

High Voltage Switchgear

Last Issue Date: 09/10/2020		Type Of Service				
Activity		A	B	C	D	E
1	Installation specific maintenance: Refer to the manufacturer's recommended maintenance procedures or the specific maintenance instructions developed for the switchgear installation. Notify the FMSP in writing of any significant safety issues, failures or major components requiring replacement identified during the maintenance procedures. Rectify the issues in line with the maintenance agreement and record any modifications in the logbook and customer service report.				Y	Y
2	General Inspection: Inspect the switchroom and switchgear for: a) general cleanliness. b) safety gear / specialist PPE availability and in good condition (where required). c) signs of overheating of components. d) ventilation openings clean and / or forced ventilation systems operational. e) condition of weather seals. f) signs of corrosion. g) leakage of oil or other compounds. h) unusual smell that may indicate overheating. i) noise that may indicate electrical discharge or looseness of components. j) signs of deterioration of the room that may impact the HV installation (e.g. settlement, cracking and salt damp etc.). k) as far as is reasonably practicable inspect: all switchgear, isolating and earthing switches, external insulation, trip mechanisms, shutter mechanism, gas vents, earth connection and any other visible parts for signs of abnormality. l) ancillary equipment, spare fuses, special tools or other equipment required for the operation of the switchgear are available and in good condition.				Y	Y
3	General testing: a) Use a heat sensitive detector to locate any hot spots or joints. Notify the FMSP if further investigation is recommended using thermal imaging and seek approval to complete the works. b) Undertake ultrasonic survey testing. Record the results in the logbook. Notify the FMSP in writing and seek approval to carry out any further recommended investigations or resulting major maintenance procedures. c) Auxiliary supply systems: 1. Test and verify the operation of any auxiliary supply system. 2. Inspect the system for any signs of shedding of active material or general degradation. 3. Confirm the battery voltages are adequate under load and under charge (as appropriate). 4. Inspect the electrolyte level (where appropriate) and top up to the required level. 5. Replace any batteries at the interval recommended by the manufacturer or if testing is failed. If the battery is replaced, record in a permanent, legible manner, the date of replacement on the container or on the battery itself.				Y	Y
4	Clean any auxiliary equipment, air filters, vents and other accessible components and				Y	Y

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	surfaces showing signs of dust and dirt accumulation that do not require the installation to be shut down.					
5	<p>General examination and overhaul:</p> <p>a) Clean with appropriate materials and products: the enclosures, switchgear spouts and chutes, vents and other accessible components and surfaces showing signs of dust and dirt accumulation during the examination and overhaul procedures.</p> <p>b) Confirm the operation of the switchgear where possible by tripping and reclosing the circuit breakers.</p> <p>c) Inspect the condition of and test the operation of any anti-condensation heaters.</p> <p>d) Inspect the overload devices and protective relays, complete injection testing (or equivalent) where practicable or as recommended by the manufacturer's recommendations. Notify the FMSP in writing of any devices that are unable to be tested.</p> <p>e) Inspect the isolators and earthing switches, verify their operation, interlocking mechanisms and inspect and clean linkages. Lubricate components as required. Replace any faulty components as required.</p> <p>f) Examine any contacts for overheating, burning or other signs of damage and clean, recondition or renew as required. Verify the tension and alignment of the springs (where applicable).</p> <p>g) Examine any arc control devices or interpole barriers for signs of burning, change of shape or degradation and clean or renew in accordance with the manufacturer's recommendations. Confirm that they are securely fastened. Notify the FMSP in writing of any signs of fault(s) that they may not be aware of.</p>					Y
6	<p>h) Mechanisms: examine, clean, lubricate and replace any worn or malfunctioning components. Confirm the correct operation.</p> <p>i) Auxiliary switches, indicating devices and interlocks: examine, clean, replace any worn or damaged components (e.g. contacts) and confirm the correct operation.</p> <p>j) Examine any isolating contacts for signs of corrosion or overheating and recondition or replace as necessary.</p> <p>k) Examine and test the instrument and protective transformers. Replace any substances or components as required in accordance with the manufacturer's recommendations.</p> <p>l) Inspect and clean all control relays and contactors. Ensure that any mechanical components have free movement as required.</p> <p>m) Verify that all joints are sound, and that good contact is maintained on current-carrying, main earth and secondary earth connections.</p> <p>n) Verify that the connections of secondary wiring and fuses are tight with good connection maintained and that all terminal boxes are free from dirt and moisture. Complete insulation and continuity testing of the wiring systems.</p>					Y
7	<p>o) Verify the operation of the shutters. Replace any failed components.</p> <p>p) Inspect and clean any busbar and busbar chambers. Replenish any compounds to the required fill level where applicable. Test and record the insulation resistance of the compound and investigate any significant changes from previous values.</p>					Y

