

	<b>CORPORATE PURCHASING SPECIFICATION</b>	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:

- a) Servo RP 150 - M/s Indian Oil Corporation
- b) HE - 1612 - M/s. BHEL, Bhopal
- c) Rustilo DW-901 - M/s. Indrol Lubricants and Specialties Ltd.
- d) Rustpro Special - M/s. Tide water oil co.
- e) 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

<b>Revisions:</b> CI 27.2.d of MOM of MRC-S&GPS			<b>APPROVED:</b> INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC(S&GPS)		
Rev No.07	Amd No.	Reaffirmed	Prepared HEP, Bhopal	Issued Corp.R&D	Dt. of 1 <sup>st</sup> Issue September 1976
Dt:15-06-2005	Dt:	Year:2019			

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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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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:

INTERPLANT MATERIAL RATIONALISATION  
COMMITTEE – MRC(S&GPS)

Rev No.07	Amd No.	Reaffirmed	Prepared	Issued	Dt. of 1 <sup>st</sup> Issue
Dt:22-02-2014	Dt:	Year:	HEP, Bhopal	Corp.R&D	July, 1976

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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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<b>6.0 MANUFACTURE:</b>																				
<p>Process of manufacture is left to the discretion of the manufacturer except Bessemer process.</p> <p>Material shall be manufactured from semi killed or killed steel.</p>																				
<b>7.0 FREEDON FROM DEFECTS:</b>																				
<p>The sheets shall be free from harmful defects, twists, buckle, rust, scale and waviness and shall be reasonably smooth, flat and square.</p>																				
<b>8.0 CHEMICAL COMPOSITION:</b>																				
<p>The melt analysis of steel and the permissible variation in the composition of the material from the melt analysis shall be as follows:</p>																				
<div><div>-----</div><table><tr><td>Element</td><td>Melt analysis, percent, max.</td><td>Permissible variation, percent, max.</td></tr><tr><td colspan="3">-----</td></tr><tr><td>Carbon</td><td>0.15</td><td>0.03</td></tr><tr><td>Manganese</td><td>0.80</td><td>0.05</td></tr><tr><td>Sulphur</td><td>0.040</td><td>0.005</td></tr><tr><td>Phosphorus</td><td>0.040</td><td>0.005</td></tr></table><div>-----</div></div>			Element	Melt analysis, percent, max.	Permissible variation, percent, max.	-----			Carbon	0.15	0.03	Manganese	0.80	0.05	Sulphur	0.040	0.005	Phosphorus	0.040	0.005
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Carbon	0.15	0.03																		
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Phosphorus	0.040	0.005																		
<b>9.0 TEST SAMPLES:</b>																				
<b>9.1 Tensile Test:</b>																				
<p>One sample shall be taken per thickness per consignment from each melt.</p> <p>As far as possible test pieces shall be cut transverse to the direction of rolling and shall be of full thickness of the sheet rolled.</p>																				
<b>9.2 Bend Test:</b>																				
<p>One sample shall be taken per thickness per consignment from each melt.</p> <p>Bend test pieces shall be cut so that the axis of the bend is parallel to the direction of rolling viz. transverse.</p> <p><b>Note:</b> When more than one thickness is rolled from the same melt, one additional test piece for each thickness shall be taken.</p>																				
<b>10.0 MECHANICAL PROPERTIES:</b>																				
<b>10.1 Bend:</b>																				
<p>When tested in accordance with IS: 1599, the test pieces shall be capable of being bent cold through 180° close. The outer convex surface of the test piece shall be free from cracks.</p>																				
<b>10.2 Tensile:</b>																				
<p>When tested as per IS: 1608, the test pieces shall show the following properties:</p>																				

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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.

