

مركز أبوظبي للصحة المهنية
ABU DHABI OCCUPATIONAL SAFETY AND HEALTH CENTER

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Abu Dhabi Occupational Safety and Health System Framework

(OSHAD-SF)

Code of Practice

CoP 15.0 – Electrical Safety

Version 3.1

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ABU DHABI PUBLIC
HEALTH CENTRE

مركز أبوظبي
للصحة العامة



Important Note:

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1. Introduction

- (a) This Code of Practice (CoP) applies to all Employers within the Emirate of Abu Dhabi and is designed to incorporate requirements set by OSHAD in the Emirate of Abu Dhabi.
- (b) This CoP establishes the requirements and standards so that the risks associated with electricity are identified, assessed, and that control measures are implemented to reduce risks to acceptable levels, thus preventing injury, illness and disease to persons who might be exposed to risks arising from those activities.
- (c) Principal Contractor when used in this CoP refers to the main contractor overseeing and responsible for “construction work” undertaken on the construction site within the Building and Construction Sector. Refer to *OSHAD-SF – CoP 53.0 – OSH Management during “Construction Work”*.
- (d) ‘Licensed Contractor’ when used in this CoP refers to a company which has been assessed by the Distribution Company (Abu Dhabi Distribution Company /Al Ain Distribution Company) as competent to work on Electrical Installations and issued a Competency Licence by that Distribution Company.
- (e) ‘Owner’ when used in this CoP refers to the legal owner of a building or property in which an Electrical Installation is installed and connected to a supply of electricity.
- (f) ‘Customer’ when used in this CoP refers to the end user of the supply of electricity, and may be private or commercial.

Note: in some cases an Owner may also be a Customer.

- (g) ‘Danger’ as used in this CoP means risk of Injury, or damage to plant, equipment or , materials.
- (h) ‘Individual Licenses’ as used in this CoP means a written demonstration of attained competency, approved by the relevant employer and issued as a demonstration of attained competency in accordance with the employer’s Safety Rules.
- (i) ‘Injury’ as used in this CoP means death or personal Injury from electric shock, electric burn, electrical explosion or arcing, or from fire or explosion initiated by electrical energy, where any such death or Injury is associated with the generation, provision, transmission, transformation, rectification, conversion, conduction, distribution, control, storage, measurement or use of electrical energy.
- (j) ‘System’ as used in this CoP means an electrical System in which all the Electrical Equipment is, or may be, electrically connected to a common source of electrical energy, and includes such source and such equipment.
- (k) ‘Safe System of Work’ as used in this CoP means a set of documented management and operational processes and procedures which are based on identified hazards, and are designed, as far as reasonably practicable, to prevent Danger.
- (l) Work in the ‘Vicinity’ as used in this CoP means any work activities which may impact, or be impacted by an Electrical System, where such works are being conducted in close proximity to such a System.
- (m) Electrical Supply Safety requirements related to specific equipment types (Overhead Lines, Underground cables, sub stations, etc) are contained in procedures and

practices of competent authorities (ADWEA, ADDC, AADC and RSB) and shall be read in conjunction with this CoP.

2. Training and Competency

- (a) Employers shall ensure that OSH training complies with the requirements of:
- (i) *OSHAD-SF – Element 5 – Training, Awareness and Competency;*
 - (ii) *OSHAD-SF – Mechanism 7.0 – OSH Professional Entity Registration; and*
 - (iii) *OSHAD-SF – Mechanism 8.0 – OSH Practitioner Registration.*
- (b) Employers shall ensure that no person is engaged in any work activity on or in the vicinity of electrical systems unless such person has the competency gained from training, technical knowledge and experience of the precautions to be taken against the risk of death or personal injury, and is under such degree of supervision as may be appropriate having regard to the nature of the work. Such competency will be assessed and awarded based on a licensing scheme as per section 2(f).
- (c) In accordance with *OSHAD-SF – Element 1 – Roles, Responsibilities and Self-Regulation* Section 3.2.5, employers shall ensure employees required to implement the requirements of this CoP are demonstrated to have the required competency to work on or in the vicinity of electrical systems and structures in question, and understand the risks associated with such activities and the required control measures put in place by the entities.
- (d) Employers shall ensure that a competency assurance process is implemented for all staff working on or in the vicinity of electrical systems, and that required competency levels are identified by documented Training Needs Analysis.
- (e) Training for employees shall be competency-based and include:
- (i) hazards and risks associated with electrical systems and task(s);
 - (ii) information on the safe systems of work identified in the risk assessment;
 - (iii) specific control measures to be followed by those involved working with any electrical circuit or system;
 - (iv) specific control measures to be followed for the circuit or system to be worked on; and
 - (v) reporting procedure in the event of incidents involving electrical systems.
- (f) Employers shall maintain a record of required training and attained competency with respect to electrical safety for all persons working on or in the vicinity of electrical systems.
- (g) Individual electrical safety competency levels shall be verified regularly by the Employer, and ongoing competency shall be assessed. Where necessary, additional training and (re) assessment shall be provided. Individual Licenses shall be issued as a demonstration of attained competency in accordance with the employer's Safety Rules.

