



Abu Dhabi EHSMS Regulatory Framework (AD EHSMS RF)

EHS Regulatory Instrument

Code of Practice

EHS RI - CoP 41.0 – Steel Erection

Version 2.0

February 2012

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.



Table of Contents

1.	Introduction	6
2.	Training and Competency.....	6
3.	Requirements	7
3.1	Roles and Responsibilities	7
3.2	Planning and Assessment.....	8
3.3	General Hazards and Limitations	10
3.4	Cranes / Material Handling and Slings	11
3.5	Material Storage	12
3.6	Stacking.....	12
3.7	Stability of Structures	13
3.8	Access and Working Places.....	14
3.9	Inspection and Maintenance	15
4.	References.....	15

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 establishes the requirements and standards so that the risks associated with steel erection are assessed, that control measures are implemented in accordance with the hierarchy of controls and that control measures are implemented to prevent injury, illness and disease to persons who might be exposed to risks arising from those activities.
- (c) 'Steel Erection' is a general term referring to work tasks associated with the erection and dismantling of a structural steel frame or structure which may include hoisting, connecting, welding, bolting, and rigging structural steel, steel joists and metal buildings; installing metal deck, siding systems, miscellaneous metals, ornamental iron and similar materials; and moving from point-to-point to perform these activities.

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) In accordance with *AD EHSMS RF – Element 01 – Roles, Responsibilities and Self-Regulation* Section 3.2.5 employers shall ensure employees required to implement the requirements of this CoP are trained in the steel erection and understand the risks associated with using the relevant plant and the control measures put in place by the employer.
- (c) Employers shall ensure all employees involved in the steel erection of the structures are trained to recognise and respond to hazards associated with this type of work.
- (d) Training shall be tailored to the specific requirements of the jobsite and include any unique issues or requirements.
- (e) Employers shall ensure an overall training programme is planned for both riggers and supervisors, and shall include, but not limited to the following:
 - (i) all aspects of rigging and erection methods, multi-lifting procedures, lifting equipment, use of tools and plant, erection of scaffolds and staging's, together with safe working practices, fall prevention, guardrail systems and statutory obligations;
 - (ii) induction training for supervisory staff, riggers and erectors prior to commencement of the work;
 - (iii) project planning for structures;
 - (iv) establishment and running of the site organization;
 - (v) procedures for dealing with emergencies and incidents; and

- (vi) issue and explanation of the company safety policy, procedures and site rules, the location of emergency telephones, first aid and medical services, and the use of protective clothing and equipment.
- (f) Employers shall maintain a record of the required training that contains the following information:
 - (i) name and ID number;
 - (ii) Emirates ID number;
 - (iii) subject(s) of training;
 - (iv) date(s) of training; and
 - (v) person(s) providing the training.

3. Requirements

3.1 Roles and Responsibilities

3.1.1 Employer

- (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 steel erection work is appropriately planned, organized and supervised;
 - (ii) those involved in steel erection are trained and competent;
 - (iii) the place where steel erection work is carried out is safe;
 - (iv) steel erection equipment shall be appropriately inspected;
 - (v) inform the Principal Contractor and any other relevant parties of the selected method for steel erection and the equipment to be used;
 - (vi) obtain all necessary work permits and authorizations and provide all necessary notifications concerning the work;
 - (vii) nominate a person to implement the operations and to supervise the work at all times. This person shall be competent in the type of steel erection needed for the particular project and experienced in the implementation of safe work procedures;
 - (viii) erect all appropriate fencing and overhead protection barriers for the protection of the public and employees at the workplace; and
 - (ix) arrange for the recycling of building waste wherever reasonably practicable and the disposal of all other refuse and debris.

