

**AIN SHAMS UNIVERSITY
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**BEHAVIOUR AND CONSTRUCTION
OF
STEEL STRUCTURES**

Chapter 1

INTRODUCTION

After the design and the preparation of the workshop drawings, constructing any steel buildings should be as follows;

Part 1 : FACTORY STAGE

a) RECEIVING AND STORAGE OF RAW MATERIAL:

- Raw material includes steel plates, steel sections, welding electrodes, bolts, etc.
- Inspection of the received raw material (Quality Control) to insure that:
 - It is comply with the specified dimensions, grade, etc.
 - It is free from defects such as; lamination of steel, surface cracks, etc.
- Storing the received material in suitable conditions in the specified area.
- Q. C. reports to verify the proceeding steps.

b) PREPERATION:

- Cutting of steel plates or elements according to the specified dimensions and method such as: saw cut, flame cut, plasma cut, etc.
- Preparing the edge conditions of the steel plates and elements (sharp, rounded or beveled).
- Holes (vertical or horizontal) using drilling or punching.
- Q. C. reports to verify the proceeding steps (the method of cutting comply with the specified one, the dimensions are within the allowed tolerance range, the edges conditions are according to the design and specifications, etc.).

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c) PRODUCTION:

- Welding of steel components such as:
 - i) Web to flange at web-Flange conjunctions in built-up sections.
 - ii) End plates, gusset plates and base plates to steel members.
 - iii) Cleat angles to steel members.
- Finishing the steel product (as a fabricated item).
- Q. C. reports to verify the proceeding steps such as:
 - 1. The dimensions of the fabricated elements are within the allowed tolerances.
 - 2. The out of straightness of the members and components are within the allowed tolerances.
 - 3. The hole sizes and locations are within the allowed tolerances.
 - 4. Weld:
 - i) Type of weld (fillet, partial penetration or full penetration).
 - ii) Method of weld (SAW, GMAW, SMAW, FCAW, EGW or ESW).
 - iii) Size of weld.
 - iv) Inspection of weld (Visual, Dye Penetrate, Magnetic Particle, Radiographic or ultrasonic).

d) SURFACE PREPARATION AND PROTECTION:

- Cleaning of member surfaces from rust, oil, greases etc. using and/or the following methods:
 - 1. Wire brush (manual or mechanical)
 - 2. Blasting using sand, gravel or marble stones.

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- Applying protection coats such as; galvanization and/or painting.
- Q. C. reports to verify the proceeding steps such as:
 1. The preparation of surface is according to the specifications.
 2. The method of surface protection is according to the specified one and the thickness of galvanization and/or painting within the allowed tolerances of the specification.

Part 2 : SITE STAGE

a) SITE CONDITION:

- To insure that the site is ready and secure to erect the steel building according to the Method of Statement of erection.
- To realize that there is enough space to store the fabricated items and the method of storing the fabricated items is suitable.
- The safety conditions are applied at the site before and during erection.
- Safety report to verify the preceding steps.

b) EQUIPMENT NEEDED AT SITE:

Such as:

- Survey tools.
- Cranes (type, capacity, position,, etc.).
- Wrenches and torque wrenches for bolts tightening.
- Accessories needed for erection.
- Safety wires and robes.

c) SEQUENCE OF ERECTION:

The method and sequence of erection should be according to the Method of Statement which include:

- Alignment of anchor bolts.
- Positioning the columns and wire them until connected stable items are erected.(main systems, bracing, etc.).
- Erecting the secondary elements.
- Applying final painting coats to the erected steel members.
- Q. C. reports to verify that preceding procedure.

Part 3 : MAINTENANCE STAGE

For any steel construction, it is essential to maintain the building at interval period of times. The procedure of maintenance is as follows;

- 1) Visual inspection (alignment of the members, painting status, weld condition, bolts tightening, etc.).
- 2) Determine the elements and/or the spots to be maintained.
- 3) Method of statement to explain the procedure of maintenance.
- 4) Applying the maintenance procedure
- 5) Q. C. reports to verify that the maintenance procedure is as specified in the method of statement.