(h) Employers shall maintain a record of the required training that contains the following:

- (i) name and ID number;
- (ii) Emirates ID number of the employee;
- (iii) subject(s) of training;
- (iv) date(s) of training; and
- (v) person providing the training;

3. Requirements

3.1 Roles and Responsibilities

3.1.1 Employers

- (a) Employers shall undertake their roles and responsibilities in accordance with the general requirements of *OSHAD-SF – Element 1 – Roles, Responsibilities and Self-Regulation* Section 3.2.5.
- (b) Employers shall ensure only persons having appropriate competency shall be authorized and Individually Licensed by the Employer to undertake works on or in the vicinity of electrical systems.
- (c) Employers shall ensure risk assessments, in line with the requirements of *OSHAD-SF – Element 2 – Risk Management* shall be completed to identify all hazards that may be present from working on or in the vicinity of electrical systems.
- (d) Employers shall ensure safe systems of work and Safety Rules shall be developed and implemented for all work activities involving electrical systems, such that identified risks are reduced to acceptable levels.
- (e) Employers shall ensure Emergency Response Plans are developed, implemented and regularly tested which address the specific risks involved in Electrical Works and the control measures required to manage these risks.

3.1.2 Principal Contractors

- (a) In the case of the Building and Construction Sector, Principal Contractors shall also undertake their roles and responsibilities in accordance with the general requirements of *OSHAD-SF – CoP 53.0 – OSH Management during “Construction Work”*.

3.1.3 Employees

- (a) Employees shall undertake their roles and responsibilities in accordance with the general requirements of *OSHAD-SF – Element 1 – Roles, Responsibilities and Self-Regulation* Section 3.2.7.
- (b) Employees shall not work on or in the vicinity of electrical systems unless they have the required competency and are authorized and Individually Licensed by the employer to do so.
- (c) Employees shall co-operate with the employer so far as is reasonably practicable to enable any duty placed on that employer by the provisions of this CoP to be complied with.
- (d) Employees shall comply with the provisions of this CoP in so far as they relate to matters which are within their control.
- (e) Employees shall to report to the employer all instances of actual and potential non-compliance with any aspect of this CoP.

3.2 Planning and Assessment

- (a) Employers shall assess the risk arising from electrical circuits and systems using risk management practices as required by *OSHAD-SF – Element 2 – Risk Management*.
- (b) Employers shall develop, implement and maintain a Safe System of Work and Safety Rules for all work on or in the vicinity of electrical systems. This shall be based on the results of documented Risk Assessments for all work activities.
- (c) Employers shall ensure that effective procedures and control measures are documented and implemented in order to manage the risks associated with working on or in the vicinity of electrical systems.
- (d) Control measures identified shall include provisions for personal protective equipment, and the use of 'electrical danger' warning signs as and when required.
- (e) Employers shall ensure that for Principal Contractors:
 - (i) the management of electricity safety requirements for building and construction are included in the Pre-Tender OSH Plan in accordance with *OSHAD-SF – CoP 53.0 – OSH Management during "Construction Work"*;
 - (ii) associated safe systems of work, and site rules for working on or in the vicinity of electrical systems are included in the OSH Construction Management Plan (OSH-CMP) in the case of the Building and Construction Sector in accordance with *OSHAD-SF – CoP 53.0 – OSH Management during "Construction Work"*, and

