

**CORPORATE PURCHASING SPECIFICATION**

AA 103 04

Rev. No. 04

PREFACE SHEET

SPRING STEEL STRIP AND PLATE - ANNEALED

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

Comparable Standards:

1. **INDIAN** : IS : 2507- 1975, Gr.: 6 (80C6) ,
annealed - for strips only
2. **BRITISH** : BS 1449-Sec. 1.15-1991, Gr.:CS80,
Annealed, BR-Bright finish

Suggested/Probable Suppliers And Grades:

Refer plant vendors list.

User Plant References:

1. BHOPAL : PS 10304
2. HEER, HARDWAR : 0500.027
3. TIRUCHY : BM – SP1

Revisions :

Cl. 26.6.23 of MOM of MRC-S&GPS

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

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Corp. R&D

AUGUST, 1976



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SPRING STEEL STRIP AND PLATE - ANNEALED

1.0 GENERAL:

This specification governs the quality requirements of Spring steel strip and plate, annealed.

2.0 APPLICATION:

For manufacture of springs.

3.0 CONDITION OF DELIVERY:

Strips (upto 5mm thick) : Cold rolled, annealed with polished surface.

Plates (above 5mm thick) : Hot rolled, annealed.

Mill edges are not acceptable.

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

The material shall comply with the requirements of the following National standard and also meet the requirements of this specification.

For strips:

IS : 2507 - 1975 : Cold rolled steel strips for springs
Gr: 6 (80C6), annealed

For plates:

BS 1449, sec 1.15-1991 : Steel plates, sheet and strips
Gr.:CS 80, annealed

5.0 DIMENSIONS AND TOLERANCES :

5.1 Sizes:

Material shall be supplied to the dimensions as specified in BHE L order.

BHEL order shall clearly state, whether the strip shall be supplied in coils or in straight lengths.

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**5.2 Tolerances:****5.2.1 Thickness:**

Tolerances on thickness of material shall be as specified below. The thickness of the material shall be measured at a position not less than 10 percent of the ordered width from the edge for widths the position of measurement of thickness higher widths the position of measurement of thickness shall be not less than 10mm from the edge. The variation in thickness of material across the width shall not exceed half the total tolerances given in table -2 of IS:2507 (Refer: Table1 - Annexure).

5.2.1.1 Tolerance on Thickness:**Strips (For thickness upto and including 5mm) :**

Shall comply with Table-2 of IS:2507. (Refer: Table 1 - Annexure).

5.2.1.2 Plate (for thickness over 5mm upto and including 10mm):

Shall be $\pm 5\%$ of the thickness of the plate.

5.2.2 Width:

Shall comply with Table-3 of IS:2507. (Refer Table-2, Annexure).

5.2.3 Flatness (for cut lengths) of strip:

Material when supplied shall be reasonably flat. When a 5 metre length of strip is allowed to lie on a flat surface by its own weight, no part of the strip shall lift more than 5 mm from the flat surface. For this purpose, rise should be measured from the flat surface. For this purpose, rise should be measured from the surface nearer to the flat surface.

5.2.4 Edge camber of strip:

Edge camber (that is, lateral departure of the edge of the material from straight line forming a chord) shall not exceed the tolerances given in Table-4 of IS:2507. (Ref:Table 3-Annexure).

6.0 MANUFACTURE:

Steel shall be manufactured by the open-hearth, electric, basic oxygen or a combination of these processes. If any other process is employed, prior approval of BHEL shall be obtained.

The material shall be manufactured from killed steel.

7.0 FREEDOM FOR DEFECTS :

Steel shall be free from defects such as scale, rust, blisters, laminations, cracked edges, etc.

Decarburisation shall not exceed 3 percent at any point of the material.

**8.0 CHEMICAL COMPOSITION :**

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

<u>Element</u>	<u>Melt analysis, percent.</u>		<u>Permissible variation, percent, max</u>
	Min	Max	
Carbon	0.75	0.85	± 0.03
Silicon	0.10	0.35	± 0.03
Manganese	0.50	0.80	± 0.04
Sulphur	--	0.050	+ 0.005
Phosphorus	--	0.050	+ 0.005

9.0 TEST SAMPLES:

One sample product shall be taken from each melt for chemical analysis.

For mechanical tests, selection and preparation of samples and test pieces shall be in accordance with IS:3711. Test pieces shall be taken in the rolling direction.

10.0 MECHANICAL PROPERTIES :

When tested in accordance with IS:1501, the material shall show a Vickers hardness of 220 HV, max.

11.0 RESPONSE TO HEAT TREATMENT:

Material shall be capable of responding to the heat treatment specified below and must achieve a Vickers hardness in the range of 350 – 425 HV.

Harden in oil from a temperature of 780 – 810⁰ C.

Temper at a suitable temperature between 430 - 510⁰C .

