



CORPORATE PURCHASING SPECIFICATION

AA 101 22

Rev. No. 15

PREFACE SHEET

STRUCTURAL STEEL-HIGH TENSILE PLATES, FLATS & BARS

FOR INTERNAL USE ONLY
REMOVE THIS PREFACE SHEET BEFORE ISSUE TO SUPPLIERS

Comparable Standards:

- | | |
|-----------|--|
| 1. GERMAN | : DIN EN 10025-2:2004 Gr: S355 J2 G3 Mat. No. 1.0577 |
| 2. INDIAN | : IS: 2062-2006 Grade E350 (Fe 490) |

Suggested/Probable Suppliers And Grades:

Refer Plant Vendors List

User Plant References:

- | | | |
|------------------|---|-----------------------|
| 1. BHOPAL | : | PS 10541 |
| 2. JHANSI | : | PS 10541 |
| 3. HEEP, HARDWAR | : | 0500.009, HW10181 |
| 4. HYDERABAD | : | HY 021 02 99, HY10591 |
| 5. TRICHY | : | TDC 0:301 |

Revisions :
CL.32.7 of MOM of MRC-S&GPS

APPROVED :
INTERPLANT MATERIAL RATIONALISATION
COMMITTEE-MRC (S&GPS)

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STRUCTURAL STEEL - HIGH TENSILE PLATES, FLATS & BARS

1.0 GENERAL:

This specification governs the quality requirements of High Tensile Structural Steel Plates where guaranteed weldability is required.

2.0 APPLICATION :

Steel intended for use in structures where enhanced mechanical properties are required and where saving in weight can be effected due to their greater strength.

3.0 CONDITION OF DELIVERY :

Plates shall be supplied in the normalized condition or in an equivalent condition obtained by normalizing rolling.

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

Material shall comply with the requirements of DIN EN 10025-2:2004, Gr: S355J2G3 (Material Number 1.0577) or the equivalent grade of latest version.

The supply of the material as per IS:2062-2006 Grade E350 (Fe 490) (latest version) meeting the requirement of clause 3.0, 5.0, and 12.0 of this specification is also acceptable.

5.0 DIMENSIONS AND TOLERANCES :

5.1 Dimensions :

5.1.1 Sizes

Material shall be supplied to the dimensions specified on BHEL Order.

5.1.2 Length :

Unless otherwise specified, hot rolled bars and sections shall be supplied in 3 to 6 metres length.

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**5.2 Tolerances:**

The tolerances on dimensions for plates shall comply with DIN EN 10029.

6.0 MANUFACTURE:

Material shall be manufactured from fully killed (FF) steel having a Carbon Equivalent (melt analysis) of:

0.45 max. for plates upto & incl. 30 mm thick

0.47 max. for plates above 40 mm thick upto & incl. 150 mm thick.

0.49 max for plates > 150mm & ≤ 250 mm thick.

7.0 FREEDOM FROM DEFECTS :

All finished steel shall be well and cleanly rolled to the dimensions, sections and weights specified. The finished material shall be free from cracks, surface flaws, laminations; rough, jagged and imperfect edges and internal & surface defects.

8.0 CHEMICAL COMPOSITION:

The melt analysis of steel and the permissible variation in the composition of the material from the melt analysis shall be as follows:

| Element | Percent, max. | Permissible variation, percent, maximum |
|----------------------|---------------|---|
| Carbon | | |
| Upto&Incl 40mm thick | 0.20 | 0.03 |
| Above 40mm thick | 0.22 | 0.02 |
| Silicon | 0.55 | 0.05 |
| Manganese | 1.60 | 0.10 |
| Sulphur | 0.025 | 0.010 |
| Phosphorus | 0.025 | 0.010 |
| Copper | 0.55 | 0.050 |

Note :

1. Total Aluminum: 0.020%, minimum.
2. Micro-alloying elements like niobium, boron, titanium and vanadium may be added by the manufacturer to achieve the mechanical properties specified.
3. Carbon Equivalent (CE) based on melt analysis shall be calculated as per following formula :

$$CE = C + \frac{Mn}{6} + \frac{Cr+Mo+V}{5} + \frac{Ni+Cu}{15}$$

9.0 TEST SAMPLES:

Test samples shall be selected and prepared in accordance with DIN EN 10025. One tensile test piece per 40 tonnes or part thereof shall be selected from finished steel from each melt for each class of products.