3.3 Electrical Systems, Work Activities and Protective Equipment

- (a) All electrical systems and circuits shall at all times be designed, constructed, operated, inspected, tested and maintained in accordance with applicable local and international standards, as to prevent, so far as is reasonably practicable, Danger.
- (b) Every work activity, including operation, use and maintenance of an electrical system and work near an electrical system, shall be carried out in such a manner as not to give rise, so far as is reasonably practicable, to Danger.
- (c) Employers shall ensure that specific precautions are implemented for electrical work in known or potentially explosive environments. These shall include as a minimum:
 - (i) only electrical and non-electrical equipment and installations designed for such service are used (Ex-rated);
 - (ii) equipment is specifically identified, assessed and marked as suitable in accordance with international standards, such as ATEX;
 - (iii) equipment is maintained in accordance with international standards to ensure its continued suitability and certification is maintained;
 - (iv) gas monitoring shall be deployed before and during works to detect the presence of potentially explosive atmosphere; and
 - (v) appropriate emergency response provisions are identified and implemented throughout the duration of the work.
- (d) Any equipment provided under this CoP for the purpose of protecting persons at work on or near electrical equipment shall be appropriate for the use for which it is provided, be maintained in a condition appropriate for that use, and be appropriately used.

- (e) No electrical equipment shall be put into use where its strength and capability may be exceeded in such a way as may give rise to Danger.
- (f) Means shall be provided to disconnect all conductors in a building or other structure from the service-entrance conductors. The service disconnecting means shall clearly indicate whether it is in the open or closed position and shall be installed at a readily accessible location nearest the point of entrance of the service-entrance conductors:
 - (i) conductors and equipment shall be protected from over-current in accordance with their ability to safely conduct current;
 - (ii) over-current devices (circuit breakers or fuses) shall be available and readily accessible. These over-current devices shall not be located where they will be exposed to physical damage or in the vicinity of easily ignitable material; and
 - (iii) each protective device shall be capable of detecting and interrupting all values of current that can occur at its location in excess of its trip setting or melting point.
- (g) Motors, equipment and appliances shall have a disconnecting means installed. The service disconnecting means shall plainly indicate whether it is in the open or closed position, and shall be capable of being locked in the off position.
- (h) Each disconnecting means shall be legibly marked to indicate its purpose, unless located and arranged so the purpose is evident.
 - (i) This requirement shall not apply to equipment connected by means of flexible cord and plug.
 - (j) Each service, feeder, and branch circuit, at its disconnecting means or over-current device, shall be legibly marked to indicate its purpose, unless located and arranged so the purpose is evident.
 - (k) Emergency power generators shall be equipped with a transfer switch or other appropriate control measures to ensure that power is not back fed to the utility supplying power to the circuit when the generator is in operation.
 - (l) Each cord set, attachment cap, plug, and receptacle of cord sets, and any equipment connected by cord and plug, except cord sets and receptacles which are fixed and not exposed to damage, shall be regularly inspected for external defects, such as deformed or missing pins, damage to the plug and insulation, and for indications of reasonably foreseeable internal damage. Equipment found damaged or defective shall not be used until repaired.
- (m) Insertion of bare conductors into receptacles is prohibited.

- (n) Safety of equipment shall be determined using the following considerations:
- (i) exposed conductors, joints, connections and other electrical equipment, located so as to present a potential hazard to employees or others, shall be insulated;
 - (ii) no conductors or equipment shall be located in damp or wet locations; where exposed to gases, fumes, vapors, liquids, or other agents that have a deteriorating effect on the conductors or equipment; or where exposed to excessive temperatures; unless of such construction or as necessary protected as to prevent, so far as is reasonably practicable, Danger arising from such exposure;
 - (iii) unused openings in boxes, raceways, cabinets, equipment cases, or housings shall be effectively closed to afford protection substantially equivalent to the wall of the equipment;
 - (iv) internal parts of electrical equipment, including busbars, wiring terminals, insulators, and other surfaces, may not be damaged or contaminated by foreign materials such as paint, plaster, cleaners, abrasives, or corrosive residues;
 - (v) there shall be no damaged parts that may adversely affect safe operation or mechanical strength of the equipment, such as parts that are broken, bent, cut, or deteriorated by corrosion, chemical action, or overheating;
 - (vi) conductors shall be spliced or joined with splicing devices identified for the use or by brazing, welding, or soldering with a fusible metal or alloy. Soldered splices shall first be spliced or joined to be mechanically and electrically secure without solder and then soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an insulating device identified for the purpose; and
 - (vii) parts of electrical equipment that in ordinary operation produce arcs, sparks, flames, or molten metal shall be enclosed or separated and isolated from all combustible material.

3.4 Insulation, Protection and Placing of Conductors

- (a) All Conductors in a System which may give rise to Danger shall either:
- (i) be suitably covered with insulating material and as necessary protected so as to prevent, so far as is reasonably practicable, Danger; or
 - (ii) have such precautions taken in respect of them (including, where appropriate, their being suitably placed) as will prevent, so far as is reasonably practicable, Danger.

