ERECTION OF STEEL STRUCTURES

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<th>Rev.</th>
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</tbody>
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Objective</td>
<td>3</td>
</tr>
<tr>
<td>2. Scope</td>
<td>3</td>
</tr>
<tr>
<td>3. References</td>
<td>3</td>
</tr>
<tr>
<td>4. Abbreviations / definitions</td>
<td>4</td>
</tr>
<tr>
<td>5. Responsibilities</td>
<td>4</td>
</tr>
<tr>
<td>6. Procedure</td>
<td>4</td>
</tr>
<tr>
<td>7. Tools and Equipment</td>
<td>6</td>
</tr>
<tr>
<td>8. HSE Instructions</td>
<td>6</td>
</tr>
<tr>
<td>9. Related documents</td>
<td>7</td>
</tr>
</tbody>
</table>
1. OBJECTIVE
The purpose of this generic work instruction is to define the procedure for Erection of Steel Structure (prefabricated and painted).

2. SCOPE
The scope of this work instruction covers following activities of Steel Structure:
- Material handling
- Foundation preparation
- Pre-assembly
- Erection
- Bolts Tightening & Alignment
- Touch up paint

3. REFERENCES
3.1 PROJECT DRAWINGS
- Applicable layout drawings
- Detail drawings.
- Others

3.2 PROJECT SPECIFICATION
- Steel Structure Specifications.
- Other related Specifications.

3.3 PROJECT QUALITY PLAN
Inspection / Testing shall be in accordance with PQP.

3.4 CODES AND STANDARDS
3.4.1 American Institute of Steel Buildings Committee (AISC)
- AISC Specification for Structural Steel Buildings.
- AISC Specification for Structural Joints using ASTM A325 or A490 bolts.
- AISC Manual of Steel Construction.

3.4.2 American Welding Society (AWS)
- AWS D1.1 Structural Welding Code.

3.4.3 American Society for Non-Destructive Testing (ASNT)
- ASNT-TC-1A Recommended Practice.
4. ABBREVIATIONS / DEFINITIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CL</td>
<td>Client</td>
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<tr>
<td>PM</td>
<td>Project Manager</td>
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<tr>
<td>SM</td>
<td>Site Manager</td>
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<tr>
<td>QIP</td>
<td>Quality Inspection Plan</td>
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<td>QC</td>
<td>Quality Control</td>
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<tr>
<td>QP</td>
<td>Quality Plan</td>
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<td>PPE</td>
<td>Personal Protection Equipment</td>
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<td>HSE</td>
<td>Health Safety &amp; Environment</td>
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</tbody>
</table>

5. RESPONSIBILITIES

- It is overall responsibility of PM/SM to organize resources to perform construction activities as per project specifications, in compliance with quality, schedule & safety requirements.
- Site Supervisor will ensure that all the works are performed safely as per Latest Issued for Construction (IFC) drawings & specifications.
- The relevant Supervisor will ensure that the steel structure work is conducted in accordance with this method statement and project specifications.
- The QC Inspector steel structure will ensure that all work is executed according to QP and that requirements of quality dossier are fulfilled.

- Safety and Construction supervision will be carried out under responsibility of Client

6. PROCEDURES

6.1 Material Receipt & Traceability

The pre-fabricated and painted steel structure material shall be received in warehouse or near to erection area and placed on wooden supports. A log shall be maintained for all materials received. The material will be segregated drawing wise as per identification numbers already marked by the manufacturer. Material handling shall be carried out in a manner to minimize damage to painted surfaces. Nylon lifting belts shall be used during the steel structure handling.

6.2 Steel Structure Foundation Check

- The Concrete Foundations shall be completed and handed over to the steel erection group with a release note and reference to permanent benchmark.
- Each Foundation will be marked with centerline and level. Top surface shall be chipped to the required level by machine/ manual chiseling (if required).
6.3 Foundation Preparation

- After foundation acceptance, the thickness of shim packing shall be calculated to achieve bottom level of the steel structure base plate as mentioned on drawings.
- The shim plate/packing shall be of steel material according to the ASTM-A-36. To maintain the surface level underneath the shim packing plates, non-shrink cement shall be used.
- The size and numbers of shim packers shall depend on each size of foundation. The packing plates shall be installed in such a manner that they are fully embedded/surrounded by grout material. A minimum cover of 50mm shall be maintained on the shim sides.
- The level of all shim plates shall be checked by using survey level/water level.
- A Survey Report shall be attached with release note.
- Necessary curing will be done for all stages of grouting in accordance with manufacturer recommendations.

