
<th>Signed</th>
<th>ID</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Print)</td>
<td>(Issuing Officer)</td>
<td>(Issuing Officer or if issued remotely Recipient in Charge)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 7: Sanction to test (STT) work permit

Sanction to Test (STT)

This STT refers to program no. _________________ (if required)

ENMAC / XA21 Permit no. _________________
(Delete which is not applicable)

1. Purpose of STT:
This STT gives access to the following circuit/apparatus for testing:

At (location)

2. The circuit/apparatus is in the following configuration for testing purpose only:

The STT is issued only for the work specified. It must be kept in the possession of the Tester in Charge of the work.

3. Earthing

<table>
<thead>
<tr>
<th>Earth no.</th>
<th>Approved</th>
<th>Placed by</th>
<th>Removed by</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

4. (a) Warnings (electrical or mechanical)

Details: ____________________________________________________________________________

☐ Yes ☐ No

(b) Temporary screens or barriers used?

Details: ____________________________________________________________________________

☐ Yes ☐ No

(c) Local precautions or secondary isolation

Details: ____________________________________________________________________________

☐ Yes ☐ No

(d) Secondary access only ☐ Earthing required for secondary access? ☐ Yes ☐ No

5. Issue - statement by the Issuing Officer of this STT

I hereby certify:
1) this STT has been registered with the Operating Authority controlling the apparatus, and
2) the above requirements have been completed according to Western Power's Electrical System Safety Procedures (ESSP).

Name ____________________________ Signed _______________ ID ___________ Date ___________ Time ___________
(Print) (Issuing Officer) (Issuing Officer or if issued remotely Tester in Charge)

Mobile ___________________________

6. Acceptance - statement by the Tester in Charge receiving this STT

I fully understand my duties and hereby acknowledge receipt of this STT for work in accordance with the conditions stated herein.

Name ____________________________ Signed _______________ ID ___________ Date ___________ Time ___________
(Print) ____________________________ (Tester in Charge)

Mobile ___________________________
7. Transfer of STT
   I hereby state that this STT is transferred.
   7.1 From Tester in Charge
<table>
<thead>
<tr>
<th>Name</th>
<th>ID</th>
<th>Time</th>
<th>Date</th>
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<tbody>
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</table>
   7.2 To Tester in Charge
<table>
<thead>
<tr>
<th>Name</th>
<th>ID</th>
<th>Time</th>
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</table>

8. Sign on/sign off - statement by the Recipients in the working party
   1) By “signing on” this STT in section 8.1 I acknowledge I have read and understand the conditions of this STT.
   2) After “signing on” I can commence work under the direction of the Tester in Charge.
   3) By “signing off” this STT in section 8.2 I acknowledge I have finished work and I understand I am no longer permitted to access the conductor and apparatus covered by this STT.

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<thead>
<tr>
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<th>Mobile or ID</th>
<th>Signature</th>
<th>Date</th>
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9. Secondary isolations restored
   [ ] Yes [ ] N/A [ ] No

10. Relinquishment - statement by the Tester in Charge relinquishing this STT
   All members of the working party have signed section 8.2 (if no explain).
   All members of the working party are clear of the equipment (IF NOT STOP).
   Work on the equipment is now complete.
   Equipment is available to be returned to service.
   The circuit/apparatus is hereby handed over to the Operating Authority in the following condition:

   ________________________________
   Name ________________________
   (Print) ________________________
   Signed ________________________
   ID ________________________
   Date ________________________
   Time ________________________
   (Tester in Charge)

11. Cancellation - statement by the Issuing Officer cancelling this STT
   I hereby certify this STT has been cancelled with the Operating Authority controlling the apparatus

   ________________________________
   Name ________________________
   (Print) ________________________
   Signed ________________________
   ID ________________________
   Date ________________________
   Time ________________________
   (Issuing Officer) ________________________
   (Issuing Officer or if issued remotely Tester in Charge) ________________________
Appendix 8: Handover Certificate

Handover Certificate
ORIGINAL TO BE RETURNED TO WORKS ADMINISTRATION ON COMPLETION

Western Power Corporation, 363 Wellington St Perth Western Australia 6000 Doc No Here

1 Please note that from the date and time stated the apparatus detailed below which has previously been controlled by
By ___________________________ Dept/Group ___________________________
Is now handed over to ___________________________ Dept/Group ___________________________
Date _______________ Time _______________ Project No (where applicable) ___________________________
Location ___________________________________________________________

2 Apparatus being handed over: __________________________________________________________
________________________________________________________
________________________________________________________
________________________________________________________

3 ☐ The circuit/apparatus listed in part 2 is handed over for the purpose of being made connectable. The circuit/apparatus
is NOT COMMISSIONED and is therefore NOT AVAILABLE FOR SERVICE
Handed over by ___________________________ Pay No ___________ Date ___________ Time ___________
Accepted over by ___________________________ Pay No ___________ Date ___________ Time ___________

