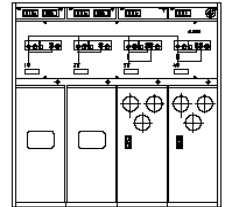


DISTRIBUTION COMMISSIONING FORM 4.9 – High voltage ring main switchgear



Purpose: This instruction covers the testing and commissioning of all replacements or new installations of high voltage (HV) ring main switchgear.

For more information refer to the [Distribution Commissioning Forms Guideline \(EDM 34137510\)](#)

Notes: The following tests and checks must be carried out after installation and before the switchgear is put into service. **Ensure the HV cables on either side of the ring main units are de energised and earthed before carrying out this commissioning exercise.**

Address/Pole No.			
Work Package No.		Test Site/Location:	

1. HV Ring Main Switchgear: Visual Inspection and Safety Check

HV switchgear serial number:	
Check that the HV switchgear matches the drawings provided.	
Check that the gas pressure is sufficient and record the value (if applicable).	MPA
Check that the HV ring main switchgear is de-energised before testing. (Cables disconnected.)	
Verify the minimum heights and protective barrier clearances.	
Operate all switch mechanisms. Test the earth switches. Test all interlock mechanisms to confirm correct and inhibit functions.	
Conduct functional tests of electrical equipment and parts of the installation; verify the settings, circuitry and programming; verify the operation and configuration by measurement or testing of protective, monitoring, measuring and control devices.	
Verify that the fire ratings for the building and enclosures are correct and that the emergency exits are operational.	
Verify the minimum clearances between the live parts and earth.	
Inspect the markings, safety signs and safety devices.	

2. Insulation Resistance Test

This test must be carried out before any cables are connected. Open all earthing switches and close all load carrying switches. Conduct an insulation resistance test of the busbar with a 5 kV insulation resistance tester for 1 minute and record the value. The value must be greater than 5,000 MΩ/5 GΩ.	Test Connection	Expected Values	Resistance
	Red - white	> 5,000 MΩ/5 GΩ	Ω
	White - blue	> 5,000 MΩ/5 GΩ	Ω
	Blue - red	> 5,000 MΩ/5 GΩ	Ω
	Red - earth	> 5,000 MΩ/5 GΩ	Ω
	White - earth	> 5,000 MΩ/5 GΩ	Ω
	Blue - earth	> 5,000 MΩ/5 GΩ	Ω

3. Continuity Test

The purpose of this test is to verify the connection between the same phases.

Connect an insulation resistance tester set at 1 kV and test between all bushings of the same phase to prove continuity.	Test Connection	Expected Values	Resistance	
	Red - red	0 MΩ	Ω	
	White - white	0 MΩ	Ω	
	Blue - blue	0 MΩ	Ω	
Close all earthing switches and open all load carrying switches. Connect an insulation resistance tester between all bushings of the same phase and earth bar to prove continuity.	Red - earth	0 MΩ	Ω	
	White - earth	0 MΩ	Ω	
	Blue - earth	0 MΩ	Ω	

4. Handover of Responsibility for the Completion of Items 1 - 3

I hereby certify that items 1 to 3 have been completed with the above results.			
Tested by		BNA	
Signature		Date & Time	

Note: A final insulation test between all phases and neutral/earth on all low voltage circuits must be performed before energising for the first time. This also applies if any connections have been disturbed or replaced.

