



# **Abu Dhabi EHSMS Regulatory Framework (AD EHSMS RF)**

**EHS Regulatory Instrument**

**Code of Practice**

**EHS RI - CoP 23.0 – Working at Heights**

**Version 2.0**

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## ACKNOWLEDGEMENTS

With gratitude Abu Dhabi EHS Center acknowledges the great support provided by the Executive Council in facilitating the issuance of Abu Dhabi Emirate Environment, Health and Safety Management System (AD EHSMS) and its implementation at Emirate level.

The issuance of the system would not have been possible without the supervision, diligent efforts and productive recommendations of the AD EHS Center Board of Directors.

These documents (Regulatory Instruments) constitute the efforts of the Abu Dhabi EHS Center and the concerned Sector Regulatory Authorities who worked together to integrate all relevant regulatory requirements under *AD EHSMS RF*. The input, contribution and constructive views of all sectors is highly appreciated.

May these documents prove to be beneficial and helpful in system implementation and in expanding the knowledge in the EHS field.



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## Preface

This Abu Dhabi EHS Regulatory Instrument was developed by the Building and Construction Sector Regulatory Authority as the primary Competent Authority for this topic to set the minimum mandatory requirements.

Every effort was made in developing this document so that it does not conflict with existing local or federal laws and regulations. In case of conflict, requirements of the existing local and federal laws and regulations shall prevail, and all concerned are obliged to bring the same to the attention of AD EHS Center for resolution.

This AD EHS Regulatory Instrument has been developed, reviewed and approved, following the process as described in *AD EHSMS Implementation Guideline: The Integration of EHS Requirements in the Emirate of Abu Dhabi*, by the following stakeholders:

- Abu Dhabi EHS Higher Committee;
- Abu Dhabi EHS Center;
- Environment Agency Abu Dhabi;
- Department of Municipal Affairs;
  - Abu Dhabi City Municipality;
  - Al Ain City Municipality;
  - Western Region Municipality;
- Department of Transport – Abu Dhabi;
- Abu Dhabi Water and Electricity Authority;
- Health Authority - Abu Dhabi;
- Higher Corporation for Specialized Economic Zones (ZonesCorp);
- Center for Waste Management – Abu Dhabi;
- Abu Dhabi Tourism Authority;
- Abu Dhabi Food Control Authority;
- Abu Dhabi Education Council;
- Regulation and Supervision Bureau; and
- Other Relevant Federal and Local Competent Authorities.

The AD EHSMS consists of the following hierarchy of documents:

- AD EHSMS RF Elements - Mandatory System Requirements

EHS Regulatory Instruments:

- Standards and Guideline Values - Mandatory EHS threshold and exposure levels
- Codes of Practice - Mandatory EHS technical requirements – subject specific
- Mechanisms - Mandatory system implementation processes and procedures

Guidelines:

- Technical Guidelines - Non-mandatory guidance on how to implement an EHS Regulatory Instrument
- AD EHSMS Guidance Documents - Non-mandatory guidance and interpretation of an *AD EHSMS RF* concept and/or principle

Further, this document is not intended to conflict with any contractual obligations in effect at the time of its issuance. However, all future contracts shall adhere to applicable requirements stated herein, and existing long term contracts shall be brought into compliance with its requirements as soon as reasonably practicable as stipulated by relevant subject authorities.

This document will be reviewed periodically as part of the continual improvement cycle.

## 1. Introduction

- (a) This Code of Practice (CoP) applies to all employers within the Emirate of Abu Dhabi. This CoP is designed to incorporate requirements set by Abu Dhabi EHS Center and Sector Regulatory Authorities in the Emirate of Abu Dhabi.
- (b) This CoP covers the requirements relevant to the planning, preparation and conduct of health and safety work practices in connection with working at heights.
- (c) Working at height in this CoP includes:
  - (i) existing places of work and means of access for working at height;
  - (ii) fall prevention;
  - (iii) guardrail systems;
  - (iv) safety nets;
  - (v) roof works;
  - (vi) ladders;
  - (vii) tower cranes;
  - (viii) fall arrest systems; and
  - (ix) working platforms.
- (d) Working at heights is work in which there is a risk of an employee falling from any height from, through, into, or onto a place or structure.
- (e) A place is 'at height' if a person could be injured falling from it, even if it is at or below ground level.
- (f) Principal Contractor when used in this CoP refers to the main contractor overseeing and responsible for activities undertaken on the site within the Building and Construction Sector. Refer to *AD EHS RI – CoP 53.0 – EHS Management During Construction Work*.