4 ☐ The circuit/apparatus listed in part 2 is now commissioned and is now ready for operational duty WITH NO
RESTRICTIONS OR LIMITATIONS
☐ The circuit/apparatus listed in part 2 is now commissioned and handed over for operational duty WITH THE
RESTRICTIONS AND LIMITATIONS AS DETAILED as detailed in part 5 or as per the attached documentation
Handed over by ___________________________ Pay No ___________ Date ___________ Time ___________
Accepted over by ___________________________ Pay No ___________ Date ___________ Time ___________

5 Restrictions/Limitations
________________________________________________________
________________________________________________________
________________________________________________________
________________________________________________________
________________________________________________________

6 Any further work on the apparatus, as identified in part 2 of this document and accepted by the Operating Authority in parts 3
or 4, can only be carried out under the control of an appropriate Permit issued by the Operating Authority
(refer to section 6.2 of the ESSP)
☐ All members of the work party have acknowledged the change condition and have signed in the appropriate column
(see reverse side of this document)
Acknowledged and confirmed by work team leader ___________________________ Pay No ___________
Date ___________ Time ___________

DM#: 8527604v1
Acknowledgement of work team by signature to changed conditions

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<tr>
<th>Pay No</th>
<th>Acknowledgement of change (not commissioned)</th>
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<table>
<thead>
<tr>
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<th>Acknowledgement of change (commissioned)</th>
<th>Date</th>
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SAMPLE
OPERATING AGREEMENT

This OA refers to Programme No ______________________ (if required)  
ENMAC / XA21 Permit No __________________________  
(DELETE THAT WHICH IS NOT APPLICABLE)

UNDERTAKING TO LEAVE EQUIPMENT DE-ENERGISED / ISOLATED / DISCONNECTED (PLEASE CIRCLE)

To: ______________________  
(Persons Name & Appointment – PLEASE PRINT)

Date: ____________________  
Time: ____________________

Authority/Company/Branch/Section: ______________________

1. Name of Equipment:

2. The above equipment will remain de-energised / isolated / disconnected with the following steps /actions being carried out:

3. Issued by:
   Name: ____________________ Signed: ___________ ID No: __________ Date: __________ Time: __________
   (Issuing Officer)

4. Recipient: I hereby acknowledge receipt of this Agreement in accordance with the conditions stated hereon.
   Name: ____________________ Signed: ___________ Position: __________ Date: __________ Time: __________

   Recipient – by telephone:
   Name: ____________________ Position: __________ Contact Number: ______________________

CANCELLATION

The work or circumstances requiring the conditions stated in Section 2 no longer apply. The equipment may now be returned to a state mutually agreed by parties to the Agreement.

5. Recipient or Authorised Delegate - in person (NAME PLEASE PRINT):
   Name: ____________________ Signed: ___________ Position: __________ Date: __________ Time: __________

   Recipient or Authorised Delegate – by telephone:
   Name: ____________________ Position: __________ Contact Number: ______________________

6. Cancelled by Issuing Authority:
   Name: ____________________ Signed: ___________ ID No: __________ Date: __________ Time: __________

   Control Room notified (if applicable): □ YES □ NO
### Appendix 10: Permit to Work process – roles

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
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</table>
| Controller         | The controller must be authorised by Western Power’s Operating Authority and is responsible for co-ordinating switching activities on Western Power’s electrical system. Responsibilities include:  
  - co-ordinating high voltage switching activities  
  - performing switching activities on SCADA controlled devices  
  - electronically record work permits to ensure compatibility of multiple work permits |
| Switching operator | The switching operator must be authorised by Western Power’s Operating Authority and is responsible to undertake switching of electrical apparatus on Western Power’s electrical system. Responsibilities include:  
  - physical switching associated with isolation and earthing  
  - flagging off and barricading the safe working area inside switchyards  
  - installing appropriate signs  
  - confirming protection, control and automation isolations  

The switching operator cannot delegate accountability for any task but can directly supervise a person familiar with the task. E.g., an earth being applied from an EWP.  

**Note:** *The switching operator is still required to sign the permit in the ‘placed by’ column.*
**Role** | **Description**
--- | ---
Issuing Officer (IO) | The issuing officer must be authorised by Western Power’s Operating Authority and is responsible for issuing and cancelling work permits. It is common practice for the issuing officer to also carry out the role of the switching operator, if authorised to do so. An issuing officer may also be the RIC of the same work permit, but this practice must be avoided where possible. Responsibilities include:
- writing a legible work permit with a precise description of the electrical apparatus and/or conductors, and the conditions under which it is issued and received
- issuing a work permit to an RIC/TIC
- registering and cancelling a work permit with the Operating Authority
- describing and/or showing the RIC/TIC (and recipients where possible):
  - isolation points
  - program earths
  - limits of the safe work area
  - locations of adjacent live points
  - confirming protection, control and automation isolations
### Electrical System Safety Rules