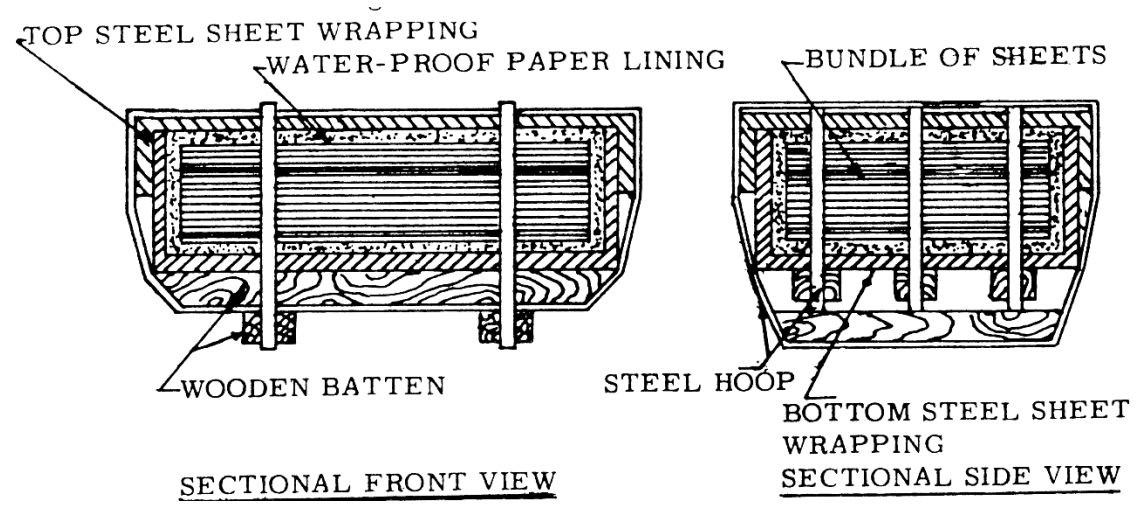
The test certificate shall bear the following information:  
AA10113, Rev 07: HOT ROLLED CARBON STEEL SHEET (330 N/mm<sup>2</sup> Tensile)  
BHEL Order No,  
Supplier's name,  
Identification No  
Melt No,  
Process of manufacture  
Details of pickling, descaling and oiling  
Results of dimensional inspection  
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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<b>Note:</b> 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.  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		
<b>14.0 REFERRED STANDARDS (Latest publications including amendments):</b>  1) IS: 1154      2) IS: 1501      3) IS: 1852      4) IS: 1599      5) IS: 1608		



# CORPORATE PURCHASING SPECIFICATION

AA10445

Rev No. 05

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## HOT FINISHED / COLD DRAWN SEAMLESS CARBON STEEL TUBES FOR HIGH TEMPERATURE SERVICE

ORDERING DESCRIPTION FOR ASME SA192

### 1.0 GENERAL

The tubes shall conform to the latest version for ASME SA192 and comply with the following additional requirements.

### 2.0 APPLICATION

For high temperature service at stress levels and temperatures allowed by ASME Boiler & Pressure Vessel Code, Section I & Indian Boiler Regulations.

### 3.0 HYDROSTATIC TEST / NDT

Each length of tube shall be subjected to Hydrostatic test as per ASME SA 450.

As an alternative to the Hydrostatic test, each length of tube shall be subjected to NDT as given below:

- a) For thickness up to 3.6mm, inclusive, Eddy current test as per ASME SE309 or for Thickness up to 12mm, inclusive, Flux leakage test as per ASME SE570.

**or**

- b) Ultrasonic test as per ASME SE213.

Norms of acceptance shall be as specified in the respective standards mentioned above.

### 4.0 INSPECTION AT SUPPLIER'S WORKS

BHEL's representative shall have free access at all times to all parts of the manufacture's works, until the work on the contract of BHEL is being performed. The manufacturer shall offer BHEL's representative all reasonable facilities, without charge, to satisfy the latter that the material is being furnished in accordance with the specification.

### 5.0 REPAIR

- 5.1 Repair involving fusion welding is prohibited.

- 5.2 When defects are repaired by mechanical means, the wall thickness requirements shall be met with and the surfaces shall be smoothly dressed up without any sharp edges.

