

- NOTES:—

[illegible]NAVY ELE
BHOPAL

10

1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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22

1. REMOVE SHARP CORNERS.

~~2. BRUSH HOLDER MATERIAL BRONZE TO AA 19943
ALTERNATIVELY GUN METAL TO AA 19941 CAN BE USED.~~

3. ITEM 001 AND 002 ARE SAME EXCEPT FOR THE DIA. 20
BOSS WITH M8 TAPED HOLE AS SHOWN IN THE DRAWING.

4. FOR FIRST TWO PROTOTYPE TM 4303 BY DIMENSIONS 106 AND 56 SHOULD BE MAINTAINED AS 126 & 76 RESPLY.

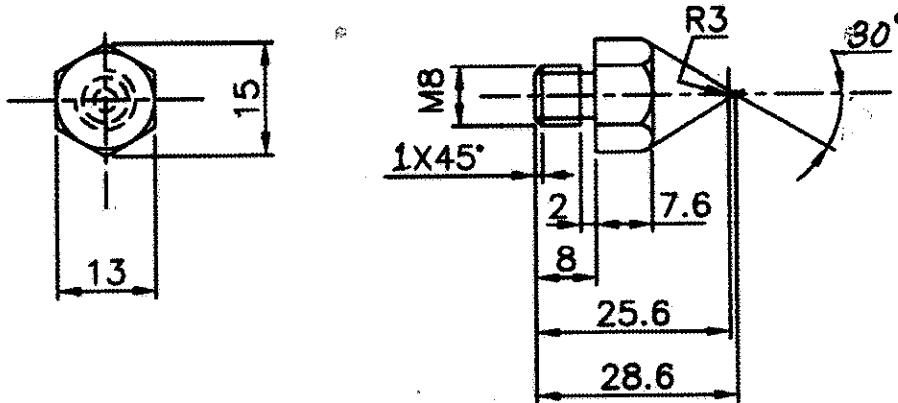
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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22

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

REV.	DATE	ALTERED	REV.	DATE	ALTERED	ADDITIONAL INFORMATION
02	21-2-11	CHECKED ML	01	5.6.09	CHECKED ML	
		APPROVED			APPROVED	
BOM MATL. SPECN AA10112 WAS BP10172.			DRG. UPDATED & DIGITIZED.			STATUS OF DRAWING
						DISTRIBUTION OF PRINTS TME-1 TXM -4 TNX -1

**NOTES:-**

1. IT.001 TO BE ZINC PLATED TO AA 0673603 AND PASSIVATED TO AA 0673604 WITH A PLATING THICKNESS 0.013 TO 0.015 MM.
2. TOLERANCES ON UNTOLERATED DIMENSIONS ARE ± 0.25

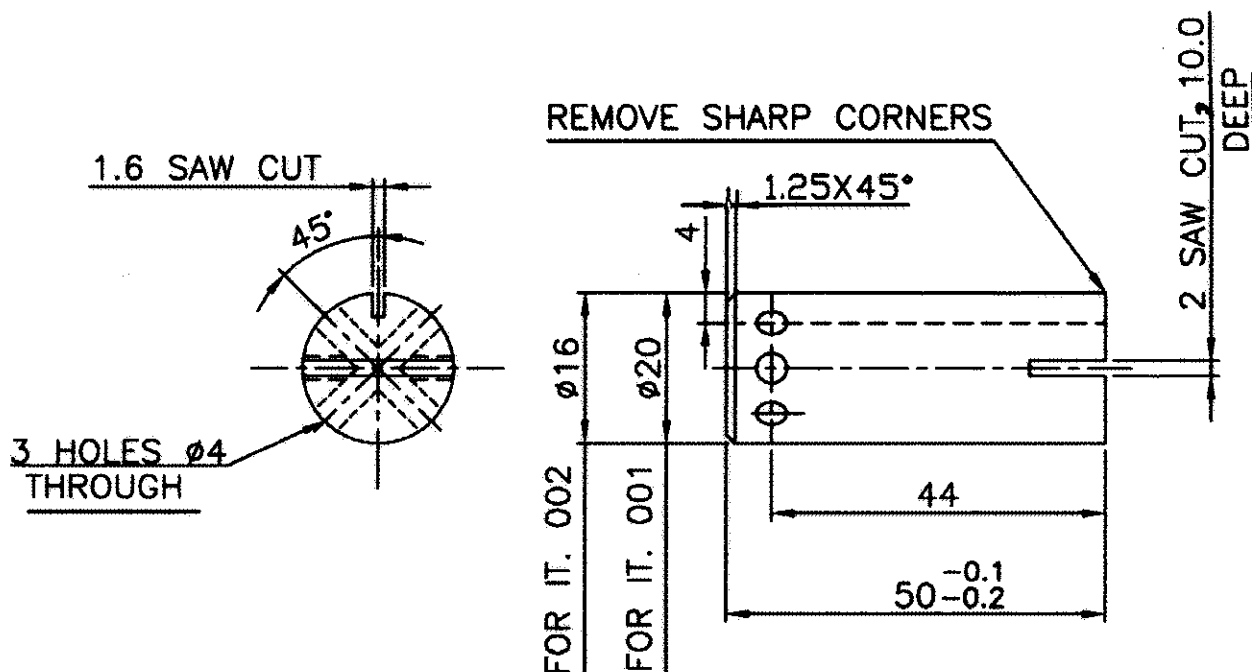
001		HEXAGONAL BAR 13 A/F X 29	BP 1010172085 AA10112	KG	0.025
REMARKS	ITEM NO.	DESCRIPTION	MATL. CODE	A/C	UNIT WT.
			MATL. SPECN.		QTY.
28		28	28	28	
DEPT. TME		GRADE OF UNTOL. DIM. C/M/A/F	SCALE	WEIGHT(KG)	REF. TO ASSY. DRG.
CODE 405			NTS	0.025	14392080005
TITLE		ARCING STUD		DRAWING NO.	
		TM 4303 AZ/BY/DY/CZ		44392080001	
				SHT. NO	NO. OF. SHT.
				01	01

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

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REV.	DATE	ALTERED	REV.	DATE	ALTERED	CZ	ADDITIONAL INFORMATION
		CHECKED	04	4.06.09	CHECKED	PK	
		APPROVED			APPROVED	20	
			DRG. UPDATED & DIGITIZED.			STATUS OF DRAWING	
						DISTRIBUTION TME-1 TNX -1	
						OF PRINTS TXM -4	

**NOTES:-**

1. MACHINE ALL OVER.
2. PIN TO BE ZINC PLATED TO AA 0673603 AND PASSIVATED TO AA 0673604.
3. PLATING THICKNESS 0.013 TO 0.015 MM.