3.5 Earthing or other Appropriate Precautions

- (a) Precautions shall be taken, either by earthing or by other appropriate means, to prevent Danger arising when any Conductor (other than a Circuit Conductor) which may reasonably foreseeably become charged as a result of either the use of a System, or a fault in a System, becomes so charged; and, for the purposes of ensuring compliance with this CoP, a Conductor shall be regarded as earthed when it is connected to the general mass of earth by Conductors of appropriate strength and current-carrying capability to discharge electrical energy to earth.
- (b) All non-current carrying metal parts of portable equipment and fixed equipment, including their associated housings, enclosures, and supporting structures, shall be earthed.

- (c) The path to earth from circuits, equipment, and enclosures shall be permanent, continuous, and effective.
- (d) The circuit wiring shall include or provide an equipment earthing conductor to which the earthing contacts of the receptacle or cord connector shall be connected.
- (e) The earthing contacts of receptacles and cord connectors shall be grounded by connection to the equipment earthing conductor of the circuit supplying the receptacle or cord connector.
- (f) A conductor used as an earthing conductor shall be identifiable and distinguishable from all other conductors.
- (g) No earthing conductor may be attached to any terminal or lead so as to reverse designated polarity.
- (h) Earthing conductors shall be inspected regularly.
- (i) Where used in construction (or activities with similar hazards, including certain maintenance, remodeling or repair activities where there is a likelihood of damage to portable cords, wet locations or equipment and wiring that is frequently re-arranged) all receptacle outlets that are not part of the permanent wiring of the building or structure and that are in use by personnel shall, so far as is reasonably practicable, have earth - fault circuit - protection via residual current devices (RCD) and power supply in 110v.

3.6 Integrity of Referenced Conductors

- (a) If a Circuit Conductor is connected to earth or to any other reference point, nothing which might reasonably be expected to give rise to Danger by breaking the electrical continuity or introducing high impedance shall be placed in that Conductor unless appropriate control measures are implemented to prevent that Danger.

3.7 Connections

- (a) Where necessary to prevent Danger, every joint and connection in an electrical system shall be mechanically and electrically appropriate for use.

3.8 Means for Protecting from Excess of Current

- (a) Means for Protecting from Excess of Current shall be determined through risk assessment, shall be appropriately located, and provided for protecting from excess of current in every part of an electrical system as may be necessary to prevent Danger.

3.9 Means for Cutting-Off the Supply and for Isolation

- (a) Live parts to which an employee may be exposed shall be de-energized before the employee works on or near them, unless the employer can demonstrate that de-energizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations.
- (b) Where necessary to prevent Danger, appropriate control measures (including, methods of identifying circuits) shall be available for:
 - (i) cutting off the supply of electrical energy to any electrical equipment;
 - (ii) the isolation of any electrical equipment; and

- (iii) the proving of electrical equipment as isolated prior to commencement of work.
- (c) In section 3.10, "isolation" means the disconnection and separation of the Electrical Equipment from every source of electrical energy in such a way that this disconnection and separation is secure.
- (d) Section 3.10 shall not apply to Electrical Equipment which is itself a source of electrical energy but, in such a case as is necessary, precautions shall be taken to prevent, so far as is reasonably practicable, Danger.
- (e) If the exposed live parts are not de-energized (e.g. for reasons of increased or additional hazards or infeasibility), appropriate control measures shall be used to protect employees who may be exposed to the electrical hazards involved.
- (f) As a minimum, approval for working on live equipment shall include documented authorization(s) obtained from a competent authority and endorsed by senior management. Such deviations shall be supported by appropriate risk assessment.
- (g) Precautions to be taken shall comply with the requirements of *OSHAD-SF – CoP 24.0 – Lock Out / Tag Out* and *OSHAD-SF – CoP 21.0 – Permit to Work Systems*.

3.10 Precautions for Work on Equipment Made Dead

- (a) Appropriate precautions shall be taken to prevent Electrical Equipment, which has been made dead in order to prevent Danger while work is carried out on or near that equipment, from becoming electrically charged during that work if Danger may thereby arise.
- (b) Precautions to be taken shall comply with the requirements of *OSHAD-SF – CoP 24.0 – Lock Out / Tag Out* and *OSHAD-SF – CoP 21.0 – Permit to Work Systems*.