## 2. Training and Competency

- (a) Employers shall ensure that EHS training complies with the requirements of:
  - (i) *AD EHSMS RF – Element 05 – Training and Competency*;
  - (ii) *AD EHS RI – Mechanism 7.0 – AD EHS Professional Entity Registration*; and
  - (iii) *AD EHS RI – Mechanism 8.0 – AD EHS Practitioner Registration*.
- (b) Employers shall provide a training program appropriate to ensure that all persons involved in working at heights acquire the understanding, knowledge, and skills necessary for the safe performance of all duties.
- (c) Training is to be provided to exposed employees prior to assignment to jobs where fall hazards exist. Training shall include the following:
  - (i) a discussion of the employer's Fall Prevention Plan;
  - (ii) types of fall protection equipment to be used at the site;

- (iii) fall hazards associated with the work to be completed;
  - (iv) procedures for removal of fall protection devices from service for repair or replacement;
  - (v) fall protection equipment identification methods;
  - (vi) equipment maintenance and inspection requirements;
  - (vii) emergency rescue procedures;
  - (viii) suspension trauma;
  - (ix) equipment donning and doffing procedures, and opportunity for each employee to use the equipment in a field exercise;
  - (x) equipment strengths and weight limitations;
  - (xi) the use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, or any other fall protection method to be used at the site;
  - (xii) practical and theoretical training on the actions to be taken in an emergency situation. This shall include rescue from height;
  - (xiii) the role of each employee in the safety monitoring system, if this system is used; and
  - (xiv) the role of employees in fall protection plans.
- (d) Prior to using fall arrest equipment each employee shall have their competency to use the equipment assessed by the employer or appointed competent trainer.
- (e) Refresher training shall be conducted when the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by this CoP. The training content shall be identical to initial training. Circumstances where retraining is required include, but are not limited to, the following conditions:
- (i) whenever (and prior to) a change in job assignment is made;
  - (ii) when there is a change in the type of fall protection equipment used; or
  - (iii) when a known hazard is added to the work environment that affects the Fall Prevention Plan.
- (f) The employer shall conduct additional retraining whenever a periodic inspection reveals, or there is reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of fall protection equipment or procedures.
- (g) The employer shall conduct additional retraining whenever a fall protection procedure fails.
- (h) Employers shall maintain a record of the required training that contains the following:
- (i) name and employee ID number;
  - (ii) Emirates ID number;
  - (iii) subject(s) of training;
  - (iv) training provider
  - (v) dates(s) of training; and
  - (vi) person(s) 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 *AD EHSMS RF – Element 01 – Roles, Responsibilities and Self-Regulation Section 3.2.5*.
- (b) Employers shall undertake their specific roles and responsibilities in accordance with the following:
  - (i) all work at height is appropriately planned, assessed, organized and appropriately supervised;
  - (ii) all work at height takes account of weather conditions that could endanger health and safety;
  - (iii) those involved in work at height are trained and competent;
  - (iv) the place where work at height is done is safe;
  - (v) equipment for work at height is appropriately inspected;
  - (vi) the risks from fragile surfaces are appropriately controlled; and
  - (vii) the risks from falling objects are appropriately controlled.

#### 3.1.2 Employee

- (a) Shall undertake their roles and responsibilities in accordance with the general requirements of *AD EHSMS RF – Element 01 – Roles, Responsibilities and Self-Regulation Section 3.2.7*.
- (b) Shall report any activity or defect relating to work at height which they believe is reasonable foreseeable to endanger their safety or that of another person's.
- (c) Shall use appropriate equipment or safety devices provided for work at height by the employer in accordance with any training or instruction received in the use of the work equipment or device concerned.

### 3.2 Planning and Assessment

- (a) Employers shall evaluate each site or operation to determine if fall hazards are present and the workplace shall be assessed using risk management practices as required by *AD EHSMS RF – Element 2.0 – Risk Management*.
- (b) The risk assessment shall follow the hierarchy of control as described within Section 3.2.1 of this CoP.
- (c) Where fall hazards are present, procedures shall be developed, documented and utilized for the control of those fall hazards.
- (d) Employers shall ensure:
  - (i) assessment of the various risks and establishment of systems of work which are safe to other employees, contractors and the public;

- (ii) that effective procedures and control measures are in place, and are implemented in order to manage working at height activities;
- (iii) that for the Building and Construction Sector the management of working at height requirements are included in the Pre-Tender Environment, Health and Safety Plan in accordance with *EHS RI – CoP 53.0 – EHS Management During “Construction Work”*; and
- (iv) that associated safe systems of work, and site rules are included in the Environment, Health and Safety Construction Management Plan (EHS-CMP) in the case of the Building and Construction Sector in accordance with *EHS RI – CoP 53.0 – EHS Management During “Construction Work”*.

### 3.2.1 Hierarchy of Control

- (a) When undertaking a risk assessment for tasks that are to be completed ‘at height’, the following hierarchy of control shall be adopted:
  - (i) *Avoid*: ensure that no work is done at height if it is safe and reasonably practicable to do it other than at height;
  - (ii) *Prevent falls*: Where it is not reasonably practicable to avoid working at height, the employer shall ensure that appropriate equipment or other control measures are in place to prevent persons falling from a place at height; and
  - (iii) *Minimize the distance and consequences of a fall*: Employers shall ensure that where it is not reasonably practicable to prevent falls, work equipment or other means shall be provided that will reduce the distance a person could fall and the consequences of this fall.

### 3.3 Preventing Injuries from Falling Object

- (a) When work is conducted at height, employers shall implement the following controls:
  - (i) establish exclusion zones and enforce them under work at height areas to prevent unauthorized access to the area;
  - (ii) work is to stop while people traverse the exclusion zone;
  - (iii) place warning signs to warn people of hazards, all safety signage shall be in accordance with *AD EHS RI – CoP 17.0 – Safety Signs and Signals*;
  - (iv) employees are to use bolt bags and tool carriers to carry small items and tools - these are not to impede the employee;
  - (v) make sure that employees required to be in the exclusion zone including persons holding ladders and banksman, wear hard hats;
  - (vi) implement safe working platforms with appropriate toe boards to prevent falling objects; and
  - (vii) prevent tools and equipment used at heights from falling by securing them with lanyards.

