	CORPORATE PURCHASING SPECIFICATION	AA 101 15
		Rev. No. 09
		PREFACE SHEET

COLD ROLLED CARBON STEEL SHEET, ANNEALED-DRAWING

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

Comparable Standards:

1.	INDIAN	:	IS: 513-1994 Gr: D (Drawing) Quality : Killed/Semi Killed Temper : SP-Annealed, skin passed Surface finish : Matt (Medium or dull) Surface type : Best
2.	GERMAN	:	DIN 1623-1983, Part 1, Gr: RRSt-13.03, Surface finish 'm'

Suggested/Probable Suppliers And Grades:

1.	M/s SAIL	:	IS : 513, Gr:D, Killed/Semi Killed. Temper : SP-annealed & Skin passed, Matt (Medium or dull finish) Best surface

User Plant References:

1. BHOPAL	:	BP 101 15
2. HEEP, HARDWAR	:	0500.003
3. HYDERABAD	:	HY 021 02 99
4. TIRUCHY	:	BM-CQ 10-Part 1

Revisions : **Cl: 27.6.8 of MOM of MRC-S&GPS**			**APPROVED :** **INTERPLANT MATERIAL RATIONALISATION COMMITTEE-MRC (S&GPS)**		
Rev. No. 09	**Amd.No.**	**Reaffirmed**	**Prepared**	**Issued**	**Dt. of 1st Issue**
Dt:15.06.2005	**Dt :**	**Year :**	**BHOPAL**	**Corp. R&D**	**JULY, 1976**

COLD ROLLED CARBON STEEL SHEET, ANNEALED - DRAWING

1.0 GENERAL:

This specification governs the quality requirements of Cold Rolled Carbon Steel Sheet/Coil of drawing quality, Annealed and skin passed condition. Sheets having thickness of 0.40 to 3.15 mm (both inclusive) and widths upto 1250 mm are covered in this specification.

2.0 APPLICATION:

Suitable for Drawing/ Welding..

3.0 CONDITION OF DELIVERY:

Sheets/Coils : 0.40 mm to 3.15 mm thick, cold rolled, descaled and oiled sheet/coil shall be supplied in fully annealed and skin passed condition. The size, weight and packing of the coils/sheets shall be as agreed to between the manufacturer and BHEL for indigenous material. For imported material, it shall comply with clause 14.0.

Sheets shall be supplied in straight lengths or in coils as specified in BHEL order.

Sheets shall be flat and the edges cleanly sheared and truly squared to the specified dimensions.

Oils used for rust prevention shall be free from pungent smell. The following oils are suggested :

a) SERVO RP 125 of M/s. IOC.

b) RUSTOP 387/388 of M/s. HPC

c) Bharat TCPF of M/s. Bharat Petroleum

d) Any other TRP conforming to IS : 1154

Sheets shall have a matt surface finish and best surface appearance.

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

4.1 Material shall comply with the requirements of IS:513-1994,
Gr:D-Drawing, Temper: SP-Annealed & Skin passed;
Quality; killed/semi killed; Surface type - Best;
Surface finish : Matt.

4.2 Material offered to DIN 1623-1983, Part 1, Gr : RRSt-13.03, (Material No. 1.0347) Surface appearance: Best surface - 05, Surface finish : Matt 'm', is also acceptable.

4.3 The tolerance on dimensions shall comply with DIN : 1541.

5.0 DIMENSIONS AND TOLERANCES:

5.1 Sizes:

Cold rolled carbon steel sheets/coils shall be supplied to the dimensions specified in BHEL order.

