



**PRODUCT STANDARD**  
SWITCHGEAR ENGINEERING DIVISION

SG 12730 Rev.No.:01

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**GLASS FILLED NYLON MOULDINGS**

**1. GENERAL**

This specification governs the quality of glass filled Nylon mouldings made from Nylon 66 based 30 % glass fiber reinforced flame retardant grade Engineering plastic materials to Drg. No.: 35211001623 & 45211001539.

**2. APPLICATIONS**

These mouldings are used as insulating shrouds for isolating contact assy. and bus bar joints etc in medium voltage switchgear panels.

**3. COLOUR**

The-colour of mouldings shall be as specified on item drawing.

**4. PROPERTIES**


Important properties are as following:

PROPERTY	UNIT	TEST METHOD	VALUE
<b><u>PHYSICAL</u></b>			
Specific gravity	-	ASTM-D792	1.3 to 1.5
Glass content	% by weight	-	25 to 30
Water absorption	%	ASTM-D570	0.5 max
<b><u>FLAMMABILITY</u></b>			
Flame Class	Class	UL94	Vo
<b><u>ELECTRICAL</u></b>			
Dielectric strength	kV/mm	ASTM-D149	> 24

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REV.	01	PRINTS TO :-		APPROVED –		
ALTD.	NB	QCX (SCR)	1	<b>R.K. SHUKLA</b>		
APPD.	RKS	PD&D	1	PREPARED	ISSUED	DATE
DATE.	28-07-2000	SWM(PLNG)	1	SMM	BPN	31-08-1995

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		PROPERTY	UNIT	TEST METHOD	VALUE	
		Volume resistivity	Ohm-cm	ASTM-D257	> 10 <sup>14</sup>	
		Surface resistivity	Ohm	ASTM-D257	> 10 <sup>12</sup>	
		Comparative Tracking Index	-	IEC 112-1979	> 600	
		Arc Resistance	Sec	ASTM-D495	> 180	
<div>COPYRIGHT AND CONFIDENTIAL</div> <div>The information on this document is the property of Bharat Heavy Electricals Limited It must not be used directly or indirectly in any way detrimental to interest of Co.</div>		<b>MECHANICAL</b>				
		Tensile strength	Mpa	ASTM-D638	> 100	
		Flexural strength	Mpa	ASTM-D790	> 130	
		Impact strength	Kg cm/cm	ASTM-D256A	> 6	
		<b>THERMAL</b>				
		Melting point	Deg. C	ASTM-D2117	> 215	
		5. FINISH :				
		The mouldings shall be smooth and free from surface imperfections and blowholes.				
		6. ACCEPTANCE CRITERION :				
		<div><div>- Six no. samples in size 3tk x 150 mm x150 mm moulded from the same batch and in the same manner as the mouldings consignment concerned, shall be supplied for testing and approval at BHEL works. After approval &amp; establishment of material for initial two lots of supplies, test values of properties glass content, water absorption, dielectric strength and flammability as stated in Para 4 shall be met with for acceptance of the lot.</div><div>- Power frequency high voltage withstand test of 40 kV rms for one minute shall be conducted on min. five no samples per lot of the item.</div></div>				
7. IDENTIFICATION :						
Supplier shall emboss following markings at location (*) shown on drawings :						
<div><div>- Suppliers name or logo.</div><div>- Mfg. date or production batch no.</div></div>						



# CORPORATE PURCHASING SPECIFICATION

AA10108

Rev No. 11

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## STRUCTURAL STEEL-STANDARD QUALITY (PLATES, SECTIONS, STRIPS, FLATS & BARS)

### (ORDERING DESCRIPTION)

#### 1.0 GENERAL:

This specification governs the quality requirements of structural steel plates, strips, flats, bars and sections such as angles, beams, channels and tees etc. of IS: 2062 – 2011, Gr: E250, Quality A

#### 2.0 APPLICATION:

For general engineering purpose.

#### 3.0 CONDITION OF DELIVERY:

Plates, Bars & Sections: Hot rolled in straight lengths without twists & Bends

#### 4.0 COMPLIANCE WITH NATIONAL STANDARDS:

Material shall comply with the requirements of IS: 2062 – 2011, Gr: E250, Quality A

Material offered to EN 10025-2:2004 Gr. S275JR is also acceptable. The tolerance on dimensions for plates shall comply with EN 10029.

#### 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.

##### 5.2 Tolerances:

5.2.1 The tolerances on hot rolled material shall comply with IS: 1852. However, no plate shall be under the specified thickness at any point.

Revisions:  
As per Cl. No. 38.1 of MOM of MRC-S&GPS

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

Rev No.11	Amd No.	Reaffirmed	Prepared	Issued	Dt. of 1 <sup>st</sup> Issue
Dt:22-02-2014	Dt:	Year:	HPEP, Hyderabad	Corp.R&D	July, 1976

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## 5.2.2 Straight for hot rolled bars:

Unless otherwise specified, the permissible deviation in straightness shall not exceed 5 mm in any 1000 mm length.

## 6.0 HARDNESS (BRINELL):

When tested in accordance with IS: 1500, the material shall show a brinell hardness in the range of 120-156 HB.

Note: Hardness test shall be conducted only when tensile test cannot be performed.

## 7.0 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.

AA10108 Rev.11 / IS:2062 Grade: E250 Quality A / EN 10025-2 Gr. S275JR,

BHEL order no., Melt no. Size, Results of chemical analysis and Mechanical tests, Supplier's name, Identification no. TC no., Signature of competent authority etc.

## 8.0 PACKING AND MARKING:

Plates shall be transported suitably to avoid damage during transit.

For plates below 10 mm thick, each pile (preferably of 16 plates) and each plate 10 mm thick & over shall be marked with melt no. AA10108, BHEL order no., Supplier's name, Identification no., Size & weight on any one corner and encircled with paint preferably of white colour.

## 9.0 REFERRED STANDARDS (Latest publications including amendments):

1) IS: 1500

2) IS: 1852

3) EN 10029



## CORPORATE PURCHASING SPECIFICATION

AA10112

Rev No. 07

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## BRIGHT STEEL BARS AND SECTIONS (STANDARD QUALITY)

## 1 GENERAL:

This specification governs the quality requirements of Bright Steel Bars and Sections of standard quality, such as I-beams and equal angles required in very small sections.

## 2 APPLICATION:

Bars are used in the manufacture of threaded and machined components for general engineering purposes. Sections are used as stator spacer plate vents in generators.

## 3 CONDITION OF DELIVERY:

## 3.1 Round Bars - Class 4, surface quality.

Up to 50 mm diameter - Cold drawn.