### 3.4 Emergency Planning

- (a) Employers are to ensure that appropriate emergency response procedures are developed, in compliance with *AD EHSMS RF – Element 06 – Emergency Management*, for working at height and in place before work starts on a site, especially when the work involves:
- (i) electrical hazards;
  - (ii) the use of power equipment;
  - (iii) hot work such as flame cutting; and
  - (iv) chemicals.
- (b) Employers shall include a rescue plan and incident response (emergency) procedures where fall arrest systems are being adopted. The rescue plan is to identify:
- (i) how incapacitated employees will be retrieved to a safe location if they fall;
  - (ii) how many employees are needed to rescue a fallen employee;
  - (iii) what additional equipment is needed for rescues; and
  - (iv) the training required for rescuers.
- (c) Employers shall ensure that employees have:
- (i) information on site incident response and emergency rescue procedures;
  - (ii) procedures in the event of emergencies such as rescues, incidents or injuries;
  - (iii) an induction on the emergency rescue procedures for the site;
  - (iv) training in the site incident response and rescue procedures;
  - (v) training in the use of fall arrest systems where used; and
  - (vi) training in suspension trauma.

### 3.5 Rescue Equipment

- (a) Employers shall ensure that when:
- (i) employees are using fall arrest systems, rescue equipment shall be available in the area to retrieve employees in the event of an incident;
  - (ii) rescuing an injured or unconscious person at height that they act quickly to prevent possible suspension trauma which can cause death very quickly; and
  - (iii) employees who are working on or near electrical equipment, safety and rescue equipment approved for electrical work is available.

### 3.6 Personal Protective Equipment

- (a) Employers shall ensure that in addition to hazard-specific PPE such as high visibility clothing, the following PPE shall be available when required:

- (i) footwear that is appropriate to prevent slips;
  - (ii) as a minimum, low impact eye protection such as sunglasses to make sure that an employee at height is not at risk due to glare or reflection; and
  - (iii) safety helmets that will remain in place in the event of a fall.
- (b) All PPE requirements shall be in accordance with *AD EHS RI – CoP 2.0 – Personal Protective Equipment*.

### 3.7 Selecting Equipment

- (a) When selecting equipment for work at height employers shall:
- (i) use the most appropriate equipment available taking into account technological advances that may introduce new means of controlling working at height risks;
  - (ii) give collective protection measures priority over personal protective equipment;
  - (iii) implement control measures effectively and monitor implementation through inspections and audits of the workplace; and
  - (iv) take account of:
    - 1) the working conditions;
    - 2) risks to the safety of all those at the place where the work equipment is to be used;
    - 3) the distance to be negotiated, in the case of work equipment for access and egress;
    - 4) the distance and consequences of a potential fall;
    - 5) the duration and frequency of equipment use;
    - 6) the need for easy and timely evacuation and rescue in an emergency; and
    - 7) any additional risk posed by the use, installation or removal of work equipment or by evacuation and rescue from it.

### 3.8 Selection of Work at Height Personnel

- (a) Employers shall ensure personnel required to work at height are selected for their ability to perform the work. The following persons may be excluded from being required to work at height:
- (i) persons who suffer from vertigo or who are afraid of heights;
  - (ii) persons who are not physically fit enough to undertake climbing activities;
  - (iii) persons who suffer from dizziness; and
  - (iv) persons who have a physical shape or weight which may affect the safe operation of working at height equipment.

### 3.9 Public Protection

- (a) Employers shall ensure that any work at height takes into account necessary protection to the public from potential falls of tools or materials or from use of mechanical platforms. Protection measures shall include, but not be limited to:
- (i) diversion of pedestrian walkways away from any overhead activities;
  - (ii) temporary closure of footpaths for specific operations (after authorization has been sought and obtained);
  - (iii) provision of a walkway with overhead protection;
  - (iv) use of debris netting to prevent material falling outside the perimeter;
  - (v) tying down or securing of materials to prevent them from being blown off; and
  - (vi) avoidance of work at height during busy times of the day when large numbers of members of the public are in the area.

### **3.10 Danger Areas**

- (a) Where a workplace contains an area where there is a risk of any person at work falling a distance; or being struck by a falling object, then means of preventing unauthorised persons from entering the area shall be in place, and clearly indicated.

### **3.11 Guardrail Systems**

#### **3.11.1 Provision of Guardrails**

- (a) Employers shall provide guardrails to all edges where there is a fall potential of 2 meters or more.
- (b) In the case where a fall potential of less than 2 meters is identified employers shall undertake a risk assessment and determine the level of protection required. As a minimum requirement for edges where a fall potential of less than 2 meters exists employers shall provide a single guardrail 950mm from the walking/working level.
- (c) Employers shall ensure guardrails are used on the edge of working platforms, walkways, stairways, ramps or landings and at:
- (i) the perimeters of buildings or other structures;
  - (ii) the perimeters of skylights or other fragile roof materials;
  - (iii) openings in floor or roof structures; and
  - (iv) edges of shafts or excavations.
- (d) Proprietary systems are to be configured, installed, used and dismantled in accordance with the manufacturer's instructions.