3.1.2 Principal Contractors

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

- (b) Principal Contractors shall undertake their specific roles and responsibilities in accordance with the following:
- (i) ensure the employer has all available descriptions of the site, including design drawings, site surveys, plans of services and information on the nature and location of hazardous materials, the nature of building materials and the building or structure's relationship to surrounding properties;
 - (ii) provide coordination for all other entities on the project who may be affected by the work being carried out by the steel erection entity;
 - (iii) all relevant authorities and utility service providers are notified and all necessary approvals are obtained before work commences;
 - (iv) notify the owners of adjoining properties of the proposed work especially where the use of cranes or out-of-hours working is undertaken; and
 - (v) the location of all utility services is known.

3.1.3 Employees

- (a) Employees 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) Employees shall undertake their specific roles and responsibilities in accordance with the following:
- (i) following information provided by the employer regarding steel erection;
 - (ii) observing steel erection safe work practices and operating procedures prescribed by the employer, including the observation of warning signs; and
 - (iii) use PPE in accordance with the employer's instructions when undertaking steel erection.

3.2 Planning and Assessment

3.2.1 Assessment

- (a) Employers shall ensure the following:
- (i) an assessment of the various risks is undertaken and systems of work are established which are safe to all parties involved or affected including the public;
 - (ii) that appropriate control measures are implemented in order to manage activities safely and without risk to health;
 - (iii) this assessment shall consider the requirements of *AD EHS RI – CoP 23.0 – Working at Heights*;
 - (iv) that for the Building and Construction Sector the management of steel erection requirements are included in the Pre-Tender Environment, Health and Safety Plan in accordance with *AD EHS RI – CoP 53.0 – EHS Management during "Construction Work"*; and
 - (v) 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 *AD EHS RI – CoP 53.0 – EHS Management during "Construction Work"*.

- (b) Employers shall ensure prior to the construction of any steel erection that a risk assessment is conducted to ensure control measures are identified to prevent or minimise exposure to health and safety risks. Refer to *AD EHSMS RF – Element 02 – Risk Management*.

3.2.2 Design and Planning

- (a) Employers shall ensure the planning for steel erection is commenced at the initial design stage with designers taking into account the need for and the practicality of, safe methods of working during erection in accordance with the general requirements of *AD EHS RI – CoP 20.0 – Safety In Design* and *AD EHS RI – CoP 23.0 – Working at Heights*.
- (b) Employers shall consider the following during each design stage:
- (i) stability at all stages of erection of the assembled structure, individually assembled portions and single components;
 - (ii) the effect of the erection sequence on stability and where this is critical, the sequence shall be stipulated;
 - (iii) realistic assessment of loadings at all stages of construction;
 - (iv) provision of safe access and working places;
 - (v) ease of connecting components including the provision of landing cleats, which allow a beam to be safely located whilst suspended from a crane, and remove the need to align it manually by using an appropriate tool (eg. podger);
 - (vi) safe handling, lifting, storing, stacking and transportation of components, depending on their size, shape and/or weight;
 - (vii) for sub-assemblies, it is critical that overall weight and lifting points are identified on drawings; and
 - (viii) designers and planners shall also consider demolition and disassembly requirements.
- (c) Design specifications shall incorporate particular requirements and essential information for the scheme to be planned and erected safely.

3.2.3 Documented Safe Systems of Work

- (a) In accordance with *AD EHSMS RF – Element 01 – Roles, Responsibilities and Self-Regulation* Section 3.2.5 employers shall ensure documented safe systems of work are developed and implemented and include:
- (i) a detailed erection scheme;
 - (ii) phasing of the work, particularly with that of other affected contractors;
 - (iii) special requirements relating to the safe erection of the structure shall be highlighted at the pre-contract stage;
 - (iv) special site conditions such as close proximity of other buildings or access restrictions;
 - (v) ground conditions particularly with regards to conditions that may need to be considered when positioning a crane;