Revisions:

Cl: 28.2.3 of MOM of MRC – FCF+HTM

**APPROVED:**INTERPLANT MATERIAL RATIONALISATION  
COMMITTEE – MRC(FCF+HTM)

Rev No.05

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Prepared

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Dt. of 1<sup>st</sup> Issue

Dt:01-01-2004

Dt:

Year:2014

HPBP, Trichy

Corp.R&amp;D

June, 1978

AA10445	<div> <div>CORPORATE PURCHASING</div> <div>SPECIFICATION</div> </div>	
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<div> <div>6.0</div> <div>CERTIFICATION</div> </div> <p>Test certificate shall be provided as per IBR FORM-III E issued by WELL KNOWN TUBE MAKER who is recognised by Central Boiler Board. Copy of certification of recognition as Well Known Tube Maker in FORM XVI - F shall also be enclosed along with the test certificate.</p> <div> <div>7.0</div> <div>PACKING AND MARKING</div> </div> <p>As per BHEL Corporate Standard AA0490001.</p> <div> <div>8.0</div> <div>REJECTION AND REPLACEMENT</div> </div> <p>If each length of tube does not comply with the requirements of this specification during receipt inspection at BHEL or if any defect is found during further processing of pipes BHEL reserves the right to reject the whole consignment and the supplier shall replace the material free of cost. The rejected material shall be taken back by the supplier after fulfilling the commercial terms and conditions.</p>
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## CORPORATE PURCHASING SPECIFICATION

AA 121 17

Rev. No. 03

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## HIGH TENSILE BRASS RODS AND SECTIONS (HT-2)

**1.0 GENERAL:**

This specification governs the quality requirements of high tensile brass rods and sections.

**2.0 APPLICATION:**

For drop forging, stamping, machining and general engineering purposes (Switchgear, control gear).

**3.0 CONDITION OF DELIVERY:**

Cold worked and stressed relieved.

**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.

IS: 320 – 1980: Specification for high tensile brass rods and sections

Gr.: HT - 2 (OTHER THAN FORGING STOCK)

**5.0 DIMENSIONS AND TOLERANCES:**

**5.1 Sizes:** The material shall be supplied as per the dimensions specified in the order.

**5.2 Tolerances:**

Tolerances for round, square, rectangular and hexagonal rods shall be “Normal”, as given in Tables 1, 2, 3 and 4 respectively of IS:2826 : Dimensions and tolerances for copper and copper alloy rods and bars for General Engineering purposes.

**6.0 MANUFACTURE:** Cold worked and stress relieved.

**7.0 FREEDOM FROM DEFECTS :**

The material shall be clean, smooth, free from surface defects, reasonably straight and free from twists.

**8.0 CHEMICAL COMPOSITION:**

The chemical composition of the material, when analyzed in accordance with IS : 3685 (Methods for chemical analysis of brasses ) or any other conventional/ instrumental methods shall be as follows:

<b>Revisions :</b> Cl: 20.10.23 of MOM of MRC-NFCW+HE			<b>APPROVED :</b> INTERPLANT MATERIAL RATIONALISATION COMMITTEE-MRC (NFCW+HE)		
Rev. No. 03	Amd.No.	Reaffirmed	Prepared	Issued	Dt. of 1st Issue
Dt:15-02-06	Dt :	Year :	HARDWAR	Corp. R&D	01-04-78

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Element	Percent, min.	Percent, max.
Copper plus incidental Nickel	56.0	61.0
*Tin	--	1.0
*Lead	0.5	1.5
Iron	0.20	1.5
Manganese	0.50	2.0
Aluminium	0.30	2.0
*Antimony	--	0.02
*Other elements	--	0.5
Zinc		Remainder

**\*Note :** These elements need not be determined when the material conforms with mechanical properties.

## 9.0 TEST SAMPLES:

9.1 One sampling per heat shall be taken for chemical analysis.

9.2 One sample per heat per size shall be taken for other tests.

Material of the same type, size and temper shall be grouped in batches as follows and one sample shall be selected from each batch or part thereof to provide the necessary test pieces :

## 10.0 MECHANICAL PROPERTIES:

### 10.1 Tensile:

When tested in accordance with IS : 1608, the material shall show the following properties. The fractured test piece shall be free from pipes and such other defects.