Above 50mm diameter - Cold drawn or Hot rolled, turned and polished

## 3.2 Rectangular/Square/Hexagonal Bars - Class 3, surface quality.

All sizes - Cold drawn.

## 3.3 Sections - Class 4, surface quality.

All sizes - Cold drawn

## 3.4 Bars and sections shall be straight, with their ends sheared, square and true and shall have a smooth surface.

## 3.5 The bars and sections shall be given a clear temporary rust preventive (TRP) coating to avoid corrosion during transit and storage.

Black TRP coating is not acceptable.

Clear TRP used shall be free from pungent smell.

The following clear TRP's are suggested:

- Servo RP 150 - M/s Indian Oil Corporation
- HE - 1612 - M/s. BHEL, Bhopal
- Rustilo DW-901 - M/s. Indrol Lubricants and Specialties Ltd.
- Rustpro Special - M/s. Tide water oil co.
- Any other clear TRP conforming to IS: 1154

## 4 COMPLIANCE WITH NATIONAL STANDARDS:

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

IS: 9550-2001 : Bright steel bars

## Revisions:

CI 27.2.d of MOM of MRC-S&GPS

## APPROVED:

INTERPLANT MATERIAL RATIONALISATION  
COMMITTEE – MRC(S&GPS)

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Prepared  
HEP, Bhopal

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**CORPORATE PURCHASING SPECIFICATION****5 DIMENSIONS AND TOLERANCES:****5.1 Sizes:**

Bars shall be supplied to the dimensions specified in BHEL order.

**5.2 Tolerances:****5.2.1 Rectangular/Square/Hexagonal/Flat Bars:**

Unless otherwise specified, tolerances on dimensions shall be as follows:

For drawn round bars and turned bars h10 to table 2 of IS:9550

For hexagonal and square drawn bars upto and including 80mm h11 and above 80mm h12 according to table 2 of IS:9550

For drawn flats in accordance with table 3 and 4 of IS:9550

For ground products in accordance with table 1 and 2 of IS:9550

**5.2.2 Sections:**

As specified in BHEL order/drawing.

**5.3 Length:**

Bar and sections shall be supplied in lengths of 2.5 to 4.5 meters with maximum 10% of shorts of not less than 1.5 meters.

**5.4 Straightness:**

Unless otherwise agreed to, the permissible deviation shall not exceed 1.5mm in any one meter length. Bars and sections shall be free from twists and bends.

**6 MATERIAL:**

The rolled bars used for purpose of producing the bright bars shall be such, so as to ensure freedom from segregation, piping and other harmful defects.

**7 MANUFACTURE:**

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

**8 FREEDOM FROM DEFECTS:**

All finished steel bars and section shall be sound and free from internal and surface defects. They shall be bright and clean.

**9 SURFACE CONDITION:****9.1 Round Bars and Sections:**

Shall be entirely free from cracks and other surface defects.

**9.2 Rectangular/Square/Hexagonal Bar-Type '3' Finish:**

Shall comply with IS: 9550, Class 3 of table 5.

**10 CHEMICAL COMPOSITION:**

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

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Element	Melt analysis percent, max	Permissible variation percent
Carbon	0.25	± 0.02
Sulphur	0.040	+ 0.005
Phosphorus	0.040	+ 0.005

### 11 TEST SAMPLES:

One sample for chemical and tensile test shall be selected from finished steel for every 20,000 kg or part thereof, with a minimum one per heat.

### 12 MECHANICAL PROPERTIES:

When tested in accordance with IS:1608, the test pieces shall show the following properties:

#### 12.1 Rectangular/Square/Hexagonal/Section - Cold Drawn:

Tensile Strength : 440 N/mm<sup>2</sup>, min

Elongation on  $5.65\sqrt{S_0}$  gauge length : 8 – 20%

#### 12.2 Round Bars:

##### 12.2.1 Bars upto 50mm Diameter – Cold Drawn

Tensile Strength : 440 N/mm<sup>2</sup>, min

Elongation on  $5.65\sqrt{S_0}$  gauge length : 8 – 20%

##### 12.2.2 Bars above 50mm Diameter:

Cold drawn or hot rolled, turned and polished.

Property	Hot rolled, turned and polished	Cold drawn
Tensile strength, min.	: 410 N/mm <sup>2</sup>	440 N/mm <sup>2</sup>
Elongation on $5.65\sqrt{S_0}$ gauge length	: 23%, min	OR 8-20%

### 13 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:

AA10112; Rev. No. 07 :

BHEL order No,

Supplier's Reference:

Name

Identification No.

Melt No.

Results of Tests:

Dimensional inspection.

Results of Chemical analysis and mechanical tests.

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**CORPORATE PURCHASING SPECIFICATION****14 PACKING AND MARKING**

The material shall be suitably packed in bundles – polythene wrapped to prevent sagging, corrosion and damage during transit. A suitable clear temporary rust preventive shall be applied all the bars as per clause 3.5 above and finally dispatched in wooden boxes.

Each bar over 50mm shall be stamped at one end with 'AA10112'. Bars 50mm and below shall be bundle together and tied with wire at 3 to 4 places along the length of the bar.

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

AA10112: BRIGHT STEEL BARS AND SECTIONS (STANDARD QUALITY)

BHEL Order No.

Consignment/Identification No.

Melt No.

Size and Weight.

Supplier's Name.

**15 REFERRED STANDARDS** (Latest Publications Including Amendments):

- 1) IS: 1154                      2) IS: 1608                      3) IS: 9550





# CORPORATE PURCHASING SPECIFICATION

AA10113

Rev No. 07

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## HOT ROLLED CARBON STEEL SHEET (330 N/mm<sup>2</sup> Tensile)

### 1.0 GENERAL:

This specification governs the quality requirements of Hot Rolled Carbon Steel Sheet of thickness of 2.5 mm to 4.0 mm (both inclusive).

### 2.0 APPLICATION:

Suitable for cold forming / drawing / fabrication by welding.

### 3.0 CONDITION OF DELIVERY:

Sheets shall be supplied in hot rolled, decaled and oiled condition. Imported sheets shall be supplied in straight lengths. The edges shall be flattened and sheared. Mill edges are not acceptable. Sheets shall be free from waviness and shall have a uniformly dull (matt) finish.

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

- SERVO RP 125 of M/s. IOC.
- RUSTOP 387/388 of M/s. HPC
- Bharat TCPF of M/s. Bharat Petroleum
- Any other TRP conforming to IS : 1154

### 4.0 COMPLIANCE WITH NATIONAL STANDARDS:

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

IS: 5986 – 2011, Gr.: 205: Hot rolled steel flat products for structural forming and flanging purposes - Specification.