5. Cable and Site Checks

Check that the earthing has been installed, tested (DCF 4.1) and connected as per the design drawings.		
Check that all the HV cable terminations are secure and that the correct bailing assemblies are used.		
Check that all the HV cable terminations are tightened to the required manufacturer standard.		
Check that the drain wires are fitted to all HV elbow connectors and are connected to the cable screen.		
Check that the HV cable screens are all solidly and separately connected and bolted to the HV earth bar.		
Check that the HV cables are numbered and labelled correctly		
Ensure that the 25 mm clearance between the cable screens and the cable support brackets is maintained.		
Check that no HV cables are exposed. Backfill if necessary.		
If the ring main unit is in a kiosk, check that the kiosk body is earthed correctly, including the kiosk doors.		
Ensure that all circuit switches are OFF, that their earth switches are ON, and that padlocks and danger labels are fitted.		
Connect the HV cables (still isolated and earthed at the remote ends)		
Ensure the site is safe and barricaded where necessary, with no hazards to personnel or the public.		
For Schneider RM6 ring main switchgear, check the following: - black bolts on the top edge of all switch disconnector panels - interlocking pin and metal tab - chassis correctly installed - short lintel bars For more information, refer to EDM 27510115.	Check that the two black bolts located on the top edge of all switch disconnector panels are installed and tightened.	
	Check the interlocking pin and metal tab located on the top edge of switch disconnector door panels and on the inner edge of the fuse cover top panel. Ensure they are not bent and are firmly attached to the panels.	
	Ensure that the chassis of the RM6 ring main unit is mounted on a flat, even surface and is not distorted.	
	Check that the short lintel bars located at the front bottom of the RM6 cable compartments are installed and bolted down. Align the front lintel bars and tighten the mounting bolts so that the door panels fit the cable compartment door frames properly.	

6. HV Metering Unit (extensible): Visual Inspection and Safety Check

Confirm that the HV metering unit has a HV test lab test certificate or tags for the current transformers and voltage transformers.	
Confirm that the HV test lab accuracy test certificate serial number matches the extensible metering unit serial number.	
Confirm that the metering officer has completed the commissioning document for HV metering units.	
Record the name of the metering officer:	

7. Handover of Responsibility for the Completion of Item 5 - 6

I hereby certify that item 5 and 6 have been completed with the above results.			
Tested by		BNA	
Signature		Date & Time	

8. Commissioning and Energisation

Ensure that the high voltage cable testing schedule is available and that the results are acceptable.							
Ensure that the earthing system test result (DCF 4.1) is available and that the results are acceptable.							
Ensure that the inside of the fuse compartment is clean and install the correct rating HV high rupturing capacity fuses according to the fuse chart. Ensure that the striker pin faces the striker bar.							
The switching operator must contact NOCC and ensure that the switchgear labels correctly match the ENMAC or PowerOn Fusion diagrams.							
Ensure that any 'spare' switches are left in the OFF position and their earth switch left ON.							
Record the switching program number:							
The following phasing out checks need to be completed in conjunction with the appropriate steps in the switching program (where applicable). ○ Check that the neon light is connected to the correct phase by measuring the voltage at the test points. ○ Take one cubicle as a reference and test the red phase of that cubicle against the red phase and other phases of the other cubicle. ○ Red to red should return minimum volts, and other phases should have a maximum voltage. ○ Repeat this procedure with the other phases.	Connection		Connection		Connection		
	R1 – R2 Should be Min V	Max V Min V	W1 – R2 Should be Max V	Max V Min V	B1 – R2 Should be Max V	Max V Min V	
	R1 – W2 Should be Max V	Max V Min V	W1 – W2 Should be Min V	Max V Min V	B1 – W2 Should be Max V	Max V Min V	
	R1 – B2 Should be Max V	Max V Min V	W1 – B2 Should be Max V	Max V Min V	B1 – B2 Should be Min V	Max V Min V	
Ensure that all equipment is in its final circuit conditions as per the switching program.							
Ensure that all equipment is locked, and secure from unauthorised entry.							

Note: Any changes to the original design must be marked, documented and stamped "As Constructed."

9. Handover of Responsibility

I hereby certify that item 8 has been completed with satisfactory results and transfer control to the network operating authority.			
Commissioned by		BNA	
Signature		Date & Time	

Note: Bolts and screws in all electrical connections across the Western Power network must be properly tightened. All lug crimps confirmed intact visually or with a pull test.

1. Ensure the work area is left tidy with no hazards to the public.
2. Hand over responsibility to the operating authority.
3. Return this form to the project file as a record of the commissioning/handover certificate.
4. After the on-site project officer signs off on the DCF, a scanned copy of the DCF must be attached to the relevant project documentation.