#### **3.11.2 Requirements for Guardrail Systems**

- (a) Employers shall ensure that guardrails are provided to all edges where there is a risk of falling 2 meters or more. Guardrails shall be provided a minimum of 950mm above the walking/working platform level.
- (b) Toe boards shall be provided at least 150mm high and run continuously along the edge where guardrail protection is provided.

- (c) Employers shall ensure that a mid-rail is fitted to all edges where there is a risk of falling 2 meters or more. The mid-rail shall be installed so that the gap between any guardrail and mid-rail or toe board and mid-rail does not exceed 470mm.
- (d) Screens and mesh, shall extend from the guardrail to the walking/working level and along the entire opening.
- (e) Other structural members such as additional mid-rails and architectural panels shall be installed such that there are no openings in the guardrail system that are more than 470mm wide.
- (f) Guardrail systems shall be capable of withstanding, without failure, a force of at least 1.25 kN point load, in any outward or downward direction, at any point along the top edge.
- (g) When the 1.25 kN point load test specified in this section is applied in a downward direction, the top edge of the guardrail shall not deflect to a height less than 900mm above the walking/working level.
- (h) Guardrail systems shall be surfaced to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.
- (i) Top rails and mid-rails shall be at least 60mm nominal diameter or thickness to prevent cuts and lacerations. If wire rope is used for top rails, it shall be flagged at not more than 2 metre intervals with high-visibility material.
- (j) When guardrail systems are used at hoisting areas, a chain, gate or removable guardrail section shall be placed across the access opening between guardrail sections when hoisting operations are not taking place.
- (k) When guardrail systems are used at holes, they shall be erected on all unprotected sides or edges of the hole.
- (l) When guardrail systems are used around holes used for the passage of materials, the hole shall have not more than two sides provided with removable guardrail sections to allow the passage of materials. When the hole is not in use, it shall be closed over with a cover, or a guardrail system shall be provided along all unprotected sides or edges.
- (m) When guardrail systems are used around holes that are used as points of access (such as ladder ways), they shall be provided with a gate, or be offset so that a person cannot walk directly into the hole.
- (n) Guardrail systems used on ramps and runways shall be erected along each unprotected side or edge.
- (o) Before using a guardrail system, employers shall consider the factors that will influence the load on the guardrail. The force applied from the momentum of a falling person, the pitch of the roof and the length of the rafter to which the guardrail is attached will determine whether the guard railing is appropriate.

### 3.12 Safety Nets

- (a) The use of safety nets shall only be considered where measures that prevent a fall of persons or objects are not reasonably practicable to implement.
- (b) Where safety nets are used employers shall put in place measures to ensure in so far as is reasonably practicable they are stored, handled and installed to prevent damage to the net from occurring.
- (c) Employers shall regularly inspect nets for any signs of damage and remove nets that show signs of damage or wear and tear from service.
- (d) Safety nets shall be erected as close as reasonably practicable to the working level, and if on the outside of the structure, shall be slightly higher at the outer edge than at the inner.
- (e) Two main types of safety nets are available:
  - (i) personnel nets - 100mm mesh. Intended to catch a person falling from above; and
  - (ii) material or debris protection nets - Smaller mesh 12mm-19mm, intended to minimize risks to those below from falling objects.

### 3.12.1 General Requirements

- (a) Employers shall ensure that where safety nets are used the maximum distance a person can fall before encountering a net is 2 meters.
- (b) Erection of safety nets shall be carried out by competent persons and shall ensure that any supporting framework can withstand impact or shock loadings, and that the framework itself does not present a hazard to personnel who may fall into the net.
- (c) When erecting nets in the vicinity of electricity lines or overhead power cables, the appropriate authority shall be consulted before work is commenced.
- (d) Configurations and rigging methods of the safety nets shall never be altered without the erector's consent and then only by persons competent to do so.
- (e) Nets that have been used to arrest falls shall not be used again until a competent person checks them and advises it is safe to do so.
- (f) Nets shall be securely attached to support framework with tie cords, hooks rings or thimbles spaced in accordance with the net manufacturer's specification. The actual tie shall be at least double the strength of the net, and if hooks are used, they shall have positive locking of some description.
- (g) Nets can be outrigged on scaffolding provided that the scaffold structure is appropriately secured into a building or similar.

### 3.12.2 Safety Net Systems

- (a) Safety nets shall be installed as close as reasonably practicable under the walking/working surface on which employees are working, but in no case more than 2

meters below such level. When nets are used on bridges, the potential fall area from the walking/working surface to the net shall be unobstructed.