	002	PIN Ø16 X 50		AA 10112	KG.	0.10
	001	PIN Ø20 X 50		AA 10112	KG.	0.12
REMARKS	ITEM NO.	DESCRIPTION	STD	MATL. CODE	A/C	UNIT WT.
				MATL. SPECN.		QTY.
QND TPE 1	28	28	QND TPE 1	28	QND TPE 2	



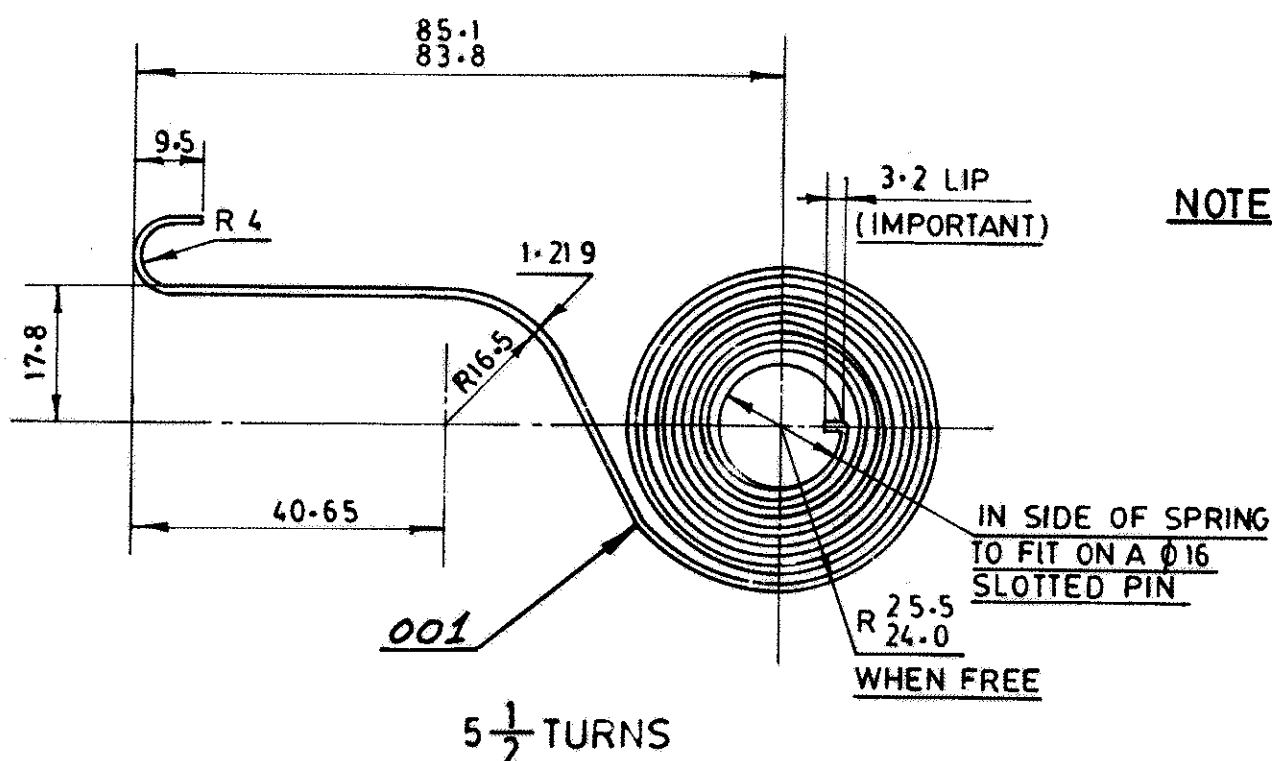
BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

DRN.	NAME	SIGN	DATE
	BHARAURIA	Sd/-	27.07.89
CKD.	SGD	Sd/-	28.07.89
APPD.	RKD/ATR	Sd/-	28.07.89

DEPT. TME	GRADE OF UNTOL.	SCALE	WEIGHT(KG)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEM
CODE 405	DIM. Ø/M/F AA0230208	NTS		14392028003 14392080006	008 008	002
TITLE BRUSH HOLDER SPRING PIN				DRAWING NO. 44392028002	REV 04	
TM 4303 AZ / CZ / BY / DY				SHT. NO 01	NO. OF SHT. 01	

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DRG. No. 3 439 20 41 002



NOTES:-

- 1 ALTERNATIVELY SPRING TO BE MADE OF AA10304. HEAT TREAT TO BRINELL HARDNESS.
- 2 REMOVE ALL SHARP EDGES & CORNERS. -410/440.
- 3 FINGER PORTION OF SPRING MUST BE FLAT & SQUARE ACROSS THE WIDTH WHEN MOUNTED ON THE $\phi 16$ SLOTTED PIN.
- 4 SPRING SHALL BE CAPABLE OF WITHSTANDING 25000 CYCLES OF UP & DOWN MOVEMENT OF ITS LIP BY 45mm. FROM ITS LOWEST POSITION, WHEN ASSEMBLED IN A BRUSH HOLDER & SET AT A LOAD OF 2.7 - 3.15 KGS, SPRING SHOULD NOT SHOW A VARIATION OF LOAD MORE THAN 0.25 KG.
- 5 SPRING IT-001 TO BE ZINC PLATED TO AA0673603 AND PASSIVATED TO AA0673604, WITH A PLATING THICKNESS OF 0.015 TO 0.020 MM. ALTERNATIVELY SPRINGS TO BE PARKERISED TO AA0673616
- 6 TOLERANCES ON UNTOLERATED DIMS TO BE ± 0.25 MM.
7. ALTERNATIVELY USE STAINLESS STEEL MATERIAL TO AISI-304 HARDNESS OF SPRING TO BE 40-45 RC.

TOOL LIST CONT'D.			TOOL LIST		
			IT.	TOOL	DESCRIPTION
	1406949	WINDING MANDREL O/D 14.5	001	1457931	BENDING TOOL
	1406950	RADIUS FORMING TOOL R 16.5 & R 4	001	1457932	MANDREL
	1406951	LOCATOR FOR END CUTTING 9.5		1406948	LIP BENDING TOOL

REV	DATE	ALTD	RBV
06	6.2.01	CKD	Me

MIC REFTM 4303 BY 8 DY WAS
NOT ON. ASSY. REF. 14392080006
WAS NOT ON. *initials*

001			ST. 454162 SEE NOTE 7.			001			SPRING 1.219 TK-X 19.05 X 638			2												KG			0.11																																						
59			64			65			75			78			79			25			27			29			58			59			60			77			29			31			34			45			55			56			58			65			72		
VAR OO			REMARKS			VAR. No.			ITEM No.			DESCRIPTION			STD			DRAWING No.			IT. No.			MATL. CODE			A			UNIT WT.			65			72																													
																					32			33			46			64			UNIT			QTY.			71			72																							
																								VAR.			MATL. SPECN.			C																																			

REV 05	DATE 19-3-97	ALT <u>Abdominal</u>
		CRD <u>2000</u>

TOOL NOS. 1406948,
1406949, 1406950,
1406951 WERE NOT ON.

(TCM-248-B)

REV. 04	DATE 11-3-95	ALTD. 25-47
		CKD. 2-11-96

NOTE-7 WAS NOT ON.

26 → **CARD TYPE-3**
ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS			
TIME	- 1	TXM	- 3
TXM	- 3	TGM	- 3

REV.	DATE	ALTERED	<i>McLaglen</i>
03	24-8-94	CHECKED	<i>[Signature]</i>

NOTE- 6 WAS NOT ON.

REV	DATE	ALTERED
02	13-10-92	CHECKED

BOM UPDATED

REV	DATE	ALTERED
01	18-7-90	C.K.B.
		CHECKED

PASSIVATED PROC. SPEC. WERE
NOT ON. PLATING THK. WAS
NOT 24.


TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT	TM 4601AZ, TM 4603 BZ & TM 4303 BY, DY MG DE LOCO AC EMU
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	BHARAT HEAVY ELECTRICALS LIMITED JHANSI	DRN.	NAME	SIGN.	DATE	73 No.
		CHD.	SGD	<i>[Signature]</i>	8-1-88	74 OF
		APPD	SKB	<i>[Signature]</i>	26-2-88	VAR

DEPT	TIME	GRADE OF UN. TOL.		SCALE	WEIGHT (Kg.)	REF. TO ASSY. DRG.	ITEM	75 77
CODE	405	DIM. 2/M/P		NTS	0.11	0 439 20 40 001 1 439 20 80 006	No. 009	No. OF ITEMS 001

TITLE	1 3	7 DRAWING No.	22 23 24
<u>BRUSH HOLDER SPRING</u>	CARD CODE	3 439 20 41 002	REV. 06

SHEET No. 01 No. OF SHEETS 11

	<h1 style="text-align: center;">CORPORATE PURCHASING SPECIFICATION</h1>			AA19941		
				Rev No.02		
				PAGE 1 of 4		
<h2>LEADED GUNMETAL SAND CASTINGS</h2>						
<p>1.0 GENERAL:</p> <p>This specification governs the requirements of leaded gunmetal sand castings.</p>						
<p>2.0 APPLICATION:</p> <p>Suitable for general casting required for fair strength, soundness, good machinability and pressure tightness.</p>						
<p>3.0 CONDITION OF DELIVERY: As specified in the order/drawing.</p>						
<p>4.0 COMPLIANCE WITH NATIONAL STANDARDS:</p> <p>IS:1458–1965, Class V – Specification for Railway Bronze Ingots and castings.</p>						
<p>5.0 DIMENSIONS AND TOLERANCES:</p> <p>The dimensions of the castings shall be in accordance with the drawings supplied with the order. All surfaces marked for machining shall have sufficient machining allowance but it shall not be too excessive resulting in more machining. For un-machined surfaces, unless otherwise stated in the order, the tolerance on linear dimensions and wall thickness shall be as per BHEL Standard AA0230402.</p>						
<p>6.0 MANUFACTURE:</p> <p>Sand Cast / Centrifugal cast, if specified on drawing or in purchase order.</p>						
<p>7.0 FINISH:</p> <p>All castings shall be properly fettled, dressed and all surfaces shall be thoroughly cleaned.</p>						
<p>8.0 FREEDOM FROM DEFECTS:</p> <p>The castings shall be free from defects such as blow holes, inclusions, shrinkage cavities, hard spots, cold shuts, cracks etc., which may adversely affect the machining and utility of castings. When it is necessary to remove the risers by flame cutting, care shall be taken to make the cut at a sufficient distance from the body of the casting so as to prevent any defect being introduced into the casting due to local heating.</p>						
<p>Revisions: Clause.25.1 of MOM of MRC-NFM+HE</p>				<p style="text-align: center;">APPROVED: INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC(NFM+HE)</p>		
Rev No.02	Amd No.	Reaffirmed	Prepared	Issued	Dt. of 1 st Issue	
Dt:17-05-2013	Dt:	Year:	6 HEEP, Haridwar	Corp.R&D	October 1977	

AA19941

Rev. No.02

PAGE 2 of 4

CORPORATE PURCHASING SPECIFICATION



9.0 CHEMICAL COMPOSITION:

The chemical composition of the material, when analysed in accordance with IS:4027 (Part 1 to Part 9) (Methods for chemical analysis of Bronzes) or any other conventional/ instrumental methods, shall be as follows:

Element	Percent	
	Minimum	Maximum
*Tin	4.0	6.0
Lead	4.0	6.0
Zinc	4.0	6.0
Phosphorus	-	0.05
**Iron	-	0.3
**Antimony	-	0.3
Iron and Antimony	-	0.5
Aluminium	-	0.01
Total of other elements including Iron and antimony	-	0.6
Copper plus incidental nickel	Remainder	

* For the purpose of utilising scrap containing a high percentage of tin, it shall be permissible to supply ingots containing tin, up to maximum of 7.0 percent.

** Iron and antimony together shall not exceed 0.5 percent.

10.0 TEST SAMPLES:

One test specimen shall be selected from each melt for chemical analysis. Care shall be taken to discard the first drillings till a clean oxide free surface is reached.

One tensile test specimen shall be prepared from each melt/consignment.

One casting shall be taken up for fracture test from each melt/consignment.


Pressure Test:

The number of castings to be subjected to pressure test and the corresponding criteria for conformity shall be subject to agreement between the supplier and BHEL.

The cost of extra castings required in accordance with the sampling clauses for carrying out different tests shall be borne by the manufacturer

11.0 MECHANICAL PROPERTIES:

The material when tested in accordance with IS:1608, the material shall show the following tensile properties:

	<h2 style="margin: 0;">CORPORATE PURCHASING SPECIFICATION</h2>				AA19941
					Rev No.02
					PAGE 3 of 4

Method of Casting of Test pieces	Tensile Strength, N/mm ² (kgf/mm ²) (Min)	%Elongation on 5.65√S ₀ (Min)	Hardness HB (Min)
Sand cast (Cast on)	185.0 (19.0)	8	60
Sand cast (Separately Cast)	205.0 (21.0)	12	65

12.0 FRACTURE TEST:

The sample of casting shall be broken in the presence of the representative from BHEL in such a manner that the area of fracture is as large as practicable in order to determine the uniformity of the grain structure of the metal. If the fracture shows segregation or dross or dirt spots or any other defect, all castings produced from the same melt shall be rejected.

13.0 OPTIONAL TEST:

If specified in the purchase order/drawing, the following additional tests shall be conducted on the castings.

1. Pressure Test
2. Radiographic Test

The requirements of these tests shall be as prescribed in the order/drawing or as mutually agreed.

14.0 REPAIR OF CASTINGS:


The castings shall not be repaired, unless permission in writing has been obtained previously from BHEL.

15.0 TEST CERTIFICATES:


The supplier shall submit five copies of test certificates giving the following information.

- 1) BHEL Order No.
- 2) AA19941, Rev.No.02: LEADED GUNMETAL SAND CASTINGS
- 3) Supplier's reference and Name
- 4) Heat No.
- 5) Results of chemical analysis, mechanical and all other tests as called for in this specification / order.
- 6) Drawing/Pattern No.
- 7) Consignment/Identification No.

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

	CORPORATE PURCHASING SPECIFICATION	AA10112 Rev No. 07 PAGE 1 of 4			
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					
Revisions: CI 27.2.d 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 st Issue
Dt:15-06-2005	Dt:	Year:2019	10 HEP, Bhopal	Corp.R&D	September 1976

RA5302

AA10112	CORPORATE PURCHASING SPECIFICATION 
Rev No. 07	
PAGE 2 of 4	

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:

	CORPORATE PURCHASING SPECIFICATION	AA10112 Rev No. 07 PAGE 3 of 4
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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/mm², 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/mm², 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 ²		440 N/mm ²
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.

AA10112	CORPORATE PURCHASING SPECIFICATION	
Rev No. 07		
PAGE 4 of 4		

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 STANDARD

AA7121123

Rev. No. 09

PAGE 1 of 3

SCREWS, HEXAGON HEAD, PRODUCT GRADE 'A' COARSE PITCH, STEEL, PROPERTY CLASS 8.8 (M6 - M24)

1 DESIGNATION

A product Gr. A hexagon head, steel screws of thread M8, length 50mm, coarse pitch and conforming to property class 8.8 shall be designated as:

1.1 On drawings

- i) Material specification column: AA7121123
- ii) Description column: SCRU HEX A M8X50 - 8.8

1.2 On indents:

Screws Hex A M8 X 50 - 8.8; AA7121123

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 1364 : Part 2 : 2018

2.2 Mechanical Properties:

To conform to property class 8.8 as specified in Table - 3 of IS: 1367, Part 3.