### 5.0 DIMENSIONS AND TOLERANCES:

#### 5.1 Sizes:

Hot rolled carbon steel sheets shall be supplied to the dimensions in BHEL order.

#### 5.2 Tolerances:

The tolerances on sheets shall comply with the following:

##### 5.2.1 Thickness (IS: 1852):

Thickness, mm	Tolerance, mm
2.50	± 0.20
3.15	± 0.22
4.0	± 0.25

#### Revisions:

As per Cl.No.38.1 of MOM of MRC– S&GPS

#### APPROVED:

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HEP, Bhopal

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## 5.2.2 Width (IS: 1852):

Width, mm	Tolerance, mm
Upto & incld. 1250 mm	+ 6 mm - 0 mm
Over 1250 mm & upto and incld.1550 mm	+ 0.5 percent - 0.0 percent
Over 1550 mm	+ 0.6 percent - 0.0 percent

## 5.2.3 Length (Continuous mill) IS: 1852:

Length, mm	Tolerance, mm
Upto & incld. 2500 mm	+ 25 mm - 00 mm
Over 2500 mm	+ 1 percent subject to a maximum of 70 mm - 0 percent

## 5.2.4 Flatness (for cut lengths):

Thickness, mm	Width, mm	Flatness tolerance, mm
From 2.5 to 4.0	Upto & incld. 1200	15
	Over 1200 & upto incld. 1500	20
	Over 1500	25

## 5.2.5 Edge camber IS: 5986:

The edge camber (i.e. lateral departure of the edge of the material from a straight line forming a chord) of sheets in cut lengths and coil shall not exceed the following values:

### 5.2.5.1 For Cut Lengths:

Length in meters		Tolerance, mm
Over	Upto & incld.	
--	1.25	5
1.25	1.80	6
1.80	2.50	8
2.50	3.15	10
3.15	3.55	12
3.55	4.00	16
4.00	5.00	19

### 5.2.5.2 For Coils:

25 mm in any 5000 mm length.

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6.0	MANUFACTURE:	
	Process of manufacture is left to the discretion of the manufacturer except Bessemer process.	
	Material shall be manufactured from semi killed or killed steel.	
7.0	FREEDON FROM DEFECTS:	
	The sheets shall be free from harmful defects, twists, buckle, rust, scale and waviness and shall be reasonably smooth, flat and square.	
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	Melt analysis, percent, max.                      Permissible variation, percent, max.
	-----	
	Carbon	0.15

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Tensile strength	: 330 – 440 N/mm <sup>2</sup>
Yield strength	: 205 N/mm <sup>2</sup> , min.
Elongation:	
For sheets up to & Incl. 3 mm, thick	: 20 %, minimum on 80 mm gauge length
For sheets above 3 mm, thick	: 28 %, minimum in 5.65 √So gauge length

## 11.0 HARDNESS (VICKERS):

When tested in accordance with IS: 1501, the material shall show a Vickers hardness in the range of 100 – 140 HV.

**Note:** Hardness test shall be conducted only when tensile test cannot be performed.

## 12.0 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:

AA10113, Rev 07: HOT ROLLED CARBON STEEL SHEET (330 N/mm<sup>2</sup> Tensile)

BHEL Order No,

Supplier's name,

Identification No

Melt No,

Process of manufacture

Details of pickling, descaling and oiling

Results of dimensional inspection

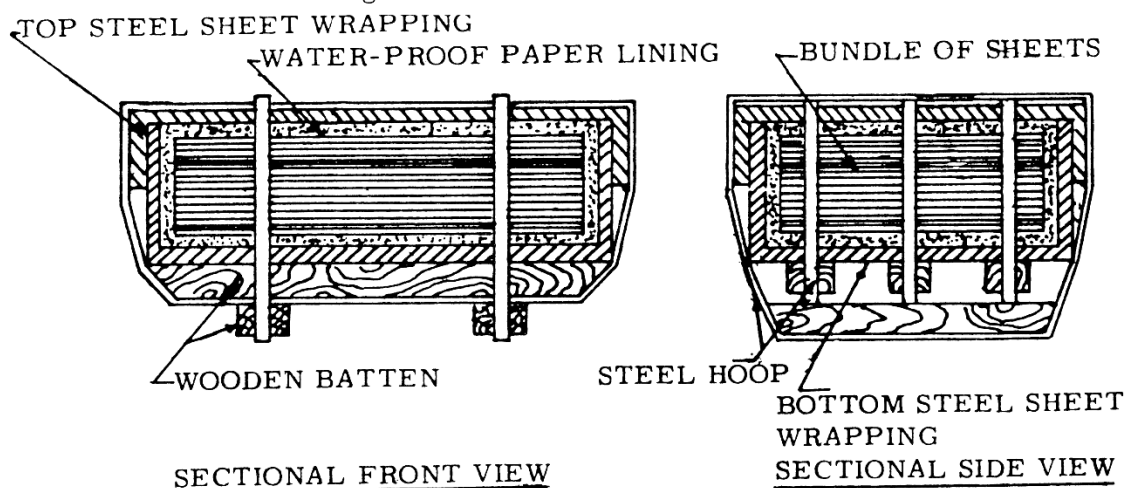
Results of Chemical analysis and Mechanical tests,


**Note:** Material procured, supplied and certified as AA10113 / IS: 5986, Gr.:205 and comply with the requirements of this specification is acceptable.

## 13.0 PACKING AND MARKING:

Steel sheets shall be supplied in bundles and shall be suitably packed in bundles to prevent corrosion and damage during transit.

The recommended packing for imported material shall be as shown below.



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**Note:**

- Water proof paper lining shall be preferably Volatile Corrosion Inhibitor (V.C.I.) Coated Paper with an additional polythene (100 micron) enveloped.
- Approximate weight of each bundle shall be 2 to 3 tonnes. Bundle weighing 2 metric tonnes is however preferred.

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

AA10113:HOT ROLLED CARBON STEEL SHEET (330 N/mm<sup>2</sup> Tensile)  
 BHEL Order No,  
 Supplier's Name & Identification No,  
 Size & Thickness of sheets  
 Weight

**14.0 REFERRED STANDARDS (Latest publications including amendments):**

1) IS: 1154	2) IS: 1501	3) IS: 1852	4) IS: 1599	5) IS: 1608
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## CORPORATE PURCHASING SPECIFICATION

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**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 :


- SERVO RP 125 of M/s. IOC.
- RUSTOP 387/388 of M/s. HPC
- Bharat TCPF of M/s. Bharat Petroleum
- 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.