6.4 ERECTION/ LIFTING WORK

- Only experienced Steel Erectors will be employed in the construction of steel works.
- The pre-assembled members and other loose pieces shall be erected on concrete foundations by crane. The steel structure elevation and straightness shall be maintained as per drawings.
- Guide ropes shall be tied to steel structure frames during erection for safe guiding the lifted piece.
- Access for erection shall be provided using Scaffolding platforms. The scaffolding work shall be inspected before use and appropriately tagged.
- Temporary supports in the form of temporary bracing or guy wires shall be installed. These are required to meet loading imposed during erection or required at the end of workday to ensure safe and stable condition until final foundation bolt tightening. Adjacent foundations shall be used as anchors/dead man.
- Qualified welders shall carry out any welding required for light steel structure member/items. An approved welding procedure shall be followed for this purpose.
- The final bolt tightening, structure leveling and alignment shall be done according to the applicable drawings, standards and specifications.
- Experienced riggers will be employed for steel structure erection work and only the experienced scaffolders will do the scaffolding work.
- Before releasing the steel structure frame from crane hook, a visual check will be done for adequate tightening of bolts up to 75%. Nuts & bolts shall be tightened by hand prior to release the crane hook.
- Acceptance criteria shall be as per Quality Plan for Steel Structure.
- Installation of floors, platforms, ladders and handrails shall be done according to the drawings and project specifications. Inspection shall be done according to the Quality Plan for steel structure.
6.5 RELEASE FOR GROUTING

- Final bolt installation, torquing and inspection shall be done as per QP. Upon acceptance the foundation shall be released for grouting. The grouting work shall be done by civil group according to specification.
- Applicable check list shall be followed as per QP and project specifications.

6.6 TOUCH UP PAINT

- Upon completion of steel structure erection all damaged paint surfaces shall be cleaned by power brush and applicable painting system shall be used for touch up.

7. TOOLS & EQUIPMENTS

7.1 EXECUTION

- Hand Tools
- Cranes
- Welding machines
- Guy wires
- Trailer
- Scaffolding & Platforms
- Theodolite
- Torque Wrench
- Man Basket
- Compressor

7.2 SAFETY

- Safety helmet.
- Safety Goggles
- Safety Shoes
- Safety belt
- Gloves
- Welders Helmet
- Ear Plugs (if required)
- Dust mask (If required)
- Fire Extinguishers (if required)

7.3 TESTING

- Visual Inspection only by using dumpy level and theodolite.

8. HSE INSTRUCTIONS

During execution of the job all measure shall be adopted to ensure safe working.

- Client site management system (latest revision) will be implemented.
- All personnel involved will use necessary PPE as required.
- The workers will be made aware of safety requirements related to this activity.
through daily, weekly and monthly toolbox and safety talks.

- Safety notice board will be installed.
- All equipment will be inspected by HSE (IZHAR SEEL) prior to use.
- During transportation of the steel structure the members shall be properly supported and tied on the Trailer.
- Only experience Steel Erector will carry out steel structure construction activities.
- Safety notice board shall be installed.
- During lifting of steel structure no body shall be allowed to work underneath.

- Erection tools should be lifted or lowered by rope. Bolts, nuts, washers etc. should be properly contained to avoid falling down. Every measure shall be taken to prevent tools falling down e.g. tied off.

- All lifting tackle will be inspected by HSE (IZHAR STEEL) according to project requirement.
- Access and good housekeeping should be maintained at site.
- Fire extinguisher should be available in working area.
- When working on height, proper fall protection measure shall be taken.
- All access ladders and scaffoldings shall be secured and tagged before use.
- Proper storage, handling and use of gas cylinders will be observed.
- All cylinders shall be kept in trolleys and in an upright position.
- Welding sets should be checked and maintained regularly for wear and tear.
- Waste managements work Instruction shall be strictly followed to keep the job site neat and clean.

9. Related Documents

- Quality Plan
- Welding Procedure Specification (WPS)