- (b) Safety nets shall extend outward from the outermost projection of the work surface as follows:

Vertical distance from working level to horizontal plane of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
Up to 1.5 meters	2.5 meters
Between 1.5 and 2.0 meters	3.0 meters

- (c) Safety nets shall be installed with appropriate clearance under them to prevent contact with the surface or structures below when subjected to an impact force equal to the drop test specified in this section.
- (d) Safety nets and their installations shall be capable of absorbing an impact force equal to that produced by the drop test specified below.
- (e) Safety nets and safety net installations shall be drop-tested at the jobsite after initial installation, before being used as a fall protection system, after any fall, whenever relocated, after major repair, and at 6-month intervals if left in one place:
- the drop-test shall consist of a 180 kg bag of sand 750mm ± 50mm in diameter dropped into the net from the highest walking/working surface at which employees are exposed to fall hazards, but not from less than 1 meter above that level;
  - when the employer can demonstrate that it is unreasonable to perform the drop-test required by this section, the employer shall certify that the net and net installation is in compliance with the provisions of this section by preparing a certification record prior to the net being used as a fall protection system. The certification record shall include an identification of the net and net installation for which the certification record is being prepared; the date that it was determined that the identified net and net installation were in compliance with this section and the signature of the person making the determination and certification; and
  - the most recent certification record for each net and net installation shall be available at the jobsite for inspection.
- (f) Defective nets shall not be used. Safety nets shall be inspected at least once a week for wear, damage, and other deterioration. Defective components shall be removed from service. Safety nets shall also be inspected after any occurrence which could affect the integrity of the safety net system.
- (g) Materials, scrap pieces, equipment, and tools which have fallen into the safety net shall be removed as soon as reasonably practicable from the net and at least before the next shift.
- (h) The maximum size of each safety net mesh opening shall not exceed 230cm<sup>2</sup> nor be longer than 150mm on any side, and the opening, measured center-to-center of mesh ropes or webbing, shall not be longer than 150mm. All mesh crossings shall be secured to prevent enlargement of the mesh opening.
- (i) Each safety net (or section of it) shall have a border rope for webbing with a minimum breaking strength of 22.2 kN.

- (j) Connections between safety net panels shall be as strong as integral net components and shall be spaced not more than 150mm apart.

### 3.12.3 Markings on Safety Nets

- (a) Employers shall ensure that the safety net bears a label marked with:
  - (i) name/trade mark to identify the manufacturer;
  - (ii) normal size of the safety net;
  - (iii) recognized international standard;
  - (iv) date of manufacture;
  - (v) deflection at center of net during prescribed test; and
  - (vi) maximum distance below the working height at which the net is designed for use.

### 3.12.4 Test Certificate

- (a) Employers shall ensure Test Certificates supplied by the manufacturer state the following:
  - (i) type of net;
  - (ii) breaking strength of:
    - 1) mesh;
    - 2) border cord; and
    - 3) net to failure.
  - (iii) height of drop withstood and deflection at center when proof tested.

### 3.12.5 Periodic Testing

- (a) Safety nets are provided with short lengths of test cord attached, (normally eight lengths).
- (b) At intervals not exceeding three months one cord shall be tested and a record kept. For net use after two years or if there is any deterioration, advice shall be sought from the manufacturers.
- (c) Nets shall be inspected and deemed fit for purpose immediately after erection, then weekly for damage, loose ties, etc together with the framework and anchorage points. All such inspections shall be recorded.
- (d) Test cords shall never be used as tie cords.

### 3.12.6 Care of Nets

- (a) Care shall be taken to reduce to a minimum unnecessary wear and mechanical damage likely to weaken the net. Materials shall not be stacked on a net, and deliberate jumping onto, or dropping of objects into nets shall be prohibited.

- (b) The following sources of damage or wear shall be avoided as far as reasonably practicable:
- (i) dragging over rough surfaces;
  - (ii) contact with sharp edges;
  - (iii) accumulation of debris in the net;
  - (iv) sparks and other sources of ignition from welding and burning operations, hot gases from blow lamps, hot ash from chimneys or furnaces; and
  - (v) chemical spills / leaks.

### **3.12.7 Maintenance of Nets**

- (a) Regular inspection is necessary to ensure the nets remain serviceable. The net manufacturer shall be consulted when there is any doubt about the suitability of nets for use in hazardous conditions, or after any known contamination.
- (b) It is necessary to wash nets occasionally and always before storing in order to remove grit and soot and to prevent abrasion. If contaminated by acids or alkalis, nets shall be well washed, preferably by hosing and allowed to dry naturally away from heat.

### **3.12.8 Storage**

- (a) Wet nets shall be dried naturally.
- (b) Man-made fibre nets may be stored wet without loss of strength, but natural fibre nets shall always be dried first.
- (c) Storage cupboards to be well ventilated (nets hung if reasonably practicable).
- (d) Nets shall be turned periodically to allow air circulation.

### **3.12.9 Repairs**

- (a) Only a competent person shall carry out repairs and assess the repaired net for its suitability for continued use. It is good practice to effect repairs away from site to ensure that the quality of repair is in line with the manufacturer's instructions.
- (b) A tag shall be fixed to each repair, carrying identification of the repairer and date of repair.
- (c) Any repairs undertaken shall not be detrimental to the strength of the net or impede its performance.
- (d) Repairs shall only be carried out using materials that are compatible with the net. Any damaged border ropes, coupling ropes or ties shall be scrapped and not repaired.