**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  
BHOPAL****Issued  
Corp. R&D****Dt. of 1st Issue  
JULY, 1976****Dt: 15.06.2005****Dt :****Year :**

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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



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**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



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**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<sup>0</sup> 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.

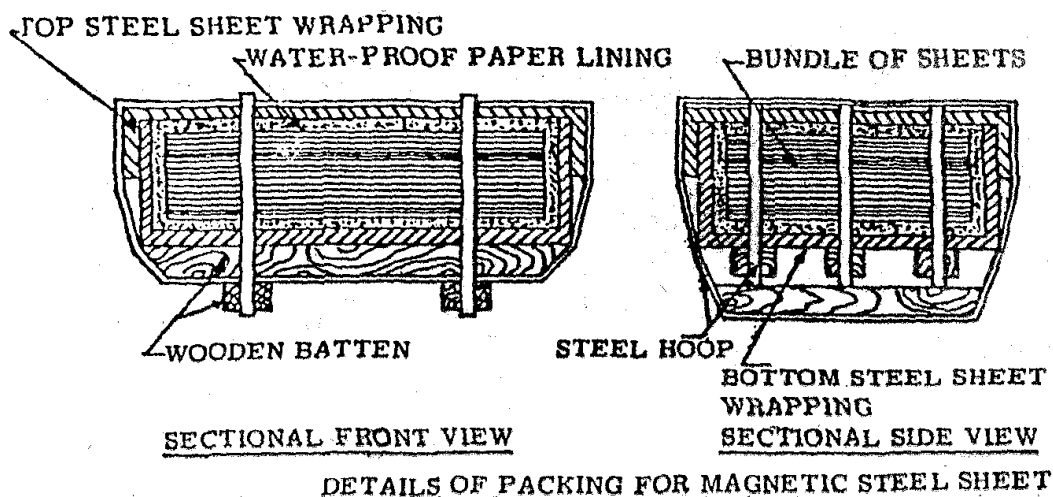


## CORPORATE PURCHASING SPECIFICATION

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14.2 Sheets :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:

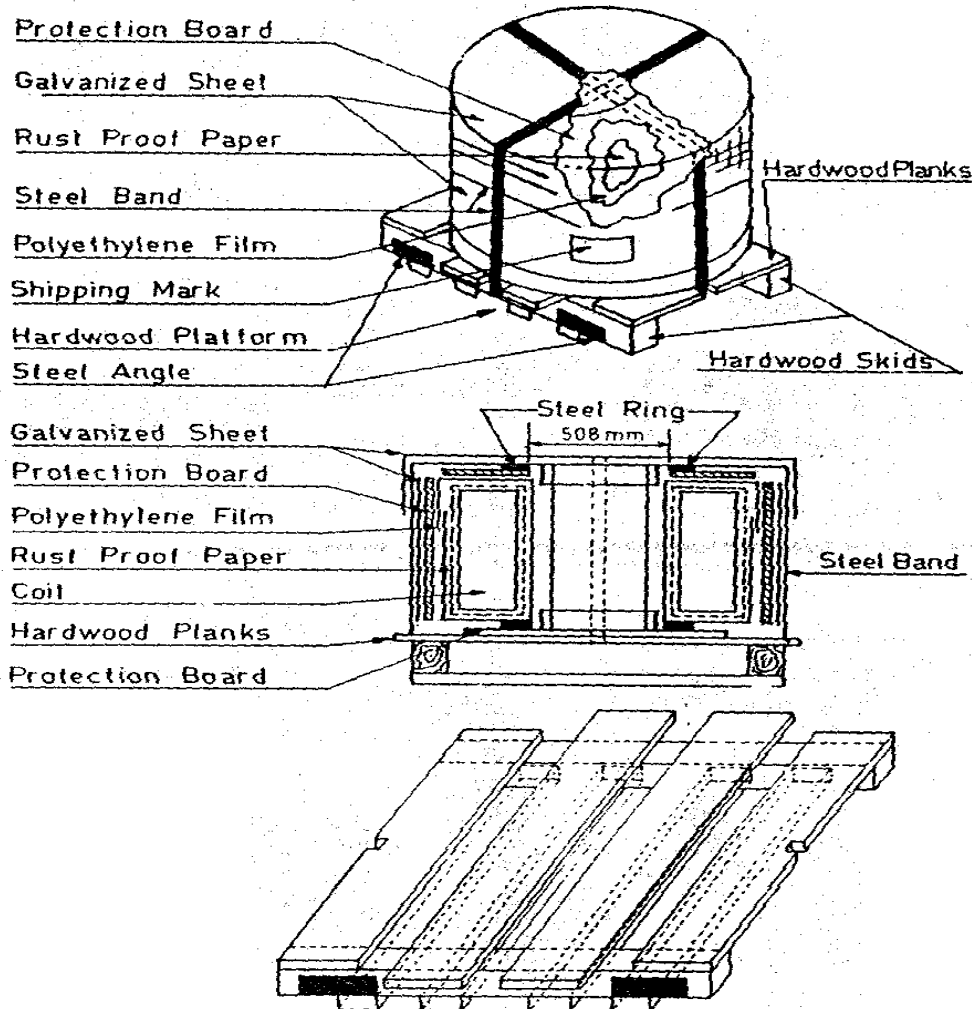
- a) An annular protection board shall be placed at either end of the coil.
- b) The coil should then be wrapped with waterproof anti-rust proof paper by lapping axially all around the circumference.
- c) The coil shall then be covered by polythylene sheet or anti-rust waterproof paper and the ends sealed 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.

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- 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.



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**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)**

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Tensile strength : 270 - 410 N/mm<sup>2</sup>

Yield strength : 280 N/mm<sup>2</sup>, max.

Elongation on 5.65  $\sqrt{S_0}$  gauge length : 23 percent, min.

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	<h1 style="text-align: center;">CORPORATE PURCHASING SPECIFICATION</h1>	AA10301
		Rev No.05
		PAGE 1 of 4

## COLD DRAWN SPRING STEEL WIRE - ZINC COATED

### 1.0 GENERAL:

This specification governs the quality of requirements of Zinc coated cold drawn carbon steel wire.

### 2.0 APPLICATION:

Suitable for the manufacture of cold formed helical springs, spring-rings and wire forms subjected to moderate load cycles-statically stressed.

### 3.0 CONDITION OF DELEVERY;

Wire shall be supplied in the form of coils in Zinc Coated, Cold drawn condition.