- (vi) Personal Protective Equipment (PPE) is selected by considering standards and requirements that apply to construction generally, and to steel erection in accordance with *AD EHS RI – CoP 2.0 – Personal Protective Equipment*;
 - (vii) ensure that prior to the erection of structures, all underground services in the area are located and rendered safe; and
 - (viii) cranes and lifting gear shall be selected and used in accordance with the requirements of *AD EHS RI – CoP 34.0 – Safe Use of Lifting Equipment and Lifting Accessories*.
- (b) Documented safe systems of work shall:
- (i) be distributed to all those concerned with the supervision of the steel erection;
 - (ii) communicated in a comprehensible manner to all employees involved in steel erection;
 - (iii) ensure steel erection is monitored to ensure that the planned sequence of operations is not deviated from in any way; and
 - (iv) be reviewed and updated as necessary so that it remains current.

3.3 General Hazards and Limitations

3.3.1 General Hazards

- (a) Employers shall ensure control measures are developed and implemented for the following general hazards and limitations which may be found on sites where steel erection works are to be undertaken:
- (i) overhead electric power lines in the area where steel erection planned;
 - (ii) buried services, including underground electric cables, gas or other pipelines;
 - (iii) restricted access to, and on, the site due to road alignment which may limit the size and weight of structural members and plant, including cranes;
 - (iv) restricted space for erection, maneuvering, storage and, if required, for on-site pre-assembly of fabrication, and low ground bearing capacity;
 - (v) proximity and condition of other buildings or roads, which may affect the planned method of erection and craneage;
 - (vi) proximity of the general public to the site;
 - (vii) activities of other contractors;
 - (viii) barriers and notices shall prohibit entry to non-erection personnel; and
 - (ix) toxic gases, chemicals, fluids or dust emitting from processes on or near the site.

3.3.2 Ground Conditions

- (a) Employers shall ensure the following with regards to ground conditions:
- (i) the provision of hard standing ground, appropriate for mobile access equipment and cranes prior to the commencement of erection; and
 - (ii) good vehicular access to the hard standing to be provided and vehicle turning circles shall also be taken into account.

3.3.3 Preparation and Bases

- (a) Employers shall ensure the following with regards to preparation and bases:
- (i) a sound foundation is provided for each steel column which shall be capable of accepting both a vertical load and also the additional horizontal thrust which is developed as soon as temporary props have been removed;
 - (ii) the area around where the steel erection is to take place shall be clear of all materials and leveled as far as reasonably practicable;
 - (iii) steel components are placed as close as reasonably practicable to the work area without interfering with access or the work sequence; and
 - (iv) employees involved shall be briefed on the steel erection sequence, in particular understanding where temporary supports will be required to ensure stability of the structure during erection.

3.4 Cranes/Material Handling and Slings

3.4.1 Cranes

- (a) In accordance with the requirements of *AD EHS RI – CoP 34.0 – Safe Use of Lifting Equipment and Lifting Accessories* employers shall also co-ordinate the use of cranes which include:
- (i) ensuring the appropriate number and type of cranes;
 - (ii) confirming that the designated siting positions for cranes can be achieved, with appropriate hard standings provided;
 - (iii) checking for the presence of hazards or development which may have altered the site since the original plans were made;
 - (iv) that all fabricated units shall have a distinctive mark identical to the erection drawings, in order to ensure that structures are correctly assembled;
 - (v) appointing a competent person to supervise the complete lifting operation, particularly when tandem lifts are used; and
 - (vi) appropriate ladders shall be available to ensure safe access on and off vehicles for persons unloading materials.

3.4.2 Lifting Steel Members

- (a) Employers shall ensure the following with regards to lifting steel members:
- (i) planned routes for pre-planned lifts;
 - (ii) procedures implemented for multiple lifts;
 - (iii) when lifting steel members they shall be slung by the use of flat slings in a conventional manner as detailed in a specifically prepared lifting plan;
 - (iv) every lift shall be under the supervision of a trained and certified signaler/slinger;
 - (v) prior to lifting each steel member into position the load shall be raised slightly off the ground and checked for balance and stability;
 - (vi) structural steel members shall not be released from lifting equipment until they have been secured and braced in accordance with the designers specification;

- (vii) exclusion areas are to be established to prevent unauthorized access to the working area and to prevent working under loads; and
- (viii) lifting accessories shall be inspected for signs of damage or wear by the signaler/slinger at the start of each shift. Damaged or worn lifting accessories shall immediately be removed from service.