Permissible hardness 238-350 HB for sizes M6-M10.

2.3 Threads

Pitch-coarse to IS: 4218, Part 2.

Tolerance quality - Medium.

Tolerance class - 6g.

2.4 Identification Marking:

As stated in clause 10 of IS 1367 : Part 3.

2.5 Surface Discontinuity

As per IS 1367 : Part 9 : Sec 1.

2.6 Finish

Plated as specified in BHEL order

Revisions:

APPROVED:

INTERPLANT MATERIAL RATIONALISATION
COMMITTEE – MRC (Fasteners)

Rev. No. 09

Amd. No.

Reaffirmed

Prepared

Issued

Dt. of 1st Issue

Dt: 20-03-2021

Dt:

Year:

14

HEEP, Haridwar

Corp. R&D

01-01-1977

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AA7121123	CORPORATE STANDARD	
Rev. No. 09		
PAGE 2 of 3		

3 NOTE

- 3.1** Length and diameter combination (refer Table 1 on page 3 of 3) between the bold lines should only be used.
- 3.2** For screw threads, general (Metric) refer to BHEL standard AA0231800.
- 3.3** For tolerance grade, position and class refer to BHEL standard AA0230201.
- 3.4** Screws to this standard would be un-plated; divisions wishing to have plated bolts would have to get them plated.
- 3.5** Weights given in this standard are for general reference only and are not for commercial transactions.
- 3.6** When fasteners are to be tested with in BHEL, the sampling and acceptance plan shall be as per IS: 1367, Part 17.

4 REFERRED STANDARDS (Latest publications including amendment)

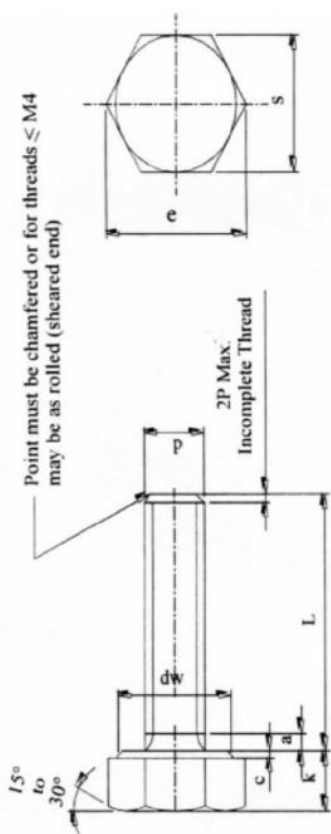
- 1) IS: 1364, Part.2
- 2) IS: 1367 Part.3, 9 : Sec 1 & 17
- 3) IS: 4218, Part.2
- 4) AA0230201
- 5) AA0231800
- 6) AA0231850

EXPLANATORY NOTE

The following changes have been made in the revision:

- In Clause 2.1, year of IS updated to 2018.
- In Clause 2.4, clause 10 in place of clause 9.2.1
- Clause 2.5, updated.

PAGE 3 of 3




Note:

1. Corporate sub codes are only given in the Table-1
2. For thread runout refer AA0231850
3. Weights have been shown in kg per 1000 No.
4. Sizes beyond chain dotted lines are for Prod Gr. B

All dimensions are in mm.

Table 1

[illegible]

	<h1 style="margin: 0;">CORPORATE STANDARD</h1>	AA7161001 <hr/> Rev. No. 04 <hr/> PAGE 1 of 3																		
<h2 style="margin: 0;">WASHERS, MACHINED, STEEL</h2>																				
<h3 style="margin: 0;">1 DESIGNATION</h3> <p>A machined washer of size 8.4 mm made of steel shall be designated as:</p> <p>1.1 On drawings</p> <p>i) Material specification column: AA7161001 ii) Description column: WASHER MCD 8.4-ST</p> <p>1.2 On indents</p> <p>Washer Machined 8.4 – Steel: AA7161001</p> <p>1.3 For issuing enquiries and on purchase orders</p> <p>While issuing enquiries and purchase orders, delete BHEL standard number from the above description and add the information given under clause 2.</p>																				
<h3 style="margin: 0;">2 COMPLIANCE WITH STANDARDS</h3> <p>2.1 Dimensions, Tolerances and General requirements</p> <p>As per IS: 2016-1967, Table-1</p> <p>2.2 Material</p> <p>Steel as stated in IS: 2016</p> <p>2.3 Finish</p> <p>Plated as specified in BHEL order.</p>																				
<h3 style="margin: 0;">3 NOTE</h3> <p>3.1 For machined washers of brass, refer to BHEL standard AA7161002</p> <p>3.2 For machined washers of copper, refer to BHEL standard AA7161004</p> <p>3.3 Washers to this standard would be unplated, divisions wishing to have plated washers would have</p> <p>3.4 For general requirements of washers, refer BHEL standard AA0230408</p> <p>3.5 Weights given in this standard are for general reference only and are not meant for commercial transactions.</p> <p>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.</p>																				
<table border="1" style="margin: 0 auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">LOT SIZE</th> <th style="padding: 5px;">SAMPELE SIZE</th> <th style="padding: 5px;">ACCEPTANCE NOS.</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Up to 1000</td> <td style="padding: 5px;">5</td> <td style="padding: 5px;">0</td> </tr> <tr> <td style="padding: 5px;">1001-3000</td> <td style="padding: 5px;">8</td> <td style="padding: 5px;">0</td> </tr> <tr> <td style="padding: 5px;">3003-10000</td> <td style="padding: 5px;">13</td> <td style="padding: 5px;">0</td> </tr> <tr> <td style="padding: 5px;">10001-35000</td> <td style="padding: 5px;">20</td> <td style="padding: 5px;">0</td> </tr> <tr> <td style="padding: 5px;">Over 35000</td> <td style="padding: 5px;">32</td> <td style="padding: 5px;">1</td> </tr> </tbody> </table>			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
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 HPEP, Hyderabad	Issued Corp. R&D	Dt. of 1 st Issue 01-01-1977															
Dt: 15-04-2011	Dt:	Year: 2019 17																		

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

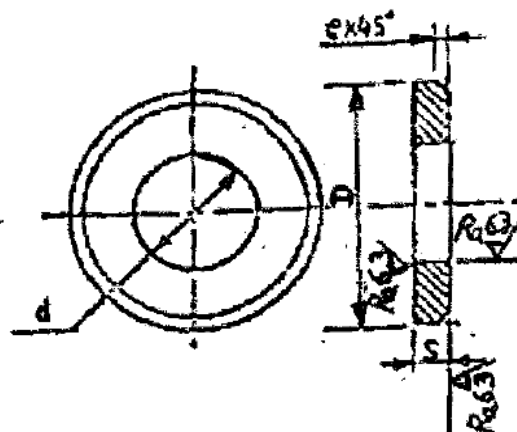
- 1) IS: 6821
- 2) AA0230408
- 3) AA7161002
- 4) AA7161004

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
		PAGE 3 of 3


Note:

- Corporate sub codes are shown in Table
- 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