### 4.0 Compliance with National Standards:

The material shall comply, in general, with requirements of the following National standards and also meet the requirements of this specification.

IS: 4454, Part 1- 2001, Gr.: SM : Steel wires for mechanical springs.

### 5.0 DIMENSIONS AND TOLERANCES:

#### 5.1 Sizes:

The material shall be supplied to the dimensions specified on BHEL order.

Wires above 0.30 mm and upto and including 20.0 mm in diameter only shall be ordered to this specification

#### 5.2 Tolerances:

**5.2.1** The tolerances of the wire shall comply with Table-4 of IS: 4454, Part-1.

**5.2.2** The cross-section of the round wire shall be circular to within half the tolerance of the permitted diameter tolerance, specified above.

Revisions: Cl. 26.6.22 of MOM of MRC-S&GPS			<b>APPROVED:</b> INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC(S&GPS)		
Rev No.05	Amd No.	Reaffirmed	Prepared HEP, Bhopal	Issued Corp.R&D	Dt. of 1 <sup>st</sup> Issue August, 1976
Dt:15-01-2004	Dt:	Year:2020			

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## 6.0 MANUFACTURE:

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

Material shall be manufactured form killed steel.

The wire shall be drawn in the galvanised condition.

## 7.0 FREEDOM FROM DEFECTS:

The surface of the wire shall be smooth and free from defects such as grooves, seams, pits, die marks, tears, rust, scale, scratches and any harmful defects which may have a noticeable adverse effect on application of the wire.

## 8.0 SAMPLING:

Unless otherwise agreed to method of drawing representative sample of material and criteria for conformity shall be as per Annex. C of IS: 4454, Part 1.

## 9.0 CHEMICAL COMPOSITION:

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

Element	Melt analysis		Permissible variation, percent, in product analysis
	% Min.	% Max.	
Carbon	0.35	1.0	± 0.02
Silicon	0.10	0.30	± 0.03
Manganese	0.30	1.20	+ 0.05
Sulphur	---	0.03	+ 0.005
Phosphorus	---	0.03	+ 0.005
Copper	---	0.20	--

### NOTE:

- i) P + S = 0.055%, max.
- ii) Cu + Ni + Cr = 0.35%, max

## 10.0 ZINC COATING:

Zinc Coating Process (Hot dip galvanising) shall be as per IS: 2629

The final weight of zinc coating shall not be less than 60 gm/m<sup>2</sup> on any size of wire when tested as per IS: 6745

	<h1 style="text-align: center;">CORPORATE PURCHASING SPECIFICATION</h1>	AA10301
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## 11.0 WRAPPING TEST:

The wire shall be bent or wrapped round a mandrel of appropriate diameter given below without cracking of the base wire, or cracking or flaking of the coating to such an extent that any zinc can be removed by rubbing with bare fingers.

Diameter of wire, mm	Minimum complete turns of wrap	Mandrel diameter
3.80 and under	6	4 D*
Over 3.80 up to and incl.7.5	6	5 D
Over 7.5	$\frac{1}{4}$ (one 90° bend )	5 D

\* Diameter of wire = D

## 12.0 MECHANICAL PROPERTIES:

### 12.1 Tensile:

The tensile test shall be carried out in accordance with IS: 1608.

The tensile strength and percentage reduction of area obtained from the test pieces shall comply with those given in Table 5 of IS: 4454, Part 1.

### 12.2 Wrapping:

The wrapping test shall be applicable to wires with nominal diameter less than 3mm. Wrapping test when carried out in accordance with IS:1755 shall not show on visual examination any sign of fracture upon closely coiled for at least four turn around a mandrel of diameter equal to diameter of wire.

### 12.3 Torsion:

For wires of diameter 0.5 mm and up to and including 10.0 mm.

The sample piece of length equal to 100 times the wire diameter, but not exceeding 500mm shall be twisted in accordance with IS: 1717. The test piece shall withstand, without failure, the minimum number of turns given in Table 6 of IS: 4454, Part I. The fracture shall be perpendicular to the wire axis and surface shall not split. Any secondary helical fracture shall be ignored.

### 12.4 Cast of Wire:

As per IS: 4454

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### 13.0 INSPECTION AT SUPPLIER'S WORKS:

Whenever specified tests and inspection are to be conducted in the presence of BHEL's representative.

The supplier shall offer BHEL's representative all reasonable facilities, without charge to satisfy the latter that the material is being furnished in accordance with this specification

The supplier shall prepare and provide necessary test specimens for testing to be carried out at his premises. If facilities are not available at his works, the supplier shall make necessary arrangements for carrying out the prescribed test elsewhere. The supplier shall notify BHEL in advance about the readiness of the material for inspection and testing.

BHEL reserves the right to test the material at BHEL's works and the final acceptance of the material shall be based on these test results.

### 14.0 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:

AA10301: Rev. No. 05: COLD DRAWN SPRING STEEL WIRE - ZINC COATED

BHEL order No:

Supplier's Reference:

Name:

Identification No:

Cast No./Lot No:

Results of Tests:

Results of chemical mechanical and Zinc coating tests.

### 15.0 PACKING AND MARKING:

The wires shall be supplied in coils having a maximum weight of 50kg. The wires shall be coiled in such a way that the coils remain flat when the ties are cut. The coils shall be suitably packed to prevent corrosion and damage during transit.

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

AA10301: COLD DRAWN SPRING STEEL WIRE - ZINC COATED

BHEL Order No:

Consignment/Identification No:

Size and Weight:

Supplier's Name:

### 16.0 REFERRED STANDARDS (Latest publications including amendments):

1) IS: 1608

2) IS: 1717

3) IS: 1755

4) IS: 2629

5) IS: 4454, Part1

6) IS: 6745





## CORPORATE PURCHASING SPECIFICATION

AA 107 21

Rev. No. 07

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## STAINLESS STEEL BARS (MARTENSITIC) Gr:X 20 Cr 13, HARDENED AND TEMPERED

### 1.0 GENERAL :

This specification governs the quality requirements of Stainless Steel Bars (Martensitic), Hardened and Tempered.

### 2.0 APPLICATION :

For general engineering purposes involving stresses under corrosive conditions.

### 3.0 CONDITION OF DELIVERY :

Hot rolled and hardened and tempered.

For size above 100 mm, forgings in H&T condition are also acceptable.

Bars shall be supplied in the descaled condition.

The ends of bars shall be square and true.

The bars shall be supplied in straight lengths without twists and bends.

