شركة العين للتوزيع
Al Ain Distribution Company

Operating Instruction
Electrical High Voltage Testing

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Issued by: _____
HSE Management System Representative

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CONTROLLED

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1. PURPOSE

This Operational Instruction (OI) is mandatory and should be read in conjunction with the AADC System Safety Rules. This OI documents the procedure to be adopted when undertaking high voltage electrical testing on alternating current (AC) equipment over 1,000 volts or the application of test voltages over 1,000 volts. All direct current (DC) equipment over 1,500 volts or the application of a test voltage over this value shall be regarded as high voltage.

2. DEFINITIONS

For this document the following definitions apply:

Additional Earth	An earth that is applied to the network either to prevent induced voltages being a danger or when a working party is not in sight of a primary earth.
High Voltage (HV)	High voltage alternating current (AC) greater than 1,000 volts or direct current (DC) over 1,500 volts.
Low Voltage (LV)	Low voltage alternating current (AC) is 50 volts and above up to and including 1,000 volts. Low voltage direct current (DC) is 120 volts and above up to and including 1,500 volts.
Primary Earth	A switchgear or portable earthing device applied to an isolated electrical network to effectively maintain the electrical conductors at zero potential to the mass of earth.
Safety Zone	An area under the control of AADC that has been made as safe as reasonably practicable for operational tasks or work to be undertaken.
Switchgear Earth	A primary or additional earth applied by either a circuit breaker or switchgear isolator earth switch.

3. PROCEDURE

3.1 General

3.1.1 Equipment on which testing is to be carried out shall be clearly identifiable or have fixed to it a means of identification which will remain effective throughout the duration of the testing.

3.1.2 All equipment that is part of the distribution network, and is to be tested by high voltage, shall be isolated, proved dead, earthed and an appropriate safety document

issued.

3.1.3 The Authorized or Competent Person responsible for the testing shall control the equipment within the test area. All test equipment leads and shorting connections shall be inspected, prior to use, to ensure they are in good condition.

3.1.4 Test equipment, when required, shall be calibrated and have a valid calibration label, with date, fixed to it.

3.1.5 All temporary test leads used for either bonding or shorting phases to earth shall be of adequate size for the purpose and be insulated with a bright distinct colour that is easily visible when it is applied in a test position.

3.1.6 The Authorized or Competent Person responsible for testing may operate the test equipment, or instruct a Competent Person under his direct control to operated the equipment, and when required remove and replace test connections within the test area.

3.1.7 To enable testing to be carried out primary earths or additional earths may be removed and replaced by the Authorized or Competent Person in receipt of a Sanction for Test safety document.

3.1.8 All high voltage generating equipment shall have a single obvious control to switch the equipment off in the event of an emergency.

3.1.9 All high voltage generating equipment shall have a clear visual indicator that warns that the high voltage output is enabled.

3.1.10 An approved resistive discharge stick shall be used to safely discharge any residual voltage after a test. The discharge stick will first be used with the resistor element to reduce the initial surge current then the second earth hook, which by-passes the resistors, to ensure no residual voltage remains.

3.1.11 Any high voltage conductor or terminal that does not have a visible earth connection or ground wire shall be regarded as live and dangerous.

3.1.12 When DC testing has been undertaken extra caution shall be taken to ensure that all stored energy is effectively dissipated. Capacitors, cables, transformers and motors have the capacity to retain large amounts of energy for a long period after the test high voltage is removed.

3.1.13 An approved insulating rubber mat shall be used by the person undertaking high voltage testing, to stand or kneel on, to provide electrical insulation from the ground.

3.1.14 When a test instrument is used to impose an AC test voltage greater than 1,000 volts then the test instrument output current shall be limited to 3 mA AC.

3.1.15 When test equipment is electrically connected to a general power supply then a residual current device (RCD) rated at 30mA shall be used. If the residual current includes a DC component then an appropriate RCD must be used.

3.2 Preparation for testing

3.2.1 A safety zone for testing shall be established by the Authorized or Competent Person. It shall be defined with barricades, and danger notices displayed to provide visible identification of the test area, its boundaries and limits.

3.2.2 Adjacent equipment that may be affected by the test procedure should also be included within a safety zone with danger notices displayed.

3.2.3 A safety zone in which testing is to take place shall have no other energized equipment, other than those supplies necessary to allow the testing to take place.

3.2.4 For all high voltage testing there shall be on site a CO_2 fire extinguisher, first aid kit and emergency contact telephone numbers for use in case of an incident.

3.3 Testing

3.3.1 The application of test voltages shall be done under the personal supervision of the Authorized or Competent Person who has received an appropriate safety document.

3.3.2 Test connections may only be applied in a panel, cell or cubicle when all exposed conductors are either isolated or effectively insulated.

3.3.3 When conductors are to have a test voltage applied and the conductors have a remote end that may be made Live by the test voltage, then the remote end shall have an adequate barricade to prohibit entry and LOTO applied. When full LOTO cannot be applied then a nominated Competent Person may personally supervise the remote end to ensure that no person, including themselves, do not approach the equipment unless instructed to do so by the Authorized or Competent Person in charge of the test.

3.3.4 Vacuum switchgear may generate x-rays when the open contact gap is stressed at high voltage, however under normal system voltage and pressure test values, there should be no harmful emissions. To safeguard personnel, the vacuum equipment must be tested with the vacuum interrupters contained in the manufacturers' normal housing and all personnel be positioned more than 2 meters away from the equipment under test.

3.3.5 All personnel conducting or observing a high voltage test shall wear eye protection.

3.3.6 Approved voltage measuring devices or devices for phasing out HV circuits may be applied in a cell or cubicle, in which there are exposed high voltage conductors, provided the appropriate safe distance is maintained.

3.3.7 When testing Live high voltage equipment appropriate rated electrical insulating gloves shall be worn.

3.4 Completion of testing

3.4.1 All test connections used to undertake the testing shall be removed.

3.4.2 Any temporary disconnection made to the equipment under test shall be reinstated and access covers replaced.

3.4.3 When a sanction for test is cleared, any changes to the condition of isolation and or earthing within the test area,3 shall be documented on the SFT by the Authorized or Competent Person in receipt of the SFT.

4. REFERENCES

4.1 Article 98 of Federal Law No. 8 for 1980 on Regulation of Labour Relations

4.2 Abu Dhabi Occupational Health and Safety Management System Framework (OSHAD-SF) – Management Systems Elements – Element 05 – Training, Awareness and Competency, Version 3.1 March 2017

4.3 Health & Safety Executive UK, Electrical Testing Guide INDG354 (rev 1, date 10/13)

5. APPENDICIES

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