	CORPORATE STANDARD			AA7171089		
				Rev. No. 07		
				PAGE 1 of 3		
PINS, SPLIT, STEEL						
1 DESIGNATION						
A split pin of nominal size 5mm, nominal length 50mm and made of steel shall designated as:						
1.1 On drawings						
i) Material specification column : AA7171089						
ii) Description column : PIN SPLIT 5 X 50 – ST						
1.2 On indents						
Pin split 5 x 50: AA7171089						
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 549: 2005, Table-1.						
2.2 Material						
Half round mild steel wire, as per IS 10794.						
2.3 Finish						
The end of each leg shall be bevelled and shall free from burrs. The eyes shall be as round in shape as possible and shall bend into the legs without sharp notches.						
Revisions: Clause 2.1				APPROVED: INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC (Fasteners)		
Rev. No. 07	Amd. No.	Reaffirmed	Prepared EDN, Bangalore		Issued Corp. R&D	Dt. of 1 st Issue 01-01-1977
Dt: 18-03-2022	Dt:	Year: 20				

AA7171089

Rev. No. 07

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CORPORATE STANDARD**3 NOTE**

3.1 Length and diameter combination (refer Table-1 on page 3 of 3) between the bold lines should only be used.

3.2 Nominal length (L) is the distance from underside of the eye to the extreme end of the short leg.

3.3 Nominal size is the diameter of the hole for receiving the split pin.

3.4 Weights given in this standard are for general reference only and are not meant for commercial transactions.

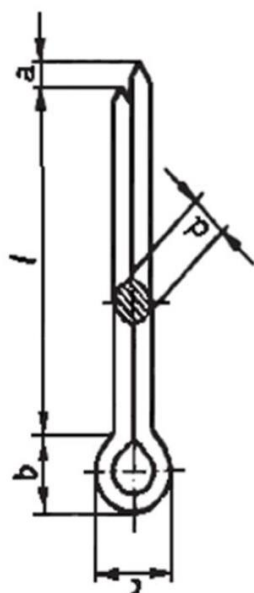
3.5 When fasteners are to be tested with in BHEL, sampling and acceptance plan as per IS 6821, Table-2 shall be followed for physical properties:

LOT SIZE	SAMPLE SIZE	ACCEPTANCE No
Upto 1000	5	0
1001 – 3000	8	0
3001 – 10000	13	0
10001 – 35000	20	0
Over 35000	32	1

4 REFERRED STANDARDS (Latest publications including amendments):

- 1) IS 549
- 2) IS 6821
- 3) IS 10794

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2) Weights have been shown in kg/1000 Nos.

Table - 1	All dimensions are in mm
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[illegible]

	CORPORATE STANDARD		AA0673603
			Rev. No. 04
			PAGE 1 of 6

PROCESS FOR ELECTROPLATING OF ZINC ON STEEL SURFACES FROM CYANIDE BATH

1 GENERAL

This standard details the process for high-speed bright zinc plating on steel surfaces from cyanide zinc solution bath by tank or barrel to provide protection against corrosion and to give a bright attractive finish to the surface.

2 APPLICATION

Used for components like fasteners, nuts, bolts, electronic panels etc. This process is not suitable for plating on cast iron surfaces.

3 COMPLIANCE WITH NATIONAL STANDARDS

This Standard has reference to the following Indian Standards regarding surface condition and quality of deposit.

IS 1340 : 1977 : Code of Practice for chromate conversion coating on Zinc and Cadmium coated articles and zinc base alloys.

IS 1573 : 1986 : Electroplated coatings of Zinc on Iron and Steel.

IS 3203 : 1982: Methods of Testing Local Thickness of Electroplated Coatings.

IS 9844 : 1981: Method of testing of corrosion resistance of Electroplated and Anodized Aluminium coatings by neutral salt spray test.

4 MATERIALS

Material	CPS No./IS No./Available from
Sodium cyanide for electroplating	AA55610
Caustic Soda (Tech.)	AA54201
Nitric Acid (Tech.)	AA54102
Zinc Anodes (99.98% Purity, Min.) (Grade 1)	IS 2605
Bright Zinc Salts	M/s. Ronuk Industries Ltd. Mumbai
Zinc Brightener Zn-21	
Zinc Brightener Zn-22	
Zinc Purifier	
Zinc Brite 16 Salt	
Zinc Brite 20 Brightener	M/s. Grauer & Weil (I) Ltd., Mumbai
Monicol Purifier	
Zinek Salt - 501	
Super Zinc Brightener – 505	M/s. Platelwel Processes & Chemicals Ltd., Vadodara
Supra Zinc Brightener 555	
Zincad Purifier - 503	
Teknobrite CZ 920 Salt	M/s. Artek Surfin Chemicals (P) Ltd., Mumbai

Revisions: As per clause 28.16.6 of MOM of 28th MRC (CPO)

APPROVED:
INTERPLANT MATERIAL RATIONALISATION
COMMITTEE – MRC (CPO&NM)

Rev. No. 04	Amd. No. 02	Reaffirmed	Prepared HEP, Bhopal	Issued Corp. R&D	Dt. of 1 st Issue 01-01-1985
Dt: 15-10-2000	Dt: 15-10-2002	Year: 2021 23			

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Rev. No. 04		
PAGE 2 of 6		

Teknobrite CZ 920 Brightener	M/s. Artek Surfin Chemicals (P) Ltd., Mumbai
Purisol	

5 EQUIPMENT

5.1 Plating Tank / Vat

The Tank/vat shall be made of plain welded steel sheets with rubber lining. The vat shall be provided with an insulated frame on top fitted with insulators for holding the anode and cathode rods. The tank shall also be provided with exhaust system.

5.2 Barrel

The plating barrel shall be constructed out of polypropylene perspex and shall be so driven as to rotate at 5 to 12 rpm.

5.3 Rinsing Tanks

Mild steel tank lined with rubber / FRP / PVC.

5.4 Hot Water Rinsing Tank (Optional)

Mild steel tank with rubber / FRP lining and heating arrangements.

6 COMPOSITION OF ELECTROLYTE AND OPERATING INSTRUCTIONS

6.1 Composition of Electrolyte (Bath Solution) and Operating Conditions

The electrolyte shall be prepared according to any one of the following compositions and operated at the conditions specified below:

	Parameter	Composition			
		I RONUK	II G&W	III PLATEWEL	IV ARTEK SURFIN
Sl. No.	Name of salt	Bright Zinc	Zinek. Brite	Zinek 501	Tekno Brite CZ 920
	Salt Content				
	For vat	180-200	200	200	200
	For barrel	200-220	200	200	200
1	Zinc Brightener Zn-21, ml/l	1.5	---	---	---
2	Zinc Brightener Zn-22, ml/l	2.5	---	---	---
3	Super zinc	---	---	6-8	---
	Brightner-505, ml/l	---	---	3-5	---
4	Supra Zinc				
	Brightener 555, ml/l	---	3-5	---	---
5	Zinc Brite 20				
	Brightener, ml/l	---	3-5	---	---
6	Tekno Brite CZ 920 Brightener	---	---	---	2-4
7	Monicol Purifier, ml/l	---	5	---	---
8	Zincad Purifier-503, ml/l	---	---	5	---
9	Purisol, ml/l	---	---	---	4
10	Temperature	Room-55	20-45	25-55	20-45
11	Anode to Cathode Ratio	1:1	1:1	1:1	1:1
12	Current density, A/dm ²				
	a) For vat	1.5-4.5	2-5	2-5	2-5
	b) For barrel	1.5-4.5	0.5-2	0.5-2	0.5-2

	CORPORATE STANDARD	AA0673603
		Rev. No. 04
		PAGE 3 of 6

13	Voltage, (Volts)				
	a) For vat	6-8	2-6	3-6	2-5
	b) For barrel	12-15	10-15	12-16	10-15

6.2 Preparation of Electrolyte

6.2.1 The vat/barrel shall be filled with water, preferably with demineralised water, to about two-thirds of its capacity.

