4 FABRICATION

4.1 GENERAL

4.1.1 Scope

1 This Part specifies the general requirements for the fabrication of structural steelwork components.

2 Related Sections and Parts are as follows:

This Section

Part 2..... Materials
Part 6..... Bolting
Part 7..... Accuracy of Fabrication
Part 9..... Accuracy of Erected Steelwork

4.2 IDENTIFICATION

4.2.1 Traceability of Steel

1 All steel to be used in the Works shall have a test certificate (see Clause 2.1.5 of this Section).

4.2.2 Material Grade Identification

1 The material grades of all steel shall be identifiable except for design grades 43A and 43B, and in the case of structural hollow sections, 43D.

4.2.3 Marking Steelwork

1 Individual pieces shall be capable of positive identification at all stages of fabrication.

2 Completed components shall be marked with a durable and distinguish erection mark in such a way as not to damage the material. Hard stamping may be used, except where otherwise specified by the Engineer.

3 Where areas of steelwork are indicated on the drawings as being unmarked, they shall be left free of all markings and hard stamping.

4.3 HANDLING

4.3.1 General Requirements

1 Steelwork shall be bundled, packed, handled and transported in a safe manner so that permanent distortion does not occur and surface damage is minimised.

4.4 CUTTING AND SHAPING

4.4.1 Cutting Operations

1 Cutting and shaping of steel may be carried out by shearing, cropping, sawing, nibbling, laser cutting or machine flame cutting, except that where machine flame cutting is impractical, hand flame cutting may be used.

4.4.2 Flame-cut Edges

1 Flame-cut edges which are free from significant irregularities shall be accepted without further treatment except for the removal of dross, otherwise cut edges shall be dressed to remove irregularities.

4.4.3 Columns

1 Columns with ends not in direct bearing or intended to be erected on packs or shims, shall be fabricated to the accuracy given in Item 2 of Table 7.1 of this Section.

2 Columns intended to be in direct bearing shall be fabricated to the accuracy given Item 3 of Table 7.1 of this Section.

3 Column sections which are one metre and over in width or depth and are intended to be in direct bearing, shall be specially prepared at the butting ends so that the erection tolerances in Items 4 and 5 of Table 9.2 of this Section can be achieved.

4.5 MACHINING

4.5.1 Thickness of Machined Parts

1 The thickness of elements shown on the drawings as requiring machining shall mean the minimum thickness after the machining operations.

4.6 DRESSING

4.6.1 Removal of Burrs

1 Cut edges shall be dressed to remove dross, burrs, and irregularities. Holes shall be dressed as required to remove burrs and protruding edges.

4.6.2 Dressing of Edges

1 Sharp edges shall be dressed, but a 90° rolled, cut, sheared or machined edge is acceptable without further treatment.

4.7 HOLING

4.7.1 Matching

1 All matching holes for fasteners or pins shall register with each other so that fasteners can be inserted without undue force through the assembled members in a direction at right angles to the faces in contact. Drifts may be used but holes shall not be distorted.

4.7.2 Drilling Through More Than One Thickness

1 Drilling shall be permitted through more than one thickness where the separate parts are tightly clamped together before drilling. The parts shall be separated after drilling and any burrs removed.

4.7.3 Punching Full Size

1 Full size punching of holes shall be permitted when:

(a) the tolerance on distortion of the punched hole does not exceed that shown in Item 3 of Table 7.2 of this Section.

(b) the holes are free of burrs which would prevent solid seating of the parts when tightened

(c) the thickness of the material is not greater than the hole diameter

(d) the maximum thickness for all steel grades used from the standards listed in Table 2.1 of this Section is:

(i) 2 mm for sub-grade A

(ii) l6 mm for sub-grade B

(iii) 20 mm for sub-grade C or higher sub-grade; in spliced connections when the holes in mating surfaces are punched in the same direction.

4.7.4 Punching and Reaming

1 Punching is permitted without the conditions in Clause 4.7.3 of this Part, provided that the holes are punched at least 2 mm less in diameter than the required size and the hole is reamed to the full diameter after assembly.

4.7.5 Slotted Holes

1 Slotted holes shall be made by one of the following methods:

(a) punched in one operation

(b) formed by drilling two holes and completed by cutting

(c) machine operated flame cutting.

4.8 ASSEMBLY

4.8.1 General Requirements

1 All components shall be assembled within tolerances specified in Section 7 of this Section and in a manner such that they are not bent, twisted or otherwise damaged.

2 Drifting of holes to align the components shall be permitted, but must not cause damage or distortion to the final assembly (see Clause 6.3.2).

4.9 CURVING AND STRAIGHTENING

4.9.1 General Requirements

1 Curving or straightening components during fabrication, shall be performed by one of the following methods:

(a) mechanical means, taking care to minimise indentations, or change of cross-section

(b) the local application of heat, ensuring that the temperature of the metal is carefully controlled, and does not exceed 650oC

(c) the induction bending process where the procedure used includes careful temperature control; after curving or straightening, welds within the area of curving or straightening shall be visually inspected. Welds which are to be subject to non destructive examination shall have these tests carried out after curving or straightening.

4.10 INSPECTION

4.10.1 General Requirements

1 Sufficient components shall be checked for dimensional accuracy and conformity to drawing, to prove that the manufacturing process is working satisfactorily.

4.11 STORAGE

4.11.1 Stacking

1 Fabricated components which are stored prior to being transported or erected shall be stacked clear of the ground, and arranged if possible so that water cannot accumulate. They shall be kept clean and supported in such a manner as to avoid permanent distortion.

4.11.2 Visible Markings

1 Individual components shall be stacked and marked in such a way as to ensure that they can be identified.

END OF PART