**10.0 MECHANICAL PROPERTIES (On longitudinal test samples) :****i) Tensile :**

The test pieces shall show the following properties, when tested in accordance with IS: 1608 / DIN EN 10025.

| Nominal thickness, mm | Tensile strength N/mm ² , min. | Yield strength N/mm ² , min. | Elongation on 5.65 $\sqrt{S_0}$ gauge length, percent, min. |
|--------------------------|---|---|---|
| From 5 to 16 | 470-630 | 355 | 22 |
| Over 16 to 40 | 470-630 | 345 | 22 |
| --- 40 to 63 | 470-630 | 335 | 21 |
| --- 63 to 80 | 470-630 | 325 | 20 |
| ---- 80 to 100 | 470-630 | 315 | 20 |
| ---- 100 to 150 | 450-600 | 295 | 18 |
| ---- 150 to 200 | 450-600 | 285 | 17 |
| ---- 200 to 250 | 450-600 | 275 | 17 |
| ---- 250 to 400 | 450-600 | 265 | 17 |

ii) Impact :

The "Choppy Impact test" shall be carried out in accordance with DIN EN 10045-1/IS-1757 at (-20°C). The impact values achieved shall be as follows.

| Nominal thickness (mm) | Impact strength (KCV) (2mm 'V' notch) |
|-------------------------|---------------------------------------|
| < 16 | Note (1) |
| 16 \geq to \leq 150 | 27 Joules |
| 150 > to \leq 250 | 27 Joules |


Note :

(1) Impact test is not required for plates below 16 mm.

The average value of the three test results shall meet the specified requirement. One individual value may be the below minimum average value specified, provided that it is not less than 2/3 rd of the same.

11.0 PROTECTIVE COATING :

Plates upto 10 mm thick shall be applied with a suitable rust preventive coating for overseas shipping only.

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12.0 ULTRASONIC EXAMINATION:

Plates above 40mm shall be ultrasonically examined in accordance with BHEL standard AA 085 01 20 (or ASTM A435 / EN10160) and shall comply with the acceptance norms specified therein.

13.0 OPTIONAL:

PRESERVATION:

If specified in order, all plates shall be applied with a suitable rust preventive to avoid pitting.

14.0 TEST CERTIFICATES:

Unless otherwise specified, three copies of test certificates shall be supplied.

In addition, the supplier shall ensure to enclose one copy of the test certificate along with their despatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information:

(i) AA 101 22-Rev. No.15, DIN EN 10025 Gr. S355J2G3, Matl. No. 1.0577.

(ii) BHEL order No, Melt No, Size & Quantity, Batch No with heat treatment details, Results of Chemical analysis, Mechanical tests & NDT, Supplier’s name, Identification No, TC No, Signature of Competent authority, etc.

15.0 PACKING AND MARKING:

Plates shall be transported suitably to avoid damage during transit.

For plates below 10 mm thick, each pile (preferably of 16 mm plates) and each plate 10 mm thick and over shall be marked with Melt No., AA 101 22, BHEL Order No, Supplier’s Name, Identification No, Size & weight, on any one corner and encircled with paint preferably of white colour.

15.0 REFERRED STANDARDS (Latest Publications including amendments):

| | | |
|-----------------|-------------------|-----------------|
| 1. IS : 1608 | 2. IS: 2062 | 3. DIN EN 10025 |
| 4. DIN EN 10029 | 5. DIN EN 10045-1 | 6. AA 085 01 20 |
| 7. ASTM A435 | 8. EN10160 | 9. IS: 1757 |