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	q) Confirm that any weather shields are securely fixed and are in good condition. Replace or refurbish if necessary. r) Service any interrupters in accordance with the type and manufacturer's recommendations. s) Inspect and test any interpole linkages and associated dashpots. t) Verify the operation and correct arrangement of any high voltage fuse connections and associated linkages. u) Inspect and clean arch flash control devices. v) Current and voltage transformers (CTs and VTs): If accessible, carry out a general inspection; make sure connections are tight and inspect any exposed insulation for signs of damage. For oil filled CTs and VTs check the oil level, top up and replace as necessary. w) Inspect and maintain any other auxiliary plant (e.g. air compressors, lifting equipment, oil handling plant etc). x) Undertake any further diagnostic testing (as appropriate).					
8	Oil filled switchgear - general inspection - additional requirements: a) Inspect the bushings for signs of leakage and replenish the oil level if necessary. b) Inspect all vents, gas seals and gas breathers to ensure that the openings are clear and any mechanical components are operational. c) Inspect the tank lifting mechanism for signs of corrosion or failure. Replace any failed or damaged components as required. d) Inspect the tank linings for evidence of burning or any other damage or degradation of components. Replace any failed or damaged components as required.				Y	Y
9	Oil filled switchgear - examination and overhaul - additional requirements: a) Test the Insulating oil, include testing a sample of oil as per AS1883, replace if necessary. b) Examine the gaskets or bushings for any leaks and replace as required.					Y
10	Air blast switchgear - general inspection - additional requirements: a) Confirm the operation of air conditioning systems. b) Confirm the operation of any emergency opening release correctly trips the circuit breaker.				Y	Y
11	Air blast switchgear - examination and overhaul - additional requirements: a) Examine the fixed and moving contacts of the sequence isolator for any signs of overheating or burning. Refurbish or replace as necessary. Ensure that the contacts and associated components have appropriate freedom of movement within their housings. b) Pressure vessels, air receivers and pipe work: clean all internal and external surfaces, restore any damaged finishes and ensure that components are free from moisture. c) Verify the correct operation and accuracy of the pressure gauges. d) Inspect and verify the operation of pressure switches.					Y
12	Sulphur Hexafluoride (SF6) switchgear - general inspection - additional requirements:				Y	Y

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	a) Verify that the gas system is operating at the required pressure and any relationships between high pressure and low-pressure components is correct. Record the values in the log book. b) Sample and test the gas in accordance with IEC 60480. c) Examine any bushings and insulators for signs of gas leaks. Replace any faulty components as required. d) Confirm the operation of any emergency opening release correctly trips the circuit breaker. e) Verify the operation of any SF6 gas heaters and replace any faulty components as required.					
13	Sulphur Hexafluoride (SF6) switchgear - examination and overhaul - additional requirements: a) Verify the correct operation and accuracy of the pressure gauges. b) Inspect and verify the operation of pressure switches.					Y
14	Final verification - undertake insulation resistance testing, verify tightness of all connections and final operational tests.					Y
15	Complete all maintenance activities identified during the inspections and testing that can be carried out safely without the need to shut down the installation.				Y	Y
16	Notify the FMSP in writing of any required shutdowns to carry out the remaining maintenance work. Coordinate an appropriate time for any required shutdowns.				Y	Y
17	Notify the FMSP in writing of any recommended or required major maintenance work resulting from the inspections and testing completed and seek approval to proceed with the work.				Y	Y
18	Record the results in the logbook and submit a customer service report to the FMSP.				Y	Y

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Special Comments and Technical Data

D SERVICE ANNUAL (INCLUDE ONLY ACTIVITIES THAT CAN BE COMPLETED WITHOUT POWER SHUTDOWN).
E SERVICE EVERY 5 YEARS (INCLUDES ACTIVITIES THAT REQUIRE POWER SHUTDOWN).
E SERVICE MAY NEED TO BE MORE FREQUENT (UP TO EVERY 2 YEARS) DEPENDING ON EQUIPMENT SPECIFICS AND THE SITE CONDITIONS.

A SPECIALIST LICENSED SUB-CONTRACTOR IS REQUIRED FOR THIS SERVICE. ENSURE SAFE WORKING CONDITIONS ARE ESTABLISHED.

WHERE SHUT DOWN OF SUPPLY IS REQUIRED FOR INSPECTION AND TESTING PURPOSES, LIAISE AND CO-OPERATE WITH THE SITE REPRESENTATIVE TO MINIMISE DISRUPTION TO THE AGENCY'S OPERATIONS.

APPLICABLE LEGISLATION AND STANDARDS: WH&S REGULATIONS, EPA REQUIREMENTS, AS1883, IEC60480, AS2067 AND AS2467 (FOR ADDITIONAL REQUIREMENTS).

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