5.2 Tolerances:

The tolerances on sheets and coils shall comply with IS : 513 as detailed below:

5.2.1 Thickness:

Tolerances on thickness of sheets

Nominal thickness, mm	Tolerance for nominal widths upto 1250 mm
-- 0.40	± 0.04
Above 0.40 up to 0.60	± 0.05
Above 0.60 up to 0.80	± 0.06
Above 0.80 up to 1.00	± 0.08
Above 1.00 up to 1.25	± 0.09
Above 1.25 up to 1.60	± 0.11
Above 1.60 up to 2.00	± 0.12
Above 2.00 up to 2.50	± 0.14
Above 2.50 up to 3.15	± 0.16

5.2.2 Width:

Width	Tolerance
Upto & Incl. 1250 mm	+ 7 mm - 0
Above 1250 mm	+ 10 mm - 0

5.2.3 Length:

Up to and incld. 2000 mm	+ 15 mm - 0
Over 2000 mm	+ 0.75 percent of length - 0

5.2.4 Camber:

Camber is the greatest deviation of a side edge from a straight line, the measurement being taken on the concave side with a straight line. Camber tolerances are as specified below:

Coils - 20 mm in any 5000 mm length

Cut lengths - 0.4% x length.

5.2.5 Out-of Square Tolerance (for cut lengths) :

1 percent of the width.

(Out-of squareness is the greatest deviation of an edge from a straight line drawn at a right-angle to the other edge of the sheet, touching one corner and extending to the opposite edge).

6.0 MANUFACTURE :

Steel shall be manufactured by open-hearth, electric, basic oxygen or a combination of these processes.

Material shall be manufactured from semi killed/killed steel, preferably aluminum killed.

Rimmed steel is not acceptable.

7.0 FINISH:

Material shall have a medium or dull finish. Pores, roll marks or scratches which do not impair uniform appearance of the finished product are permissible. The sheets shall be free from waviness and the surface shall be ideal for spray painting.

8.0 HEAT TREATMENT :

Sheets and coils shall be fully annealed and skin passed.

9.0 FREEDOM FROM DEFECTS :

The material shall be free from harmful defects such as scale, rust, blisters, laminations, pitting, cracked edges, etc.

10.0 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	Melt analysis, percent, max.	Permissible variation percent, max.
Carbon	0.12	0.02
Manganese	0.50	0.03
Sulphur	0.040	0.005
Phosphorus	0.040	0.005

11.0 TEST SAMPLES:

One bend test and hardness test shall be carried out from each lot of 5,000 kg of material or part thereof, per melt per consignment.

Where material of more than one thickness are rolled from the same melt, one additional bend test shall be made for each thickness.

Test pieces shall be cut so that the axis of the bend is parallel to the direction of rolling, viz., transverse direction.

12.0 MECHANICAL PROPERTIES :

12.1 Bend Test :

The test piece shall be capable of being bent cold through 180^0 close without showing sign of cracks or fracture on the outer convex surface.

Bend test shall be carried out in accordance with IS : 1599.

12.2 Hardness (VICKERS) :

When tested as per IS : 1501, the test pieces shall show a Vickers hardness as given below:

Upto & Incl. 1.25 mm, thick	:	115 HV, max.
Above 1.25 mm, thick	:	125 HV, max.

13.0 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 dispatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information:

AA 101 15, Rev 09/IS:513 Gr:D/DIN 1623 Gr: RRSt 13.03 m,

BHEL Order No,

Melt No,

Size and Quantity,

Results of Chemical analysis and Mechanical tests,

Supplier's name,

Identification No

TC No,

Signature of Competent authority, etc..