3.11 Work On or Near Live Conductors

- (a) No person shall be engaged in any work activity on or so near any live Conductor (other than one suitably covered with insulating material so as to prevent Danger) that Danger may arise unless:
 - (i) it is not reasonable practicable in all the circumstances for it to be dead;
 - (ii) it is reasonable practicable in all the circumstances for the employee to be at work on or near it while it is live; and
 - (iii) appropriate control measures (including where necessary the provision of appropriate protective equipment) are taken to prevent Injury.

3.12 Working Space, Access and Lighting

- (a) Appropriate working space, means of access, and appropriate lighting shall be provided at all electrical equipment on which or near which work is being done in circumstances which may give rise to Danger.
- (b) Appropriate access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment. Working space required by this standard may not be used for storage.
- (c) The depth of the working space in the direction of access to live parts shall be appropriate to avoid danger to personnel working on adjacent equipment.

- (d) Illumination shall be provided for all working spaces about service equipment, switchboards, panel boards, and motor control centers installed indoors.
- (e) Except as elsewhere required or permitted by this standard, live parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by use of approved cabinets or other forms of approved enclosures or by other approved and appropriate means of separation.
- (f) Entrances to rooms and other guarded locations containing exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter.
- (g) Entrances to rooms and other guarded locations containing exposed live parts shall be secure from unauthorized entry at all times, unless they are under the observation of a competent person.

3.13 Temporary Electricity Supplies

- (a) All temporary electrical supplies to be in 110 volts. This shall be extended to all electrical tools and equipment to be used, except equipment which requires more voltage (eg. Welding machines, etc).

3.14 Maintenance, Inspection and Testing

- (a) All owners of electrical systems shall ensure that appropriate inspection, maintenance and testing arrangements are in place for all systems. This shall be demonstrated through the development of a register(s) of all physical assets which require to be maintained and a series of maintenance, inspection and test activities based on documented risk assessment.
- (b) Inspection, testing and maintenance programs shall be documented, and take account of:
 - (i) risk levels related to the equipment in question;
 - (ii) equipment criticality (safety and reliability);
 - (iii) previous failure modes, past experience and maintenance history;
 - (iv) manufacturers' recommendations, where available;
 - (v) regulatory requirements;
 - (vi) insurance requirements;
 - (vii) method statements and procedures for undertaking the work; and
 - (viii) frequency.
- (c) Employers shall establish and maintain a planning and scheduling system for all maintenance, inspection and testing activities. Results shall be recorded and trended for use in continuous improvement of the overall program.
- (d) Overdue, postponed or cancelled activities shall be supported by a documented risk assessment and where this assessment reveals the requirement for additional control measures, these shall be implemented and verified before work (re)commences. The ongoing status of overdue, postponed or cancelled work shall be regularly monitored and reported to management, as a means of monitoring non-compliance with the established program.

- (e) Maintenance, inspection and testing of all private (customer) electrical systems shall be undertaken only by Licensed Contractors, and in accordance with the latest version of *The Electricity Wiring Regulations* as published.
- (f) Employers shall periodically review the effectiveness of their maintenance, inspection and testing provisions to determine on-going asset performance / condition, and maintenance effectiveness.

4. References

- *OSHAD-SF – Element 1 – Roles, Responsibilities and Self-Regulation*
- *OSHAD-SF – Element 2 – Risk Management*
- *OSHAD-SF – Element 5 – Training Awareness and Competency*
- *OSHAD-SF – Mechanism 7.0 -OSH Professional Entity Registration*
- *OSHAD-SF - Mechanism 8.0 - OSH Practitioner Registration*
- *OSHAD-SF – CoP 53.0 – OSH Management during “Construction Work”*
- *UK Statutory Instrument – ‘The Electricity at Work(EAW) Regulations 1989’*
- *The Regulation and Supervision Bureau - The Electricity Wiring Regulations 2007*

5. Document Amendment Record

Version	Revision Date	Description of Amendment	Page/s Affected
2.0	Feb 2012	First Issue	N/A
3.0	1 st July 2016	Change of Logo	All
		Change from AD EHS Center to OSHAD	throughout
		Change of document title: AD EHSMS RF to OSHAD-SF	Throughout
		Acknowledgements deleted	2/3
		Preface Deleted	4
		EHS changes to OSH	Throughout
		Clause 2(i) added	5
		Clause 3.5(i) updated to include 'so far as is reasonably practicable'	11
3.1	18 th June 2017	Clause(s) 2(b), 3.2(e)(iii), 3.13(a), 3.14(f), 3.3(f)(iv) and 3.3(g) deleted with consequent changes in the list of references.	Various
		Minor editorial changes throughout the document without changing requirements.	Throughout