### 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.

EN 10088-3, Gr. X 20 Cr 13 : General Purpose Semi-finished Products, Bars,  
Hardened and Tempered : Rods and Sections

### 5.0 DIMENSIONS AND TOLERANCES :

**5.1 Sizes:** The bars shall be supplied to the dimensions specified in BHEL order.

#### 5.2 Tolerances:

**5.2.1 For Forged bars:** The tolerances shall be + 8 mm - 0 mm.

**5.2.2** Tolerances on rolled bars shall comply with following specifications:

EURONORM 58: Hot rolled flats for general purposes

EURONORM 59: Hot rolled square bars for general purposes

EURONORM 60: Hot rolled round bars for general purposes

Tolerances as per equivalent IS Standards are also acceptable

|

#### Revisions:

Cl.29.5.0. of MOM of MRC-S&GPS

#### APPROVED:

INTERPLANT MATERIAL RATIONALISATION  
COMMITTEE-MRC (S&GPS)

Rev. No. 07

Amd.No.

Reaffirmed

Prepared

Issued

Dt. of 1st Issue

Dt: 01-9-2007

Dt :

Year: 2013

BHOPAL

Corp. R&amp;D

MAY, 1978

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**5.3 Length :**

Unless otherwise specified, hot rolled bars shall be supplied in lengths of 3 to 6 meters or in multiples with maximum of 10% shorts down to 1 meter.

Forged bars shall be supplied in lengths of 1.5 to 3 metres.

**6.0 MANUFACTURE :**

Process used for the manufacture of the bars is left to the discretion of the manufacturer. Material shall be manufactured from fully killed steel. Sufficient reduction and discard shall be made from each ingot to ensure freedom from pipe, harmful segregation and other defects.

**7.0 HEAT TREATMENT :**

The recommended heat treatment is as follows:

Harden in oil / air at temperature of 950-1050°C.

Temper at suitable temperature between 650-750°C.

Details of the actual heat treatment cycle followed shall be specified in the test certificate.

**8.0 FREEDOM FROM DEFECTS :**

The bars shall be free from internal and surface defects. Bars shall be free from twist and bends.

**9.0 CHEMICAL COMPOSITION :**

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

Element	Melt analysis, percent		Permissible variation, percent,
	min.	max.	
Carbon	0.16	0.25	- 0.01 + 0.02
Silicon	--	1.00	+ 0.05
Manganese	--	1.50	+ 0.04
Chromium	12.00	14.00	± 0.20
Sulphur	—	0.030	+ 0.005
Phosphorus	—	0.040	+ 0.005

**Note:** Elements not listed in this table shall not be intentionally added to the steel without the agreement of the purchaser except for finishing the cast. All appropriate precautions are to be taken to avoid the addition of such elements from scrap and other materials used in production which would impair mechanical properties and the suitability of the steel.



## CORPORATE PURCHASING SPECIFICATION

AA 107 21

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**10.0 TEST SAMPLES :**

The test samples shall be selected as per EN 10088 Part 3.

**11.0 MECHANICAL PROPERTIES :****11.1 Tensile and impact:**

The test pieces shall show the following properties:

Ruling section, mm	Tensile strength, N/mm <sup>2</sup>	Yield strength, min N/mm <sup>2</sup>	Percent Elongation, min	Impact Strength at Room Temperature, ISO – V, Joules	Hardness BHN
Upto 160mm ( Inclusive )	700-850	500	13	25	208-252

**Note:**

1. The mechanical properties required for sizes above 160 mm shall be as per mutual agreement between BHEL and manufacturer.
2. The tensile test shall be carried out in accordance with IS: 1608 or any reputed National Standard.
3. The charpy impact test shall be performed in accordance with IS: 1499 or any reputed National Standard.

An impact test shall consist of three specimens from a single test location, the average value of which shall be as specified above.

Only one value of the three can be below the specified minimum but in no case below 2/3 of the specified minimum value.

- 4 Hardness shall be informed in the test certificates for information.

**12.0 ULTRASONIC TEST:**

- 12.1 Each bar above 100 mm shall be tested ultrasonically in accordance with BHEL standard AA 085 01 18 to ensure freedom from internal defects. The norms of acceptance shall be as per category 2 of the above standard.

**12.2 Optional tests:**

If specified in order, each bar > 40 to 100mm shall be tested ultrasonically in accordance with BHEL standard AA 085 01 18 to ensure freedom from internal defects and the norms of acceptance shall be as per category 2.

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**13.0 TEST CERTIFICATES :**

Three copies of test certificates shall be supplied, unless otherwise stated in the order.

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:

**BHEL References:**

AA 107 21 (Rev. No. 07) : Stainless steel bars (martensitic), Gr: X 20 Cr 13, H&T  
BHEL order No.

**Supplier's References :**

Name  
Identification No.  
Melt No.  
Details of heat treatment.

**Result of Tests:**

Dimensional inspection.  
Results of chemical analysis, mechanical tests and Hardness check called for in this specification.

**14.0 PACKING AND MARKING:**

The material shall be suitably packed in bundles-Hessian wrapped-to prevent sagging and damage during transit.

Each bar/flat 50 mm in diameter/width across flats shall be stamped with 'AA 107 23', melt No., BHEL order No., at one end or on the end face.


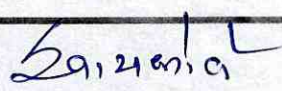
Bars bar/flat upto and including 50 mm in diameter/width across flats shall be bundled together and tied with wire at 3 to 4 places along the length of the bars.

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

AA107 21 : Stainless steel bars (martensitic), Gr: X 20 Cr 13, H&T  
BHEL Order No.  
Consignment/Identification No.  
Melt No.  
Size and Weight.  
Supplier's Name.