12.0 TEST CERTIFICATES :

Three copies of test certificates shall be supplied, unless otherwise stated on the order. In addition, to the above, 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:

AA 103 04, Rev. No. 04: Spring steel strip and plate, annealed

BHEL order No,

Supplier's Reference :

Name

Identification No.

Melt No.

Results of Tests :

Dimensional inspection

Results of Chemical and Mechanical tests.

**13.0 PROTECTIVE COATING**

The material shall be adequately coated with rust preventive oil/compound.

14.0 PACKING AND MARKING :

Strips shall be supplied in coils or in bundles of cut lengths, as specified in the order, in packages each weighing not more than 3,000 kg.

Material shall be packed in water proof-paper of polythene lined hessian cloth and securely tied round with hoop iron and with wooden battens underneath to prevent the material from corrosion and damage during transit.

Plates upto 10mm thick, each pile (preferably of 16 plates) shall be marked with the following:

A metal label shall be securely attached to each bundle/package and shall be marked with Melt No., AA 103 04; BHEL order No.; Suppliers name/Identification No.; size; weight; etc. on any one corner and encircled with the paint preferably of white colour.

15.0 REFERRED STANDARDS (Latest Publications Including Amendments):

1. IS: 1501

2. IS : 2507

3. IS:3711

4. BS:1449, Sec. 1.15

ANNEXURE

TABLE - 1 (Cl: 5.2.1 & 5.2.1.1)

TOLERANCES ON THICKNESSES OF STEEL STRIPS

THICKNESS,* mm	TOLERANCE FOR WIDTHS, mm				
	Up to and Including 100	Above 100 Up to and including 125	Above 125 Up to and including 250	Above 250 Up to and including 400	Above 400 Up to and including 650
0.10	±0.01	±0.01	-	-	-
0.15	±0.01	±0.01	±0.02	±0.02	±0.02
0.20	±0.02	±0.02	±0.02	±0.02	±0.03
0.25	±0.02	±0.02	±0.02	±0.03	±0.03
0.30	±0.02	±0.02	±0.03	±0.03	±0.03
0.40	±0.02	±0.03	±0.03	±0.03	±0.04
0.50	±0.03	±0.03	±0.03	±0.04	±0.04
0.60	±0.03	±0.03	±0.04	±0.04	±0.05
0.80	±0.03	±0.04	±0.05	±0.05	±0.05
1.00	±0.04	±0.04	±0.05	±0.06	±0.06
1.25	±0.04	±0.05	±0.06	±0.06	±0.07
1.50	±0.05	±0.05	±0.06	±0.07	±0.08
1.80	±0.05	±0.06	±0.07	±0.08	±0.08
2.00	±0.06	±0.06	±0.07	±0.08	±0.09
2.50	±0.06	±0.07	±0.08	±0.09	±0.10
3.00	±0.07	±0.08	±0.09	±0.10	±0.11
3.55	±0.08	±0.09	±0.10	±0.11	±0.12
4.00	±0.08	±0.09	±0.11	±0.12	±0.13
5.00	±0.09	±0.10	±0.13	±0.14	±0.15

* When intermediate thicknesses are specified, the tolerance of the next larger thickness step is applicable.



TABLE-2 (Cl: 5.2.2)

TOLERANCES ON WIDTH							
NOMINAL THICKNESS, mm	TOLERANCE ON NOMINAL WIDTH, mm						
	Up to and Including 100	Above 100 Up to and Including 125	Above 125 Up to and Including 250	Above 250 Up to and Including 320	Above 320 Up to and Including 400	Above 400 Up to and Including 500	Above 500 Up to and Including 600
For Mill Edges:							
0.10 to 5.0	±1.5	±1.6	±2.2	±2.5	±3.3	±4.4	±6
For Sheared Edges:							
0.10 to 0.6	±0.15	±0.2	±0.25	±0.3	±0.4	±0.5	±0.6
0.61 to 1.0	±0.2	±0.25	±0.3	±0.35	±0.45	±0.55	±0.65
1.01 to 2.0	±0.25	±0.3	±0.4	±0.5	±0.6	±0.7	±0.8
2.01 to 3.0	±0.3	±0.4	±0.5	±0.6	±0.7	±0.85	±1.0
Above 3	Subject to agreement						

TABLE - 3 (Cl: 5.2.4.)

TOLERANCES ON EDGE CAMBER					
SPECIFIED WIDTH, mm		SPECIFIED THICKNESS, mm		MAXIMUM TOLERANCE ON EDGE CAMBER IN ANY 2000mm LENGTH, mm	
Over	Up to and Including	over	Up to and Including	Cold-Rolled Unhardened	Hardened and Tempered
-	50	-	2	10	2
-	50	2	-	13	3
50	250	-	2	6.5	2
50	250	2	-	13	3
250	600	-	2	6.5	2
250	600	2	-	13	3