6.2.2 The required amount of salt shall be added to the bath in small quantities with stirring.

6.2.3 The temperature of the solution should not raise beyond 70°C.

6.2.4 Stirring shall be continued until all the salts get dissolved.

6.2.5 The solution shall then be brought upto the working level by adding cold demineralised water. At this stage the temperature of the bath shall be at the working range.

6.2.6 The requisite amount of purifier shall now be added to the solution and stirred thoroughly. If necessary, filtration at this stage shall be carried out. Then requisite amount of brightener shall be added.

6.3 Analysis of the Electrolyte

The solution shall be analysed initially after make up and subsequently at suitable intervals.

6.4 Maintenance of the Electrolyte


6.4.1 The concentration of the electrolyte shall be maintained as below:

Parameter	Composition			
	I	II	III	IV
	RONUK	G&W	Platewel	ARTEK
Zinc as metal, g/l	33-40	30-40	30-34	30-40
Total Sodium Cyanide, g/l	90-105	75-140	80-90	75-140
Total Sodium Hydroxide, g/l	75-93	65-85	70-80	65-85
Sodium Cyanide to Zinc ratio	2.5-3:1	2.5-3.5:1	2.7-3.2:1	2.5-3.5:1

6.4.2 Addition of Brighteners

Brightness of the deposit shall be maintained by adding brighteners for every 1000 ampere-hours as shown below:

Brightener	Composition			
	I	II	III	IV
	RONUK	G&W	PLATEWEL	ARTEK
Brightener Zn-21, ml	60	---	---	---
Brightener Zn-22, ml	100	---	---	---
Zinc Brite 20 Brightener:				
i) For vat, ml	---	100-150	---	---
ii) For barrel, ml	---	150-200	---	---
Super Zinc Brightner-505:				
i) For vat, ml	---	---	150	---
ii) For barrel, ml	---	---	200	---
Supra Zinc Brightener – 555	---	---	100	---
Teknobrite CZ 920 Brightener	---	---	---	100-250

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Rev. No. 04		
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Brighteners may be added directly into the bath and stirred well. Excess of brightner must be avoided.

6.4.3 Bath shall be analyzed periodically and if the values do not lie in the limits as given in 6.3.1, required chemicals shall be added to the bath to bring the composition to the required level.

6.4.4 Purification of Electrolyte:

The electrolyte shall be filtered at least once in a week or as required addition of 0.25 ml of zinc purifier per litre of solution for Composition-I, 0.1 to 0.2 ml of Monicol per litre for Composition-II and 0.1 to 0.2 ml of Zincad-503 purifier for Composition-III shall be made daily and stirred well to eliminate impurities in the solution and also to settle before resuming the work.

7 PROCESS:

7.1 Cleaning

All articles shall be properly cleaned as described in BHEL Standard AA0673601: Process for cleaning and preparation of metal surfaces prior to electroplating or BP0673693: Electroplating of zinc on steel surface from Acid bath.

7.2 Rinsing

All articles shall be rinsed thoroughly after cleaning to avoid contamination of the plating solution.

7.3 Plating

It shall be ensured that the current is on before the articles are put into barrel or tank.

All articles shall be plated at the specified current density for a duration, which will depend on the thickness of the deposit required.

7.4 Cold Rinsing

After removal from the plating bath, all articles shall be rinsed thoroughly in cold running water till all the traces of solution are removed.

7.5 Drying

The rinsed articles shall be dried using a centrifugal drier or hot air blower /hot air oven.

8 HEAT TREATMENT: (Whenever required)

Note : Steels of tensile strength of 100 kgf/mm² or corresponding hardness should be heat treated.

8.1 Stress Relieving Before Plating: (IS 1573)

In accordance with IS 1573.

8.2 Stress Relieving after Plating: (IS 1573)

In accordance with IS 1573.

9 PASSIVATION

Electroplated heat treated articles shall be passivated as per AA0673604 : Process for Passivation of Zinc And Cadmium Plated Articles.


10 CARE OF ANODES

Anodes shall be removed from the bath when the bath is idle.

Ensure that the anodes are bright in luster while plating is on.

11 PRECAUTIONS

11.1 While preparing the solution the operator shall use rubber hand gloves, apron and respirator mask to avoid irritation of skin and suffocation due to fumes. The safety precautions for electroplating shop and handling of chemicals given in AA0462801 shall be followed.

	<h1 style="text-align: center;">CORPORATE STANDARD</h1>	AA0673603
Rev. No. 04		
PAGE 5 of 6		

11.2 Solution shall be kept covered when not in use.

11.3 Any chemical that may be necessary to be added shall be dissolved in a part of the original solution (except brighteners) before adding it to the vat/barrel. It shall be poured through a filter or perforated bucket.

11.4 Any metal that may be deposited on any part of the vat/barrel shall be removed immediately.

11.5 Any article that becomes lodged in any part of the vat / barrel shall be removed immediately.

11.6 Remove Zinc Anode at the end of shift so as to avoid dissolution of zinc metal during idle period.

12 INSPECTION AND QUALITY OF DEPOSIT

When tested in accordance with the test methods shown against each, the deposit shall conform to the norms specified below:

12.1 SAMPLING

Minimum of 1% of each batch of tank/barrel load of part there of shall be taken at random for testing with a minimum of 5 samples. When plated components are big and cannot be subjected to any of the specified test, a test panel of suitable size of the same basis metal shall be plated along with component under identical conditions for the purpose of testing. For corrosion resistance tests, test piece of minimum 150 mm. length, and 100 mm width and approximately 1 mm thick shall be used.

12.2 Condition of Surface

The plated surface shall appear as a smooth and continuous film over the basis metal and shall be free from defects such as pits, stains, cracks, blisters, nodules, pinholes, un-plated areas and other superficial blemishes visible to the unaided eye. The plated surface shall be bright with required passivation.

12.3 Thickness of Deposit (IS 3203)

The minimum thickness shall be as specified on relevant drawing on BHEL order.

12.4 Adhesion (IS 1573)

Flaking and blistering of the coating is not acceptable and the coating shall continue to adhere to the base metal after this test.

12.5 Humidity test (IS 1573)

Breakdown of the film or appearance of white corrosion products after two cycles of the test shall be taken as failure.

13 ADDITIONAL TESTS

Whenever required, the following test shall be conducted as per the test methods shown against each and the norms of acceptance shall be as specified below:

13.1 SALT SPRAY TEST (IS 9844)

When tested in accordance with IS 9844 white corrosion products shall not be visible within 96 hours on plated and passivated components.

14 REJECTION

If the samples taken do not comply with clauses 12.2 to 12.5 and 13, a further quantity not less than twice the number originally taken, shall be subjected to these tests. If any one of these samples also fails, the whole batch shall be rejected.