3.5 Material Storage

- (a) Employers shall ensure areas are allocated for stacking and storing components which shall be clearly marked on site plans. These areas shall be:
 - (i) clear of obstructions, as level as reasonably practicable, and of appropriate size;
 - (ii) on ground which is capable of withstanding loads imposed by the stored materials and plant used in the area and investigation shall include a check for the presence of underground services in order to prevent damage from imposed loads;
 - (iii) sited away from hazards such as overhead power lines;
 - (iv) arranged so that clear access and lines of sight are provided and maintained between stacks of components;
 - (v) provided with artificial lighting and weather protection, where appropriate, to aid handling; and
 - (vi) if on site manufacture, fabrication, modification or repair work is to be undertaken, additional areas may be needed with facilities similar to those of storage areas.

3.6 Stacking

- (a) Employers shall ensure the following with regards to stacking or de-stacking components:
 - (i) materials shall be stacked so as to ensure there is little risk of collapse or sliding;
 - (ii) timbers, battens and wedges shall be provided for resting material stacks on and preventing uncontrolled material movements;
 - (iii) safe access for slinging purposes shall be provided;
 - (iv) employees shall be briefed on the safe system of work when moving materials from storage areas;
 - (v) particular care shall be taken when breaking steel banding used to secure materials on pallets;
 - (vi) appropriate space shall be provided around material stacks to allow for the safe movement of employees involved with moving materials;
 - (vii) steel members shall be placed on wooden blocks to ensure safe slinging; and
 - (viii) materials on pallets shall be stacked no more than 3 pallets high or as per the suppliers recommendations.

3.7 Stability of Structures

- (a) Employers shall ensure the requirements for stability at all stages of steel erection are clearly understood by all persons dealing with the steel erection work.
- (b) Employers shall ensure additional control measures are implemented to verify stability in the following circumstances:
 - (i) temporary cessation of work;
 - (ii) when fastenings may be incomplete in case of lining up and adjustment of level, high wind or when high winds are expected;
 - (iii) when the stage of completion of permanent work on which the stability depends is inappropriate, or when the permanent work has not developed appropriate strength;
 - (iv) when the structure or parts of it may be subject to construction loads due to impact, stacking of parts, and lifting or freeing of components which may have become inadvertently wedged in position;
 - (v) temporary supports shall be:
 - 1) of appropriate design and construction as identified on drawings or in the method statement;
 - 2) left in place until the structural steel is fixed in place in accordance with the designers specification. The minimum number of bolts for columns and other structural members shall be determined by the designer; and
 - 3) used in the way intended. Improvised supports must not be employed.
 - (vi) anchor points:
 - 1) must be able to resist any force reasonably foreseeable to be imposed upon them;
 - 2) anchor points or bolts that are damaged during the fixing operation shall be not be used. Anchor points and bolts shall not be repaired;
 - 3) movement of an anchor shall be reported immediately and prompt remedial action taken;
 - 4) steel cables for anchorage purposes shall not enter the ground unless appropriately protected;
 - 5) fastening of guy lines to anchorages in the ground shall be carried out using chains or steel bars; and
 - 6) screw type anchors shall be used in accordance with the manufacturer's instructions.
 - (vii) connecting beams and columns:
 - 1) where structural steel beams and columns are joined or connected this shall be in accordance with the designers specification; and
 - 2) where column or beam splices are used all bolts must be fitted and tightened to the designers recommended torque before the joint can be relied upon structurally.