Size mm	Tensile strength in N/mm <sup>2</sup> , min.	%Elongation on 5.65 √So gage length min.
For upto and including 40 mm	520	12.0
Over 40 mm	500	15.0

## 11.0 MERCUROUS NITRATE TEST:

The test shall be carried out on a piece cut from each brass tube selected for testing. When tested in accordance with IS : 2305, the test piece shall not show any sign of cracking. Should any specimen fail under this test, all brass tubes submitted for inspection shall be withdrawn but may be resubmitted for inspection after stress relieving.

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**12.0 RETEST:**

Should any of the test pieces first selected, fail to pass the prescribed tests mentioned under various clauses in this specification, two further samples from the same batch shall be selected for testing, one of which shall be from the same component from which the original test sample was taken, unless that component has been withdrawn by the supplier.

Should the test pieces from both these additional samples pass, the batch represented by the test sample shall be accepted. Should the test pieces from either of these additional samples fail, the batch represented by the test sample shall be rejected.

**13.0 INSPECTION AT SUPPLIER'S WORKS**

Tests and inspection are to be conducted in the presence of the customer's representative. The representative shall have the access at all times while the work on the contract is being performed, to all parts of the manufacture's works. The supplier shall offer the purchaser'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 arrangement for carrying out the prescribed test elsewhere.

**14.0 TEST CERTIFICATES :**

The supplier shall submit 3 copies of test certificates along with each consignment.

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

The test certificate shall bear the following information:

BHEL Order No,

AA 121 17, Rev 03: High Tensile Brass Rods and sections – HT -2

Supplier's Reference and Name

Batch / Heat No.

Results of chemical analysis, mechanical and all other tests as called for in this specification/ order.

Consignment / Identification No.

**15.0 PACKING AND MARKING:**

The material shall be suitably packed in crates to prevent corrosion and damage during transit. Each package or crate shall be legibly marked with the following information:

BHEL Order No.

CPS No.12117: High Tensile Brass Rods and sections – HT -2

Batch No.

Identification Mark/No.

Weight

Supplier's Reference and Name

**16.0 Referred standards(Latest publications Including Amendments):**

1. IS:320

2. IS:1608

3. IS:2305

4. IS:2826

5. IS:3685



# CORPORATE STANDARD

AA7161001

Rev. No. 04

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## WASHERS, MACHINED, STEEL

### 1 DESIGNATION

A machined washer of size 8.4 mm made of steel shall be designated as:

#### 1.1 On drawings

- i) Material specification column: AA7161001
- ii) Description column: WASHER MCD 8.4-ST

#### 1.2 On indents

Washer Machined 8.4 – Steel: AA7161001

#### 1.3 For issuing enquiries and on purchase orders

While issuing enquiries and purchase orders, delete BHEL standard number from the above description and add the information given under clause 2.

### 2 COMPLIANCE WITH STANDARDS

#### 2.1 Dimensions, Tolerances and General requirements

As per IS: 2016-1967, Table-1

#### 2.2 Material

Steel as stated in IS: 2016

#### 2.3 Finish

Plated as specified in BHEL order.

### 3 NOTE

- 3.1 For machined washers of brass, refer to BHEL standard AA7161002
- 3.2 For machined washers of copper, refer to BHEL standard AA7161004
- 3.3 Washers to this standard would be unplated, divisions wishing to have plated washers would have
- 3.4 For general requirements of washers, refer BHEL standard AA0230408
- 3.5 Weights given in this standard are for general reference only and are not meant for commercial transactions.
- 3.6 When fasteners are to be tested with in BHEL, the following sampling and acceptance plan based on IS: 6821 (Table-2) shall be followed for physical properties.