AA0673603

Rev. No. 04

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CORPORATE STANDARD**15 REFERRED STANDARDS (Latest Publications Including Amendments)**

- 1) IS 1573
- 2) IS 2605
- 3) IS 9844
- 4) AA54102
- 5) AA54201
- 6) AA55610
- 7) AA0673601
- 8) AA0673604



CORPORATE STANDARD

AA0673604

Rev. No. 05

PAGE 1 of 3

PROCESS FOR PASSIVATION OF ZINC AND CADMIUM PLATED ARTICLES

1 GENERAL

This standard details the compositions of the passivation solution and the procedure for passivation of zinc and cadmium electroplated articles.

2 APPLICATION

To increase resistance to corrosion and finger marking.

3 COMPLIANCE WITH NATIONAL STANDARDS

This standard has reference to the following Indian standards regarding the quality of the passivated film:

IS 1340 : 1977: Code of practice for chromate conversion coating on zinc and cadmium coated articles and zinc base alloys

IS 1573 : 1986: Electroplated coating of zinc on iron and steel.

4 MATERIAL

Material	CPS No. / IS No. /Available From
Sulphuric Acid (Technical)	AA54101
Nitric Acid (Technical)	AA54102
Chromic Acid-Electroplating Grade	AA54104
Sodium Bichromate (Technical)	AA55612
Ginthox - Q.982 (L)	M/s Grauer & Weil (I) Ltd., Mumbai.
Ginthos – 995	
Kempas – 755	M/s Artek surfen Chemicals (P) Ltd., Mumbai
Zinc chrome 62L	M/S Platewel & process chemicals, Vadodara

5 EQUIPEMENT

5.1 Passivating Rinsing Tank

FRP/PVC lined mild steel tank preferable with heating arrangements.

5.2 Cascade Rinsing Tank

FRP/PVC lined mild steel tank with suitable partitions and provided with running water facilities, water cascading from one partition to the other

5.3 Acid Treatment Tank (Optional)

FRP/PVC lined mild steel tank


5.4 Rinsing Tank - After Acid Treatment - (optional)

FRP/PVC lined mild steel tank

Revisions: As per 40th MOM of MRC-CPO

APPROVED:
INTERPLANT MATERIAL RATIONALISATION
COMMITTEE – MRC (CPO&NM)

Rev. No. 05	Amd. No.	Reaffirmed	Prepared HEEP, Haridwar	Issued Corp. R&D	Dt. of 1 st Issue 01-02-1986
Dt: 26-05-2012	Dt:	Year: 2021 29			

AA0673604	CORPORATE STANDARD	
Rev. No. 05		
PAGE 2 of 3		

5.5 Hot Air Oven
Hot air oven suitable for heating 50-70°C

5.6 Centrifugal Drier
A standard centrifugal drier suitable for drying barrel components

6 COMPOSITION/PREPARATION OF SOLUTIONS & OPERATING INSTRUCTIIONS

6.1 Passivating Solution

6.1.1 Composition and Operating Conditions
The passivating solution shall be made of any one of the following compositions and operating conditions

6.2 Preparation of solution

6.2.1 The tank shall be filled with water preferably demineralised water to about two-thirds of its capacity.

6.2.2 The required amount of salt/chemical shall be added to the bath in small quantities with stirring.

6.2.3 After complete dissolution, the required quantity of recommended acid shall be poured to the solution with stirring.

6.2.4 Finally, the solution shall be brought to the operating level by adding water.

6.3 Maintenance of the solution
Any deficiency of the acid from the above composition shall be corrected by cautions addition of concentrated acid.

After the solution has been working from some time/and or any deficiency in the solution, if observed, then the passivating chemicals shall be added to keep the solution upto the working strength, or if required a fresh solution shall be prepared. While making the addition the salt shall be dissolved in the separate acid resisting container with the required quantity and then added to the tank.

7 PROCESS

7.1 Acid Treatment

7.1.1 Zinc/cadmium plated, heat treated articles after proper rinsing, shall be dipped in 0.4 to 0.5% nitric acid solution for 5-10 seconds.

7.1.2 After acid treatment, the articles shall be rinsed in clean cold running water.

7.2 Passivation

7.2.1 The articles shall then be immersed in the passivating solution as specified in clause 6.1.1 for 10 to 30 seconds.


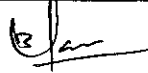
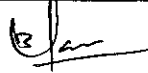
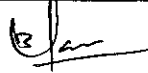
7.2.2 The articles shall be drained for about 30 seconds after passivation.

7.2.3 The passivated articles shall be double rinsed in cold water for a period sufficient to ensure that water draining from the articles contains no trace of yellow colouration. The total rinsing time shall not be longer than 5 minutes.

7.2.4 After rinsing, the articles shall be dried off using air oven/compressed air. In case of barrel plating, the articles shall be dried by means of centrifugal drier.

PAGE 3 of 3

- 1) IS 1340
- 2) IS 1573
- 3) IS 8602
- 4) AA54101
- 5) AA54102
- 6) AA54104
- 7) AA55612

 TSD 6206 A	PLANT PURCHASING SPECIFICATION BHOPAL	BP 10570 Rev No. 07 PAGE 1 OF 3 SUPERSEDES BP 10570 Rev.06				
<u>CHROMIUM VANADIUM SPRING STEEL STRIP COLD ROLLED -ANNEALED</u>						
<table border="1" style="width: 100%;"> <tr> <td data-bbox="156 1833 783 1975"> Revision : Reviewed & brought upto date. </td> <td data-bbox="788 1833 1495 1975"> Issued by :  STANDARDS AND MATERIALS GROUP TECHNICAL SERVICES DEPARTMENT </td> </tr> <tr> <td data-bbox="156 1981 459 2028"> Rev.07 </td> <td data-bbox="464 1981 1495 2028"> Date: 12.03.2022 </td> </tr> </table>			Revision : Reviewed & brought upto date.	Issued by :  STANDARDS AND MATERIALS GROUP TECHNICAL SERVICES DEPARTMENT	Rev.07	Date: 12.03.2022
Revision : Reviewed & brought upto date.	Issued by :  STANDARDS AND MATERIALS GROUP TECHNICAL SERVICES DEPARTMENT					
Rev.07	Date: 12.03.2022					

1. GENERAL :

This specification governs the requirements of cold rolled, annealed springs steel strips from 0.10 to 5.00 mm thick.

Refer to BP 10571 for chrome vanadium spring steel wire annealed.

2. APPLICATION:

For the manufacture of springs.

3. CONDITION OF DELIVERY:

The material shall be supplied in coils in the fully annealed condition suitable for subsequent heat treatment.

The strips shall be supplied with sheared edges free from burrs, unless otherwise specified. The surface shall have a dull finished

The strips shall be treated with a continuous coating of oil containing rust and oxidation inhibitors.

4. 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: 2507 -1975: (Reaffirmed 2015) : "Specification for cold rolled steel strips for springs"
Grade -.50Cr4V2

5. DIMENSION AND TOLERANCE:

5.1 Sizes:

All sizes shall be selected from table 2 and table 3 of IS 2507



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5.2 Tolerance:

5.2.1 Thickness:

Tolerance of thickness of the steel strip shall comply with IS 2507 table 2. The thickness of the steel strips shall be measured at a position not less than 10% of the ordered width from the edge for widths up to and including 75 mm. For higher widths the position of measurement of thickness shall be not than 10 mm from edges.