**15.0 REFERRED STANDARDS (Latest Publications Including Amendments):**

1. EN 10088-3
2. AA 0850118
3. Euronorm 58, 59 & 60

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			<b>SUPERSEDES</b> BP 10398 Rev.05
<p align="center"> <b><u>COLD DRAWN SPRING STEEL WIRE</u></b>  <b><u>(HIGH CARBON)</u></b> </p>			
<p>1. GENERAL :</p> <p>This specification governs the quality requirements for patented cold draw carbon spring steel wire. Refer AA 10301 for col draw spring steel wire for general purpose.</p>			
<p>2. APPLICTION:</p> <p>Suitable for the manufacture of springs, such as, highly stressed static springs under moderate to high dynamic stressed and in smaller diameter even for impact loaded springs.</p>			
<p>3. CONDITION OF DELIVERY:</p> <p>Wire shall be supplied in the phosphate and / or oiled condition.</p>			
<p>4. COMPLIANCE WITH NATIONAL STANDARDS:</p> <p>The material shall comply with the requirements of the following national standard and also meet the requirements of this specification.</p> <p>IS: 4454 (Part-I) 2001 Gr. SM ) Specification for steel wires  <b>(REAFFIRMED 2015 )</b> for cold formed springs.</p>			
<p>5. DIMENSION AND TOLERANCE:</p> <p>5.1 Sizes:</p> <p>The material shall be supplied to the dimensions specified on the order.</p>			
Revision :IS – 4454 (Part-I) 2001 Gr. SM) (REAFFIRMED)		Issued by :  STANDARDS AND MATERIALS GROUP TECHNICAL SERVICES DEPARTMENT	
Rev.06	Date : 31/08/2019	Date of first Issue: July - -1974	





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### 5.2 Tolerances:

- 5.2.1 The tolerance of the wire shall comply with table 2 of IS: 4454 (Part I), reproduced below:-

Nominal Diameter mm	Permissible Variation mm
0.07 to 0.18	$\pm 0.005$
0.20 to 0.80	$\pm 0.010$
0.85 to 1.40	$\pm 0.015$
1.50 to 1.90	$\pm 0.020$
2.0 to 3.2	$\pm 0.03$
3.4 to 5.6	$\pm 0.035$
6.0 to 8.5	$\pm 0.04$
9.0 to 10.0	$\pm 0.06$
10.5 to 12.5	$\pm 0.07$
13.0 to 17.0	$\pm 0.08$

- 5.2.2 The cross-section of the round wire shall be circular to within half the tolerance of the permitted diameter tolerance specified below.

### 6. MANUFACTURE:

Steel for springs shall be manufactured by the electric, basic oxygen of a combination of this process. If any other process is employed, prior approval of BHEL shall be obtained.

Material shall be manufactured from killed steel.

### 7. FREEDOM FROM DEFECTS :

The surface of the wire shall be smooth and free from defects such as seams, pits, die marks and other imperfections.

### 8. CHEMICAL COMPOSITION:

The melt analysis of steel and permissible variation in the composition of the material from the melt analysis except for carbon, manganese and copper shall be as specified below.

Element	Percent		Permissible Variation Max.
	Min.	Max.	
Carbon	0.75	1.0	-
Silicon	0.15	0.35	$\pm 0.03$
Manganese	-	0.80	-
Sulphur	-	0.030	$\pm 0.005$
Phosphorus	-	0.030	$\pm 0.005$
Copper	-	0.12	-





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Note :-

1. The limits for carbon and manganese are for general guidelines only and slight deviations are permissible provided the test samples satisfied the specified physical properties.
2. Sulphur + phosphorus shall not exceed 0.050 percent including permissible variation..

### 9. MECHANICAL PROPERTIES:

#### 9.1 Tensile : (For wires of diameter 0.07 mm and upto and including 10 mm)

The tensile test shall be carried out in accordance with IS : 1608

The tensile strength and percentage reduction of area, obtained from the test pieces shall comply with those given in table 3 of IS : 4454 (Part I)

#### 9.2 Wrapping test :

For wires of diameter 0.5 mm and under:

The wrapping test shall conform to IS:1755 and shall be carried out in such a way that approximately 500 mm long test wire is tightly wound close on an arbour equal to three times the diameter of the wire and then stretched to five times the original length of the coil.

After stretching and releasing the test spiral shall show an uniform pitch

#### 9.3 Torsion test:-

For wire of diameter 0.5 mm upto and including 10 mm

The sample piece of length equal to 100 times the wire diameter, but not exceeding 500 mm shall be twisted in accordance with IS:1717. The test piece shall withstand, without failure, the minimum number of turns given in table 3 of IS : 4454 (Part I). The fracture shall be smooth, clean and perpendicular to the wire axis and any secondary helical fracture shall be ignored.

The test shall show, in addition, a uniform twist. However the pitch in the two broken pieces may differ. The test piece shall be free from surface cracks.

#### 9.4 Dead wire test

The wire shall lie flat in the coil without any cork-screw set.



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**9.5 Decarburization Test :**

Decarburization test shall be carried out in accordance with IS: 6396.

The wire shall be free from any totally decarburized zones. Partial decarburization as indicated by a network of ferrite not exceeding to a depth below 1.00 percent of the nominal diameter of the wire shall be permissible.

**9.6 Deep Etch test –for wire of diameter 1mm and above**

The test piece shall be immersed in a boiling solution of 50 percent of concentrated hydrochloric acid and 50 percent of water for a period of time equivalent to two seconds of every 0.025 mm of diameter, with a maximum of five minutes, after which, when examined microscopically, they shall be free from seams or other defects likely to prejudice the performance of the finished spring.

It is necessary to heat the test piece to temperature of about 500 deg. C, for the purpose of stress relief before carrying out this test.

**9.7 Microscopic Examination:**

Test samples taken in the longitudinal direction, when examined microscopy shall reveal a structure corresponding to cold drawn condition.

**10. PROTECTIVE COATING:**

The wire shall be supplied in the phosphate and / or oiled condition.

**11. TEST CERTIFICATE :**

Unless otherwise specified three copies of test certificate shall be supplied, alongwith the consignment.

In addition, the supplier shall ensure to enclose one copy of the test certificate alongwith the dispatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information:

**BHEL Reference:**

BP 10398

Rev. 06

Order No.

**Supplier's References**

Name

Process of manufacture

Identification No.

Melt No/Lot No.

Size &amp; weight.



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Results of Test

Result of chemical and other tests, called for in this specification.

**12. PACKING AND MARKING**

The wire shall be supplied in coils having a maximum weight of 50 kr. The wire shall be coiled in such a way that the coils remain flat when the ties are cut. The coil shall be suitably packed to prevent corrosion and damage during transit.

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


BP: Cold drawn Spring Steel Wire (High Carbon).


Our Order NO

Consignment or Identification No.

Size and Weight

Supplier's Name.