LOT SIZE	SAMPELE SIZE	ACCEPTANCE NOS.
Up to 1000	5	0
1001-3000	8	0
3003-10000	13	0
10001-35000	20	0
Over 35000	32	1

Revisions: As per clause 29.4 of MOM of WG-F

**APPROVED:**

INTERPLANT MATERIAL RATIONALISATION  
COMMITTEE – MRC (F)

Rev. No. 04	Amd. No.	Reaffirmed	Prepared	Issued	Dt. of 1 <sup>st</sup> Issue
Dt: 15-04-2011	Dt:	Year: 2019	HPEP, Hyderabad	Corp. R&D	01-01-1977

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**CORPORATE STANDARD****4 REFERRED STANDARDS (Latest publications including amendment)**

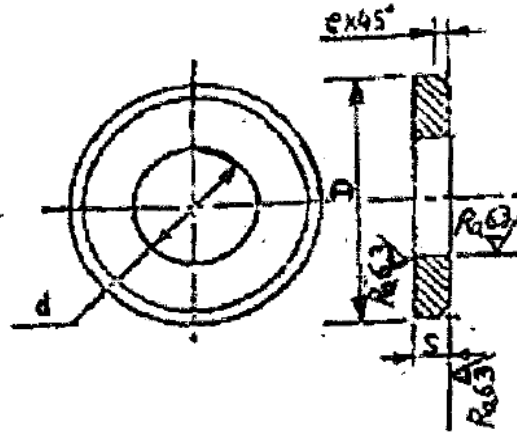
- 1) IS: 6821
- 2) AA0230408
- 3) AA7161002
- 4) AA7161004

**EXPLANATORY NOTE**

This standard was first issued in January 1977. The standard was based on IS:2016-1967 for dimensions, tolerances and general requirements. Subsequently many changes have been agreed upon at International & IPSC level and were reflected in IS: 2016-1967.

There is no change in IS: 2016-1967. This standard has been reviewed and brought up to date.

- Clause 3.6 “Sampling plan” for washers has been modified in line with IS: 6821
- Clause 4.0 has been modified accordingly.







## CORPORATE STANDARD

AA7161001

Rev. No. 04

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Note:

- 1) Corporate sub codes are shown in Table
- 2) Weights have been shown in kg per 1000 Nos.

Table 1

All dimensions in mm.

Size Nom. d h12	Outside diameter D		Thickness S		e nom	for bolt or screw size	Sub-code	Weight
	Basic	Tol.	Basic	Tol.				
1.7	4	+0 -0.3	0.3	±0.1	0.1	M1.6		
2.2	5	+0 -0.3	0.3	±0.1	0.1	M2	170	
2.7	6.5	+0 -0.3	0.5	±0.1	0.2	M2.5	161	
3.2	7	+0 -0.3	0.5	±0.1	0.2	M3	013	0.11
4.3	9	+0 -0.3	0.8	±0.1	0.3	M4	021	0.29
5.3	10	+0 -0.3	1	±0.1	0.4	M5	030	0.42
6.4	12.5	+0 -0.4	1.6	±0.2	0.6	M6	048	1.08
8.4	17	+0 -0.4	1.6	±0.2	0.6	M8	056	2.07
10.5	21	+0 -0.5	2	±0.2	0.6	M10	064	3.98
13	24	+0 -0.5	2.5	±0.3	0.6	M12	072	6.16
17	30	+0 -0.5	3	±0.3	0.6	M16	080	11.17
21	37	+0 -0.8	3	±0.3	1	M20	099	16.7
25	44	+0 -0.8	4	±0.3	1	M24	102	31.78
31	56	+0 -1.0	4	±0.3	1	M30	110	52.95
37	66	+0 -1.0	5	±0.6	1.6	M36	129	89.99
43	78	+0 -1.0	7	±1	1.6	M42	137	180.3
50	92	+0 -1.5	8	±1	1.6	M48	145	291.26
58	105	+0 -1.5	9	±1	1.6	M56	188	421.8
66	115	+0 -1.5	9	±1	2	M64	153	486.45



# PRODUCT STANDARD

## SWITCHGEAR ENGINEERING DIVISION

SG 12720 Rev.:02

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### SUPPORT ROLLER'S - SPECIAL NEEDLE ROLLER BEARINGS

#### 1. INTRODUCTION

Support Rollers are special high load carrying capacity needle roller bearings with or without inner rings and are used at critical locations in spring operating mechanism of vacuum circuit breakers.