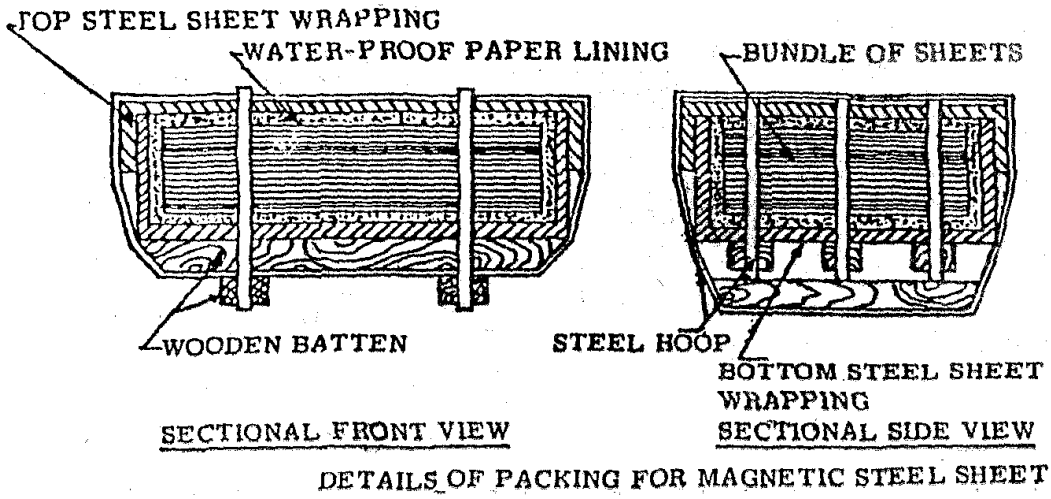
14.0 PACKING :

14.1 Packing:

Sheets and Coils shall be suitably packed in bundles to prevent corrosion and damage during transit.

Recommended packing for imported material shall be as shown below. However, other methods of packing is also acceptable if prior agreement of BHEL is obtained in writing by the manufacturer.

14.2 **Sheets :**



DETAILS OF PACKING FOR MAGNETIC STEEL SHEET

Note:

a) Water proof paper lining shall be preferably Volatile Corrosion Inhibitor (V.C.I.) Coated Paper with an additional polythene (100 micron) enveloped.

b) Approximate weight of each bundle shall be 2 to 3 tonnes. Bundle weighing 2 metric tonnes is however preferred.

14.3 **Coils:**

The material shall be supplied in coils of continuous strip. The nominal weight of each coil shall be 1800 - 2000 kg.

The nominal internal diameter of coil shall be 500 mm.

Sheet shall be protected to prevent damage and rusting during transit.

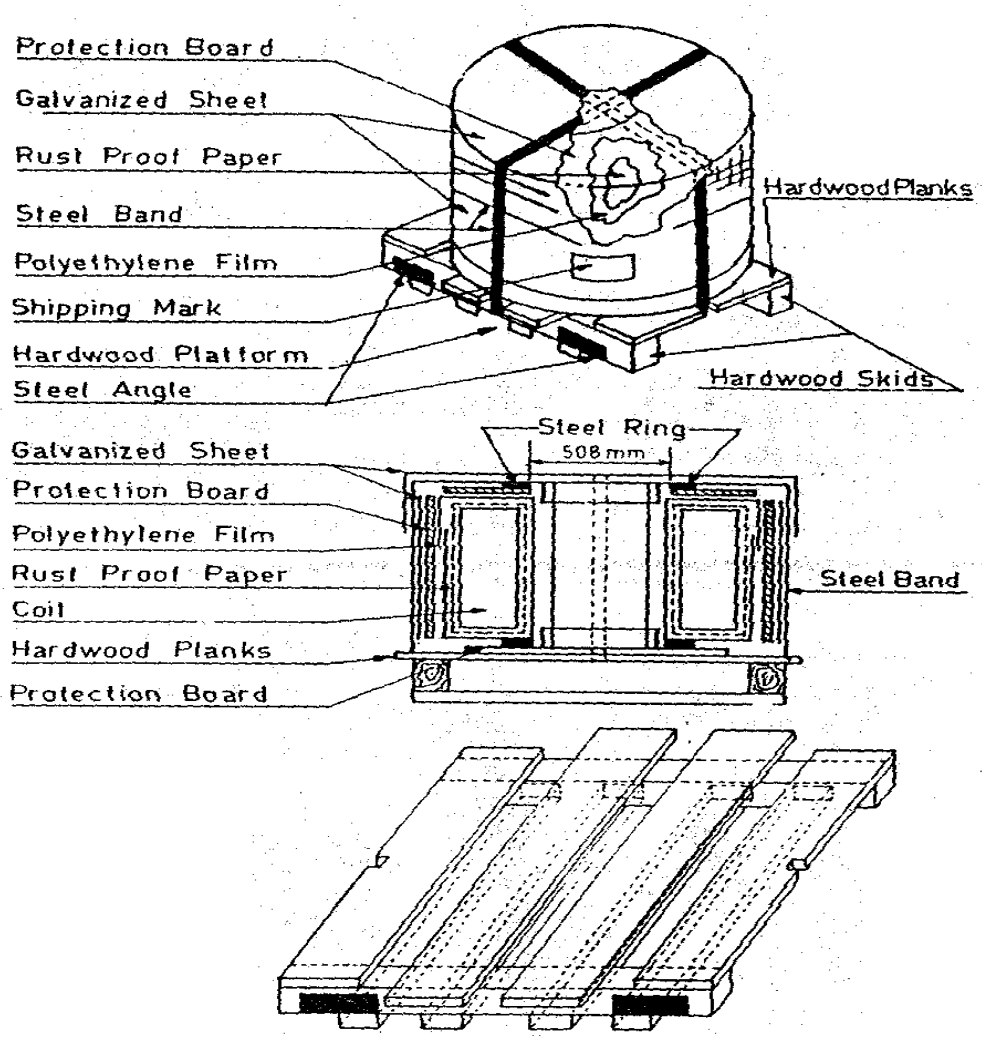
Sheet shall be vertically packed according to the instructions and drawings given below:

a) An annular protection board shall be placed at either end of the coil.

b) The coil should then be wrapped with waterproof anti-rust proof paper by lapping axially all around the circumference.

c) The coil shall then be covered by polythylene sheet or anti-rust waterproof paper and the ends sealed properly.

d) A galvanized sheet shall be wrapped on the outside of the coil and the top and bottom of the coils. Care shall be taken to ensure that the ends of the top and bottom of the coils extend sufficiently over the inside diameter of the coil.



e) A galvanized sheet shall be wrapped on the inside of the coil. Care shall be taken that it overlaps sufficiently over the ends of the sheet mentioned in (d) above.

f) Steel ring made from thick angle sheets shall be placed on the rim of the inner diameter at both ends of the coil. The rings shall be held at either ends at four points by steel bands.

g) The coil should then be mounted on wooden skids held together by steel bands. Wooden skids must have cutouts to house the steel bands for tight fit and to avoid slippage.

h) The packing shall ensure that there is no seepage of moisture and the coils reach BHEL in completely rust free condition. It shall be strong enough to withstand handling.

i) Coils shall be sufficiently tight-wound to prevent collapse to an extent that would preclude their being mounted on a mandrel appropriate to the ordered internal diameter.

j) Each package should indicate the , Sling Position, for lifting without damage. It is preferable to fix a suitable size of, 'Sheet Steel Angle', at the position where the Sling Rope is to be fitted to avoid slippage/damage/breakage of the wooden skid at four places.

15.0 MARKING:

A metal label shall be securely attached to each bundle and shall bear the following information :

AA 101 15
BHEL Order No,
Supplier's Name and Identification No,
Melt No,
Size and Weight.

16.0 REFERRED STANDARDS (Latest Publications Including Amendments) :

1. IS : 513	2. IS : 1154	3. IS : 1501
4. IS : 1599	5. DIN : 1541	6. DIN : 1623, Part 1

GENERAL INFORMATION FOR CALCULATION
(NOT TO FORM ACCEPTANCE CRITERION)

Tensile strength	:	270 - 410 N/mm^2
Yield strength	:	280 N/mm^2, max.
Elongation on 5.65 √So gauge length	:	23 percent, min.