## **3.13 Fall Arrest Systems (FAS)**

### 3.13.1 Selecting FAS and Equipment

- (a) Employers shall ensure when selecting the type of equipment to be used, the following factors shall be considered:
  - (i) the type of work;
  - (ii) the potential for a fall, and the fall's potential severity;
  - (iii) task mobility requirements; and
  - (iv) constraints on fall distances and clearances.
- (b) Employers shall ensure when selecting equipment for any particular task the equipment shall give the wearer:
  - (i) the maximum degree of comfort and freedom of movement;
  - (ii) in the event of a fall, the most reasonably practicable protection against injury from:
    - 1) impact with the ground or other objects below the wearer; or
    - 2) impacting surrounding structures.
- (c) FAS users:
  - (i) shall ensure that the equipment combination is in accordance with the manufacturer's instructions; and
  - (ii) cannot make any alterations that may adversely affect safe operation of any part of a FAS.

### 3.13.2 Inspection and Maintenance

- (a) Employers shall ensure inspections and maintenance in compliance with:
  - (i) *Ministerial Order No. 37/2 (1982); and*
  - (ii) *AD EHS RI – CoP 34.0 – Safe Use of Lifting Equipment and Lifting Accessories.*
- (b) Employers shall ensure sure that fall arrest equipment is inspected and maintained and that any defective item found during inspection and maintenance shall be segregated, tagged with a cautionary “Out of Service Tag” and not used until it has been repaired and tested, or replaced. Repair of defective equipment shall be carried out by a competent person.
- (c) Employers shall ensure that in the event of a fall arrest, each item of equipment involved shall be tested and inspected before re-use. Any items found to have been stretched or damaged shall be replaced before the equipment can be re-used.
- (d) Users shall inspect the following items before and after each use:
  - (i) harnesses, lanyards, connectors, fall arrest devices, ropes, slings, and any other mobile attachment devices, eg. snap-hooks, karabiners, rope grabs.
- (e) Employers shall ensure the inspection shall:
  - (i) be by touch as well as sight;
  - (ii) include the opening of any equipment where access for daily inspection is provided, to make sure that internal components are in satisfactory condition;

- (iii) include the opening or removal of temporary rope or line protectors, to enable rope to be appropriately inspected;
- (iv) include operation of the locking mechanism on fall arrest devices;
- (v) for ropes, include running the rope through the hands; and
- (vi) for portable pole platforms, include checks to make sure that:
  - 1) surfaces have no cracks;
  - 2) there is no deformation, permanent bending, excessive corrosion, modification, and lack of insulation in recessed screw holes;
  - 3) non-slip surfaces are functional;
  - 4) welds are sound and joints and fastenings are tight; and
  - 5) the safe working load markings are clearly legible.
- (f) Employers shall ensure inspections of belts, harnesses and lanyards are to be conducted every 6 months by a person who has been trained and is competent. Also, items are to be checked in accordance with the manufacturer's instructions to determine whether there is excessive wear or any other fault liable to render the item unsafe during a fall arrest.
- (g) Employers shall ensure anchorages are to be inspected and certified before use after initial installation, and inspected every 12 months thereafter by a qualified rigger, scaffolder or specialist installer. Anchorages are to be visually inspected for signs of deterioration which might make them unserviceable, together with any other requirements contained in the manufacturer's instructions.
- (h) Employers shall ensure the parent structure is visually inspected for modifications or deterioration which might lead to loss of anchorage strength and drilled-in anchorages such as friction or glued-in anchorages shall be proof-tested as part of each inspection.
- (i) Employers shall ensure inspections of fall-arrest devices are to be conducted every 3 months by a person who has been trained and is competent.
- (j) Employers shall ensure inspection of horizontal life lines, vertical life lines used with fall arrest devices and horizontal or vertical rails is to be undertaken every 12 months.
- (k) Employers shall make sure that:
  - (i) slings are inspected every 3 months by a banksman or equivalent and tested every 12 months by a competent testing organization;
  - (ii) ropes used to suspend a person are inspected before and after each use;
  - (iii) ropes are inspected every 3 months; and
  - (iv) ropes are not pull tested as this can cause damage to the rope.
- (l) Employers shall ensure fall arrest devices are to be fully serviced if they have been in storage for longer than 12 months.
- (m) Employers shall ensure hardware and mechanical devices are to be maintained in accordance with the manufacturer's instructions.

- (n) Employers shall ensure synthetic textile materials are to be maintained by cleaning with mild soap and water. If more severe cleaning is required reference is to be made to the recommendations of the manufacturer of the item.
- (o) Employers shall ensure that fall arrest equipment is stored and transported in conditions which avoid dampness, heat and stress on components.

### **3.14 Working Platforms**

#### **3.14.1 Protection of Open Sided Floors, Runways and Platforms**

- (a) Every open-sided floor or platform 1.2 meters or more above an adjacent floor or ground level shall be guarded by a standard railing on all open sides except where there is entrance to a ramp, stairway, or fixed ladder. The railing shall be provided with a toe board wherever:
  - (i) employees can pass;
  - (ii) there is moving machinery; and
  - (iii) there is equipment with which falling materials could create a hazard.
- (b) Every runway shall be guarded by a standard railing on all open sides 1.2 m or more above floor or ground level. Wherever tools, machine parts, or materials are likely to be used on the runway, a toe board shall also be provided on each exposed side.
- (c) Runways (such as oiling, shafting, or filling tank cars) may have the railing on one side omitted where operating conditions require such omission, providing the falling hazard is minimized by using a runway of not less than 45 cm wide. Employees entering such open runways shall utilize appropriate fall protection meeting the requirements of this CoP.
- (d) Regardless of height, open-sided floors, walkways, platforms, or runways above or adjacent to dangerous equipment, open tanks, and similar hazards shall be guarded with a standard railing and toe board.
- (e) A standard railing shall consist of top rail, mid-rail, and posts, and shall have a vertical height of 950mm nominal from upper surface of top rail to floor, platform, runway, or ramp level. The top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be approximately halfway between the top rail and the floor, platform, runway, or ramp.
- (f) The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least 90 kg applied in any direction at any point on the top rail.