#### 2. CONSTRUCTION

Support Rollers consist of an outer ring, an inner ring and loosely fitted needle rollers (no cage is used). The support Rollers without inner ring use special pins over which the needle rollers directly slide.

#### 3. APPLICATION :-

The bearings are used in VCB mechanism, GVM36 RFT shaft and of PVN12/PVN36 inter phase mechanism. The dimension details are shown in drg. No. 45211001620 for VCB mechanism bearing, 45213030912 for PVN12/36 inter phase mechanism thrust bearing and 45171000577 for GVM36 RFT shaft assembly.

#### 4. MATERIALS

The outer ring, inner ring or pin and needle rollers are made out of high strength, thorough hardened rolling bearing chrome steels of suitable grades: Finished needle housings, inner ring and needles (duly hardened and ground) shall have hardness of 670 to 840 HV (58 to 65 HRC). Hardness depth shall be min 0.3 mm after grinding. Surface finish of all rolling elements shall be Ra 0.2 microns.

#### 5. OPERATING TEMPERATURE RATING

The operating temperature range required for the spherical rod ends is - 20°C to 120°C.

#### 6. LOAD RATINGS

The basic load capacity and Radial load ratings (static and dynamic) are as mentioned on item drawing. At loads up to the magnitude of the static load rating no permanent deformation should develop in the sliding surface parts. Also no increase in friction or seizing of the surfaces in sliding contact should occur.

#### 7. DIMENSIONS

The dimensions of the support roller shall be as per item drawing.

#### 8. TEST REQUIREMENTS


Following checks / tests shall be conducted at the supplier's works :

- Dimension checks as per drawing.
- Test to verify materials used and process followed.
- Testing the static load rating (Co) (Refer para 6)

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REV.	02	PRINTS TO :-		APPROVED –		
ALTD.	NB	QCX	1	R.K. SHUKLA		
APPD.	RKS	PD&D	1	PREPARED	ISSUED	DATE
DATE.	08/07/2000	SWM(PLNG)	1	SMM	RAJESH	17-07-1995

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			PAGE 02 OF 02	
<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>		9. ACCEPTANCE CRITERION		
		<div>SUPPLIERS CERTIFICATE:</div> <div>Supplier shall send test certificate of meeting the requirements outlined in Clause 8 with each lot of supply for acceptance.</div>		
		10. TESTS AT BHEL:		
		<div>For supplies from reputed bearing manufacturers / established sources such as M/s FAG, M/s SKF, M/s INA &amp; M/s NRB no tests at BHEL are advised. In such cases, he supplier's Test Certificate / Guarantee certificate for originality is sufficient for the acceptance of the item.</div> <div>However for supplies from new sources following quality checks are recommended:</div> <div><div><div>- Dimension checks as per drawing.</div><div>- Surface hardness and its depth check.</div><div>- Checking the static load capacity (Radial)</div></div><div>For this purpose the support roller shall be mounted as shown below and load applied in radial direction.</div><div><div><div><div><div></div><div>DIRECTION OF STATIC LOAD</div></div><div><div><div><div></div><div>PIN</div></div><div><div><div><div></div><div>ADAPTOR</div></div></div></div><div><div><div><div></div><div>SUPPORT ROLLER ASSY.</div></div></div></div></div></div></div></div></div></div>		
		<div><u>Observations during static load testing shall be as per clause 6.</u></div>		
		11. IDENTIFICATION MARKINGS		
		<div>Supplier's name /logo and item designation shall be engraved / punched on the side face of the outer ring of the support roller.</div>		
		12. PACKAGING		
		<div>These support rollers are having loosely fitted needles, hence shall be packed appropriately against loss of needles / inner rings / pins and protection against damages due to atmospheric effects.</div>		