3.8 Access and Working Places

3.8.1 Temporary Access

- (a) Employers shall consider various means of temporary access that may be used in the erection of structures, and employers shall consider the type of equipment to be used in the preparation of the documented safe systems of work, in accordance with *AD EHS RI – CoP 23.0 – Working at Heights*. These may include:
- (i) platforms or staging's may be used as working platforms, but they require a firm base and shall always be securely fixed;
 - (ii) under no circumstances shall 'beam walking' as a means of access be allowed;
 - (iii) ladders used to access heights or column shall be footed or fixed securely in accordance with *AD EHS RI – CoP 37.0 – Ladders*;
 - (iv) consideration shall be given on larger steel frame erection projects to the provision of Mobile Elevating Work Platforms (MEWPs); and
 - (v) where it is not reasonably practicable to use MEWPs, or other equipment specifically designed for lifting persons, then man-riding skips or cradles suspended from cranes may be used.

3.8.2 Metal Decking

- (a) Employers shall ensure that metal decking is progressed in accordance with working at height requirements as set out in *AD EHS RI – CoP 7.0 – Working at Height* and take all reasonably practicable control measures to ensure employees are protected from the hazard of falling.
- (b) Employers shall ensure that before metal decking is used as a working platform or before working at height control measures are removed it must be secured in accordance with the manufacturers requirements.

3.8.3 Scaffolds

- (a) Employers shall ensure scaffolding is erected in accordance with *AD EHS RI – CoP 26.0 – Scaffolding* which may include:
- (i) towers - used for making low level connections;
 - (ii) independent scaffolds - for the construction of ladder access towers to provide roof access; or
 - (iii) purpose-built platforms - these are appropriately designed and fabricated platforms which are used where a large number of similar connections require fixing. They can be fixed to components, and can be removed for re-use at the next location.

3.8.4 Permanent Access

- (a) Employers shall ensure the following with regards to permanent access:
- (i) all permanent walkways, ladders and steps shall be erected as early as reasonably practicable to enable the structure itself to be used for access;
 - (ii) edge protection shall be appropriate and temporary guardrails shall be fitted if the permanent rails are not available; and

- (iii) once an access route has been established, gratings and boards shall be removed only under a permit-to-work system.

3.9 Inspection and Maintenance

- (a) Employers shall ensure appropriate control measures are implemented for the inspection and maintenance of a steel erected structure to ensure it remains in a safe condition.
- (b) Employers shall ensure after erection and prior to handover, the steel erection to be inspected by a competent person to ensure that the structure has been erected in compliance with the design drawings. If design drawings have been prepared by an engineer, the engineer shall provide the certification.
- (c) Employers shall ensure copies of the certification are kept on site.
- (d) Employers shall ensure that as a minimum, the inspections shall make sure:
- (i) the structure / supporting structure is appropriate;
 - (ii) working platforms are secured and protected;
 - (iii) access and egress is appropriate; and
 - (iv) the structure will enable the work to be performed appropriately and safely.
- (e) Employers shall determine the frequency of inspections which may vary depending on weather and site conditions, the type and size of the structure and the risks associated with collapse.
- (f) Employers shall ensure inspection records are kept on site and include the location, comments, date and time of inspections, relevant design or specification references and the details of the person who conducted the inspection.

4. References

- *AD EHSMS RF – Element 01 – Roles, Responsibilities and Self-Regulation*
- *AD EHSMS RF – Element 02 – Risk Management*
- *AD EHSMS RF – Element 09 – Compliance and Management Review*
- *AD EHS RI – CoP 2.0 – Personal Protective Equipment*
- *AD EHS RI – CoP 20.0 – Safety In Design.*
- *AD EHS RI – CoP 23.0 – Working at Heights*
- *AD EHS RI – CoP 26.0 – Scaffolding*
- *AD EHS RI – CoP 34.0 – Safe Use of Lifting Equipment and Lifting Accessories*
- *AD EHS RI – CoP 37.0 – Ladders*
- *AD EHS RI – CoP 53.0 – EHS Management during “Construction Work”.*