#### **3.14.2 Protection of Stairs**

- (a) Every flight of stairs having four or more risers shall be equipped with standard stair railings or standard handrails as provided below:
  - (i) on stairways less than 1 meter wide having both sides enclosed, at least one handrail, preferably on the right side descending;
  - (ii) on stairways less than 1 meter wide, having one side open, at least one stair railing on open side; and

- (iii) on stairways less than 1 meter wide, having both sides open, one stair railing on each side.
- (b) A standard stair railing shall be of construction similar to a standard railing but the vertical height shall be not more than 860mm or less than 760mm from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread.
- (c) Vertical clearance above any stair tread to an overhead obstruction shall be at least 2.1 meters measured from the leading edge of the tread.

### 3.14.3 Requirement for Fixed Stairs

- (a) Fixed stairs shall be provided for access from one structure level to another where operations necessitate regular travel between levels and for access to operating platforms at any equipment which requires attention routinely during operations.
- (b) Fixed stairs shall also be provided where access to elevations is required daily or at each shift for purposes such as:
  - (i) gauging, inspection, regular maintenance, etc., where such work may expose employees to hazardous substances; or
  - (ii) where carrying of tools or equipment by hand is normally required.

### 3.14.4 Fragile Surfaces

- (a) Employers shall ensure that no one goes onto or near a fragile surface unless that is the only reasonably practicable way for the employee to carry out the work safely, having regard to the demands of the task, equipment, or working environment.
- (b) If anyone does work on or near a fragile surface employers shall:
  - (i) ensure that appropriate platforms, coverings, guard rails, and the like are provided (and used) to minimize the risk; and
  - (ii) do all that is reasonably practicable, if any risk of a fall remains, to minimize the distance and effect of a fall.
- (c) If anyone goes onto or near a fragile surface, an employer shall do all that is reasonably practicable to make them aware of the danger, preferably by prominent warning notices fixed at the approaches to the danger zone.

### 3.14.5 Fall Protection Requirements for Unprotected Edges

- (a) Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 2 meters or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems, or other combination of fall protection as addressed in the sections below:
  - (i) regardless of height above the equipment, each employee above dangerous equipment shall be protected from falling into or onto the dangerous equipment by guardrail systems or by equipment guards;
  - (ii) each employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges 2 meters or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall

arrest systems, or a combination of warning line system and guardrail system, warning line system and safety net system, or warning line system and personal fall arrest system, or warning line system and safety monitoring system. On roofs 15.25 meters or less in width the use of a safety monitoring system alone without the warning line system is permitted; and

- (iii) each employee on a steep roof with unprotected sides and edges 2 meters or more above lower levels shall be protected from falling by guardrail systems with toe boards, safety net systems, or personal fall arrest systems.

### 3.14.6 Protection from Falling Objects

- (a) All employees exposed to falling objects shall wear a hard hat and the employer shall implement one of the following measures:
  - (i) erect toe boards, screens, or guardrail systems to prevent objects from falling from higher levels; or
  - (ii) erect a canopy structure and keep potential fall objects far enough from the edge of the higher level so that those objects would not go over the edge if they were accidentally displaced; or
  - (iii) barricade the area to which objects could fall, prohibit employees from entering the barricaded area, and keep objects that may fall far enough away from the edge of a higher level so that those objects would not go over the edge if they were accidentally displaced.

### 3.15 Inspections

- (a) Employers shall ensure that fall protection systems are ready and able to perform their required tasks. To achieve this, an inspection and maintenance procedure shall be implemented and maintained.
- (b) The following, as a minimum, shall be included in the inspection and preventive maintenance procedure:
  - (i) equipment manufacturer's instructions; and
  - (ii) a requirement that all fall protection equipment shall be inspected prior to each use, and also a documented inspection at intervals not to exceed 6 months, or in accordance with the manufacturers guidelines.
- (c) Employers shall ensure that any item is inspected:
  - (i) after it is assembled and before first use;
  - (ii) at regular intervals (at periods not exceeding 7 days);
  - (iii) following any substantial alterations; and
  - (iv) following any impact or extreme conditions that may affect the stability of the platform.
- (d) For mobile platforms, inspection at the site is appropriate without the need for re-inspection every time the platform is moved.
- (e) Employers shall keep the report of a platform inspection:
  - (i) at the construction site until the work is completed; and