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recipient in charge (RIC)</td>
<td>The RIC must be authorised by Western Power’s Operating Authority. All work under an EAP or VA is performed under the control of a RIC. Responsibilities include:</td>
</tr>
<tr>
<td></td>
<td>• accepting and relinquishing EAP and VA work permits</td>
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<td>• ensuring all recipients understand and have signed on/off a work permit</td>
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<td></td>
<td>• ensuring all recipients are informed of the conditions of a work permit including:</td>
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<tr>
<td></td>
<td>• isolation points</td>
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<td></td>
<td>• program earths</td>
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<td></td>
<td>• limits of the safe work area</td>
</tr>
<tr>
<td></td>
<td>• locations of adjacent live points</td>
</tr>
<tr>
<td></td>
<td>• protection, control and automation isolations</td>
</tr>
<tr>
<td></td>
<td>• actively managing the work to be performed ensures the work is performed safely within the conditions of the work permit</td>
</tr>
</tbody>
</table>

An RIC cannot delegate the accountability of any task to another individual; however, they can directly supervise a person familiar with a relevant task, e.g., proving de-energisation and/or applying working earths. Regardless the RIC must sign the permit.

**Note:** An RIC cannot perform the function of a safety observer at the same time as being the RIC.
<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
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</table>
| Tester in charge (TIC)        | A TIC must be authorised by Western Power’s Operating Authority. All testing and commissioning work under an STT is performed under the control of a TIC. Responsibilities include:  
  • accepting and relinquishing STT permits  
  • ensuring all recipients are informed of the conditions of the work permit  
  • actively managing any testing ensures that all work is performed safely under the conditions of the permit  

A TIC cannot delegate the accountability of any task to another individual; however, they can directly supervise a person familiar with a relevant task. Regardless the TIC must sign the permit.  

**Note:** *A TIC cannot perform the function of a safety observer at the same time as being the TIC.*
## Electrical System Safety Rules

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
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<tbody>
<tr>
<td>Recipient</td>
<td>The recipient must be authorised by Western Power’s Operating Authority.</td>
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<tr>
<td></td>
<td>Responsibilities include:</td>
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<td>• working safely under the conditions of the work permit and direction of</td>
</tr>
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<td>the RIC/TIC</td>
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<tr>
<td></td>
<td>• signing on to work permits before commencing work and signing off after</td>
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<td></td>
<td>work is complete</td>
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<tr>
<td></td>
<td>• understanding the conditions of the work permit which include:</td>
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<tr>
<td></td>
<td>• isolation points</td>
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<td></td>
<td>• program Earths</td>
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<td></td>
<td>• limits of the safe work area</td>
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<td></td>
<td>• locations of adjacent live points</td>
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<tr>
<td></td>
<td>• protection, control and automation isolations</td>
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<tr>
<td>Ordinary person</td>
<td>An ordinary person includes contractors, employees or members of the public.</td>
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<td></td>
<td>Ordinary persons cannot enter a work site or sign onto a work permit</td>
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<td>(unless under direct personal supervision of an authorised person).</td>
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</table>
Appendix 11: Transition from live to earthed network state for EAP (HV)

Figure 14: General transition from live to earthed network state for EAP (HV) process
Appendix 12: Transition from live to short-circuited state for EAP (LV)

Figure 15: General transition from live to short-circuited state for EAP (LV) process
## 15 Bibliography

<table>
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<td>6777496</td>
<td>Applicant Information Pack – for excavation and above ground work near western Power’s electrical networks.</td>
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<td>Electrical Equipment Hazard &amp; Significant Hazard Response Instructions</td>
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<td>Extra Safety Precautions Prior to Entering CBD and Remote Controlled HV Substations</td>
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<td>7678123</td>
<td>Handover &amp; Initial Energisation Procedure</td>
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<td>6127457</td>
<td>High Voltage Live Work Manual</td>
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<td>8749527</td>
<td>Incident Reporting and Investigation Procedure</td>
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<td>8217417</td>
<td>Network Authority Card Rules</td>
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<tr>
<td>8224570</td>
<td>Notification to customers with life support equipment and other sensitive customers affected by planned power interruptions</td>
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<td>6851520</td>
<td>NWI 108 - Distribution Network Keys</td>
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<td>2249252</td>
<td>NWI-87: Operations requiring a switching programme</td>
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<td>Operational Tags Standard</td>
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<td>Permit to Work Standard</td>
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<td>8693530</td>
<td>S&amp;H Competency and Training Management Standard</td>
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<td>Switching and Network Access Authorities Suspension and Reinstatement Management Procedure</td>
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<td>4151076</td>
<td>Western Power Dictionary – Glossary of Terms, Acronyms &amp; Abbreviations</td>
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<td>6999451</td>
<td>Distribution Work Practice Manual</td>
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<td>AS 5804.1-4, 2010 : High voltage live working</td>
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<td>N/A</td>
<td>Code of Conduct for the Supply of Electricity to Small Use Customers</td>
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<td>N/A</td>
<td>Electricity (Supply Standards and System Safety) Regulations 2001</td>
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<td>N/A</td>
<td>Electricity Industry (Network Quality and Reliability of Supply) Code 2005</td>
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<td>3528260</td>
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<td>4463438</td>
<td>ENA NENS 03-2006 National Guidelines For Safe Access To Electrical and Mechanical Apparatus</td>
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