1811091/2023/HEP-SWM20961				<b>PRODUCT STANDARD</b> SWITCHGEAR ENGINEERING DIVISION		SG 12635 REV.04		
						PAGE 1 OF 3		
		<b><u>SELF-ADHESIVE/STICKER LABEL (INSTANT LABEL) (TEMP INDEX 100)</u></b>						
		<p>1.0 <b><u>GENERAL</u></b> :</p> <p>This specification governs the quality of SELF-ADHESIVE/STICKER (INSTANT LABEL) (TEMP INDEX 100). The label shall be resistant to dry &amp; damp heat and electrolytic corrosion. The material shall have temperature index of at least 100.</p> <p>2.0 <b><u>APPLICATION</u></b> :</p> <p>The Instant labels shall be suitable for use on 2-3 mm sheet steel zinc plated passivated or painted surfaces to be used in INDOOR / OUTDOOR panels exposures for the following applications.</p> <ul style="list-style-type: none"><li>- RATING PLATES / COMPANY MONOGRAMS / NAME PLATE.</li><li>- INSTRUCTIONS LABEL.</li><li>- NOMENCLATURE LABEL.</li><li>- LINE DIAGRAM / MIMIC DIAGRAM / FLOW CHART ETC.</li><li>- CAUTIONS LABEL.</li><li>- PHASE INDENTIFICATIONS.</li></ul> <p>It shall not be possible to remove the Label from the surface without any damage.</p> <p>3.0 <b><u>COMPLIANCE WITH NATIONAL STANDARDS</u></b> :</p> <p>There is no Indian Standard covering this type of material.</p> <p>4.0 <b><u>DIMENSIONS AND TOLERANCES</u></b> :</p> <p>DESCRIPTIONS, SIZES, LETTERS COLOUR &amp; BACK GROUND COLOUR Shall be as per drawings and order.</p> <p>5.0 <b><u>BACKING MATERIAL</u></b> :</p> <p>The backing material shall be either metallised Polyester over laid with polyester or soft cast vinyl specially formulated to with stand outside weather conditions &amp; abrasion resistance.</p> <p>6.0 <b><u>ADHESIVE</u></b> :</p> <p>The adhesive used shall be of suitable pressure sensitive at least 100 temperature class. Composition of adhesive in bulk supply as determined by Infra-Red Spectrophotometer or by any standard method shall confirm to type approved sample.</p> <p>7.0 <b><u>FINISH</u></b> :</p> <p>The Instant Label shall be free from surface or edge defects, inclusions, voids, pin-holes, cracks which may effect its suitability for use. Instant label shall be “PROTECTED” OR “WRITEN PROTECT”.</p>						
<div>COPYRIGHT AND CONFIDENTIAL</div> <div>The information on this document is the property of Bharat Heavy Electricals Limited It must not be used directly or indirectly in any way detrimental to interest of Co.</div>		REV.	04	PRINTS TO :-		APPROVED –		
		ALTD.		CEG	1	R.K.SHUKLA		
		APPD.		PD & D	1			
		DATE.	22/11/2k	CEE-STD	1	PREPARED	ISSUED	DATE
				SWM (PLNG)	1	GBG	BPN	5/12/97
				QCX (SCR)	1			

			<b>PRODUCT STANDARD</b> SWITCHGEAR ENGINEERING DIVISION	SG 12635 REV.04
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<b>COPYRIGHT AND CONFIDENTIAL</b>  The information on this document is the property of Bharat Heavy Electricals Limited It must not be used directly or indirectly in any way detrimental to interest of Co.		8.0 <b><u>SHELF LIFE</u></b> : More than 12 months at normal room temperature.		
		9.0 <b><u>PROPERTIES</u></b> :		
		9.1 DIMENSION STABILITY : 0.2 mm maximum.		
		9.2 ADHESIVE STRENGTH : Minimum 180 gm / cm (IS : 7809 Part II)		
		9.3 TENSILE STRENGTH : 22 N/Sq.mm (IS : 7809 Part II)		
		9.4 ELONGATION : 25 % (IS : 7809 Part II)		
		9.5 FLAMMABILITY : SELF EXTINGUISHING. (IS : 7809 Part II).		
		9.6 ACCELERATED AGEING : No Negative Effect ON 1500 Hours Exposure.		
		9.7 DRY HEAT : 100 + 3 deg. C. Label shall be applied on a painted surface and aged at 100 + 3 deg. C. for 24 hours. After removal from the oven, there shall be no appreciable change on visual examination.		
		9.8 DAMP HEAT : 55 + 2 deg. C. HUMIDITY – 95 to 100%. Label shall be applied on a painted surface and exposed to tropical conditioning at a temperature of 55 + 2 deg. C. HUMIDITY – 95 to 100 %. After removal from the oven, there shall be no appreciable change on visual examination.		
		9.9 CHEMICAL RESISTANCE : Resistance to most of the chemicals and solvents like Gasoline, Diesel oil, Transformer oil, Antifreeze distilled water, Detergent solution, S.A.E. motor oil, Kerosin etc. The test shall start after application of labels on to the surface after 24 hours. The label shall be immersed in above chemicals for 60 minutes & it should remain intact on the surface.		

		<div><div></div><div><div>PRODUCT STANDARD</div><div>SWITCHGEAR ENGINEERING DIVISION</div></div></div>	SG 12635 REV.04
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		10.0 <u>ACCEPTANCE NORMS</u> :	
		10.1 <u>TEST CERTIFICATE</u> : Three copies of test certificate shall be supplied of compliance for the properties specified in clause 9.0 with each consignment.	
COPYRIGHT AND CONFIDENTIAL  The information on this document is the property of Bharat Heavy Electricals Limited It must not be used directly or indirectly in any way detrimental to interest of Co.		10.2 <u>TEST SAMPLES</u> : New Supplier shall submit 5 Nos. samples of the Labels for testing and approval before printing full bulk quantity.	
		11.0 <u>PACKING AND MARKING</u> :	
		11.1 The Labels shall be supplied in such way that both sides are well protected so as to prevent distortion of the (PROTECTED) labels under normal conditions of transportation and use.	
		11.2 The adhesive side of the Label shall be on the inside surface and suitable interleaving material between the Label and base material shall be used.	
		11.3 Labels shall be packed in such a manner that it is adequately protected from damage in transportation and from deterioration due to climatic condition. Packing shall be protected in such a manner that they will not adhere to each other or to the container.	
		11.4 Each package shall be marked with the following information :	
		SELF-ADHESIVE/STICKER LABEL (INSTANT LABEL) (TEMP INDEX 100) : SG12635	
		BHEL Order No. : CODE NO. : Batch/Lot No. : Manufacturer's Name and Type : Month and Year of Manufacture : Shelf life ..... Viz use before ( Date of Expiry ). Quantity.	
		<u>LIST OF APPROVED SUPPLIER</u>	
		1.0 PRODUCT ABRESTAL, STATICAL & FLEET MARK OF SJS ENTERPRISES. M/S COMPACT AGENCIES.	
		2.0 PRODUCT PERMACEL INSTACAL PM OF JOHNSON & JOHNSON M/S CHAMBEL AGENCIES.	