- (ii) then at an employer office for another three months.
- (f) The user shall inspect fall protection equipment prior to each use. Before each use and shall include the following:
  - (i) carefully inspect body belts, safety straps, harnesses, lanyards, lifelines, and connectors for indications of wear and deterioration, or evidence of impact loading;
  - (ii) visually inspect for the following:
    - 1) webbing or rope cuts, loose stitching, kinks, knots, abrasions, burns, excessive swelling, discoloration, cracks, charring, broken fibers, and chemical or physical exposure;
    - 2) loose, bent or pulled rivets, bent grommets, and broken cuts or burned threads;
    - 3) nicks, cracks, distortion, or corrosion of hardware (buckle, D ring, snap hook);
    - 4) breakaway jacket on deceleration unit of shock absorbing lanyard is intact and has no broken stitches, tears, stretch marks or other evidence of impact loading;
    - 5) check all equipment for damage, wear, mildew, or distortion;
    - 6) hardware shall be free of cracks, sharp edges, or burns; and
    - 7) ensure that no straps are cut, broken, torn, or scraped;
  - (iii) any fall protection equipment subjected to a fall or impact load shall be removed from service immediately for examination;
  - (iv) equipment that is damaged or in need of maintenance shall be tagged as unusable, and shall not be stored in the same area as serviceable equipment; and
  - (v) anchors and mountings shall be inspected before each use by the user and supervisor for signs of damage.

### **3.16 Safe Work on Roofs**

#### **3.16.1 Designer Responsibilities**

- (a) Employers performing designers duties shall consider health and safety in the design of every roof structure, as per the requirements of *AD EHS RI – CoP 20.0 – Safety in Design*. This shall include the health and safety considerations for the construction, maintenance, repair and demolition of the roof.
- (b) Employers performing designers duties shall consider the following:
  - (i) elimination / reduction of the risk of falling by designing out the fall potential through the construction of permanent walls, cast-in mesh, specification of non-fragile materials or similar;
  - (ii) provision of collective protective measures such as permanent guardrails and toe boards to roof edges;
  - (iii) provision of anchorage points for static lines or built in fixings for safety nets;

- (iv) accelerated preparation of the floor level below the roof area to allow for mobile elevated work platforms (MEWP's) to be used for the roof installation process;
  - (v) where reasonably practicable the provision of safe access in the design such as stairs as opposed to vertical ladders; and
  - (vi) consideration of off-site assembly or prefabrication to reduce the amount of work undertaken on site.
- (c) Employers acting as designers shall keep a record of the health and safety design risks that they have considered and the measures that they have taken to mitigate these risks where reasonable practicable.

### 3.16.2 Preparation of Roof Work Areas

- (a) Employers shall ensure the following before allowing roof works to commence:
- (i) edge protection systems are installed, inspected and signed off by a competent person;
  - (ii) safety harnesses are available where required and employees are trained in their use;
  - (iii) employees involved with roof working are briefed specifically on the safe system of work;
  - (iv) rescue arrangements are in place to deal with any employee who may fall and become suspended by their safety harness;
  - (v) areas below where roof works are to be undertaken are barricaded off and warning signs are clearly displayed;
  - (vi) weather conditions are assessed and within the limits for work to start safely; and
  - (vii) fragile roof materials are identified and access to these areas are restricted with the use of rigid barriers and warning signs.

### 3.16.3 Access for Roof Works

- (a) Employers shall ensure that safe access is provided to each roof work area in accordance with the following:
- (i) access stairs shall be provided where regular access to the roof is required;
  - (ii) ladders shall be used in only where infrequent access to the roof is required;
  - (iii) clear designated walkways shall be established on the roof;
  - (iv) access requirements shall take into account the requirements for employees to carry any necessary tools and materials; and
  - (v) signage shall be provided to indicate any special access requirements or warnings.

### 3.16.4 Working on Fragile Roofs

- (a) Fragile roof materials include any material that is not capable of supporting the weight of a person and are typically moulded or fabricated sheet materials including but not limited to:

- (i) asbestos cement sheeting / cellulose cement sheet;
  - (ii) slate;
  - (iii) glass;
  - (iv) fiberglass; and
  - (v) acrylic or other similar synthetic materials.
- (b) Employers shall identify fragile roof materials and where work is required on the roof a risk assessment must be undertaken.
- (c) Employers shall ensure that fragile areas of roofs are provided with appropriate walkways including guardrails and toe boards to allow for safe access on the roof.
- (d) Employers shall ensure that warning signs are clearly displayed at the access point to roofs fabricated with fragile materials.
- (e) Employers shall take appropriate precautions where fragile roof lights are present on a roof. Precautions shall include the following:
- (i) a permit to work system for all roofs where fragile roof lights are present;
  - (ii) all personnel working on roofs where fragile roof lights are present shall be trained in the specific control measures of the access and work requirements;
  - (iii) fragile roof lights shall be barricaded off where reasonably practicable. Where this is not reasonably practicable fragile roof lights shall be securely boarded over; and
  - (iv) proximity restraints may be used in the case of short duration work to prevent access to areas where fragile roof lights are present.

#### 4. References

- *AD EHSMS RF – Element 01 – Roles, Responsibilities and Self-Regulation*
- *AD EHSMS RF – Element 02 – Risk Management*
- *AD EHS RI – CoP 2.0 – Personal Protective Equipment*
- *AD EHS RI – CoP 17.0 – Safety Signs and Signals*
- *AD EHS RI – CoP 20.0 – Safety in Design*
- *AD EHS RI – CoP 34.0 – Safe use of Lifting Equipment and Lifting Accessories*
- *AD EHS RI – CoP 53.0 – EHS Management during “Construction Work”*
- *Ministerial Order 37/2 (1982)*

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