The variation in thickness of the material across the width shall not exceed half the total tolerance.

5.2.2 Width:

Tolerance on width when supplied in sheared edges shall comply to IS:2507: Table 3.

5.2.3 Flatness:

When a 5-meter 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, raised should be measured from the surface nearer to the flat surface.

5.2.4 Edge Camber – (Lateral departure of the edge of the material from straight line forming a chord) shall not exceed the tolerance given in the table 4 of IS:2507

6. MANUFACTURE:

Steel shall be manufacture by the open hearth, electric, duplex, basic oxygen or a combination of these processes. Steel shall be of the killed type.

7. FREEDOM FRIM DEFECTS:

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

8. RESPONSE TO HEAT TREATMENT:

Sample cut from the material, as received and hardened at a temperature of 830-860⁰ C in oil followed by tempering at 420-440⁰ C and air cooled shall have a hardness of 420-475 HV.

9.0 CHEMICAL COMPOSITION:

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

Element	Melt analysis percent		Permissible variation percent
	% Min	%Max	
Carbon	0.45	0.55	± 0.03
Mangnese	0.50	0.80	± 0.04
Silicon	0.10	.035	± 0.03
Chromium	0.90	1.20	± 0.03
Vanadium	0.15	0.30	± 0.02
Sulphur	--	0.050	± 0.005
Phosphorus	--	0.050	± 0.005



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10.0 TEST SAMPLES:

10.1 One test sample shall be taken per size per heat per consignment.

10.1 Test pieces for mechanical properties shall be taken in the direction of rolling.

11.0 MECHANICAL PROPERTIES: As received.

11.1 Tensile:

When tested in accordance with IS 1608, the test pieces shall show the following properties in the longitudinal direction.

Tensile strength	:	780 N/mm ² Max.
Yield strength	:	340 N/mm ² Min
5.65 \sqrt{so} gauge length	:	20 percent Min.

11.2 Hardness:

When tested in accordance with IS 1501, the material shall show a Vickers hardness of 240 HV maximum.

12.0 TEST CERTIFICATE:

Three copies of a test certificate shall be supplied unless otherwise stated on the order. In addition, the supplier shall ensure to enclose one copy of the test certificate along with their dispatch document to facilitate to quick clearance of the material. The certificate shall bear the following information:

BHEL Reference

BP 10570 (Rev.07) :Chromium vanadium spring steel strip cold rolled -annealed

Order No

Supplier Name

Melt / Heat & Batch no

Identification No.

Result of tests:

Result of chemical analysis and mechanical tests and response to heat treatments (Cl.8)

13.0 PACKING & MARKING:

Strips shall be supplied in coils unless otherwise stated on the order. It shall be securely bound and packed in water – proof paper to withstand damage during transit. Each package shall bear a metal tag with the following information:

BP 10570 : Chromium vanadium spring strip cold rolled – annealed.

BHEL Order No

Supplier's Name

Consignment or identification no.

Size & weight



BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL

QUALITY ASSURANCE PLAN FOR BRUSH HOLDER ASSY TO BHEL ORDERING SPECIFICATION/DRAWING AS PER PO

QUALITY PLAN NO. – QAP/OTM/VENDOR QAP/2024-25/ BRUSH HOLDER ASSY DTD 11.11.2024 REV 00
Reference Document- PO DRAWING/SPECIFICATION

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SL. NO	COMPONENT	CHARACTERISTICS	TYPE OF CHECK	QUANTAM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	INSPECTION AGENCY	REMARKS
				TP	TP/A					
1)	Raw Material (all items)	Test	TC Verification	100%	100%	As per drawing & Specification	As per drawing & Specification	MTC	BHEL/TP/A	TEST LAB NABL/EQUIVALENT ACCREDITED/SOURCE MILL /Supplier to get the raw material correlated with material TC & invoice
2)	Dimension	Dimension	TC Verification & Measurement	100%	5%	As per drawing & Specification	As per drawing & Specification	Supplier record	BHEL/TP/A	Supplier internal report for 100 % to be reviewed and 5 % to be Witness by TP/A
3)	Brush spring pressure	Routine test	TC Verification & testing	100%	5%	As per drawing & Specification	As per drawing & Specification	Supplier record	BHEL/TP/A	Supplier internal report for 100 % to be reviewed and 5 % to be Witness by TP/A
4)	Zinc coating	Coating thickness	TC Verification & testing	100%	1 %	As per drawing & Specification	As per drawing & Specification	Supplier record	BHEL/TP/A	Supplier internal report for 100 % to be reviewed and 1 % to be Witness by TP/A
5)	Identification vendor name, PO & job serial no.	Visual	Visual	100%	10%	As per drawing & Specification	As per drawing & Specification	Supplier record	BHEL/TP/A	Witness

Prepared By

SHRIYAMIT SINGH

Senior Engineer

QAP/OTM/TP/A

QAP/OTM/TP/A

Approved By

गोपल रीठ राठोर / G.S. RATHORE

Manager

QAP/OTM/TP/A

QAP/OTM/TP/A



BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
QUALITY ASSURANCE PLAN FOR BRUSH HOLDER ASSY TO BHEL ORDERING SPECIFICATION/DRAWING AS PER PO

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SL. NO	COMPONENT	CHARACTERISTICS	TYPE OF CHECK	QUANTAM OF CHECK		REFERENC E DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	INSPECTION AGENCY	REMARKS
				TP	TP/A					
1)	Raw Material (all items)	Test	TC Verification	100%	100%	As per drawing & Specification	As per drawing & Specification	MTC	BHEL/TP/A	1.TC FROM NABL LAB 2.Supplier to get the raw material correlated with material TC & invoice
2)	Dimension	Dimension	TC Verification & Measurement	100%	5%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TP/A	Supplier internal report for 100 % to be reviewed and 5 % to be Witness by TP/A
3)	Brush spring pressure	Routine test	TC Verification & testing	100%	5%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TP/A	Supplier internal report for 100 % to be reviewed and 5 % to be Witness by TP/A
4)	Zinc coating	Coating thickness	TC Verification & testing	100%	1 %	As per drawing & specification	As per drawing & specification	Supplier record	BHEL/TP/A	Supplier internal report for 100 % to be reviewed and 1 % to be Witness by TP/A
5)	Identification vendor name, PO & job serial no.	Visual	Visual	100%	10%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TP/A	Witness

Prepared By

अभिषेक वर्मा / Asstt. Engr.
अभिषेक / Engineer
यू.पी.एम. विभाग / Q.T.M. Divn.
बी.एस.ई.एल., भोपाल/BHEL, Bhopal

Approved By

गजेन्द्र सिंह राठौर / G.S. RATHORE
अधीक्षक / Dy. Manager
यू.पी.एम. विभाग / Q.T.M. Divn.
बी.एस.ई.एल., भोपाल/BHEL, Bhopal



QUALITY ASSURANCE PLAN FOR BRUSH HOLDER ASSY TO BHEL ORDERING SPECIFICATION/DRAWING AS PER PO

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Reference Document- PO DRAWING/SPECIFICATION

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Abbreviation: TPPIA – BHEL appointed third Party Inspecting Agency, TP – Task Performer (vendor), RR-Record Review,

Prepared By

Approved BY HORE

Manager

Division

वयू.टी.ए. / C.A. / M.A.
भारत / RHE.L., BHOPAL

बी.एच.ई.एल., भापाला D.A. (1987)