



CORPORATE PURCHASING SPECIFICATION

AA19941

Rev No.02

PAGE 1 of 4

LEADED GUNMETAL SAND CASTINGS

1.0 GENERAL:

This specification governs the requirements of leaded gunmetal sand castings.

2.0 APPLICATION:

Suitable for general casting required for fair strength, soundness, good machinability and pressure tightness.

3.0 CONDITION OF DELIVERY: As specified in the order/drawing.

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

IS:1458–1965, Class V – Specification for Railway Bronze Ingots and castings.

5.0 DIMENSIONS AND TOLERANCES:

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.

6.0 MANUFACTURE:

Sand Cast / Centrifugal cast, if specified on drawing or in purchase order.

7.0 FINISH:

All castings shall be properly fettled, dressed and all surfaces shall be thoroughly cleaned.

8.0 FREEDOM FROM DEFECTS:

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.

Revisions:
Clause.25.1 of MOM of MRC-NFM+HE

APPROVED:
INTERPLANT MATERIAL RATIONALISATION
COMMITTEE – MRC(NFM+HE)

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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="text-align: center;">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.

AA19941	CORPORATE PURCHASING SPECIFICATION	
Rev. No.02		
PAGE 4 of 4		

16.0 PACKING AND MARKING

Castings shall be suitably packed to prevent corrosion and damage during transit.
Machined surface shall be properly protected with anti-corrosive compounds.

Each package or casting shall be legibly marked with the following information:

- 1) BHEL Order No.
- 2) AA19941
- 3) Heat No.
- 4) Identification Mark/No.
- 5) Weight
- 6) Supplier's reference and Name

17.0 REFERRED STANDARDS (Latest Publications including Amendments)

- 1) AA0230402 2) IS:4027 3) IS:1608

	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:

- 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)		
Rev No.07	Amd No.	Reaffirmed	Prepared HEP, Bhopal	Issued Corp.R&D	Dt. of 1 st Issue September 1976
Dt:15-06-2005	Dt:	Year:2019			

AA10112

Rev No. 07

PAGE 2 of 4

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:

	CORPORATE PURCHASING SPECIFICATION		AA10112
			Rev No. 07
			PAGE 3 of 4

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

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)

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COMMITTEE – MRC (CPO&NM)

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AA0673603

Rev. No. 04

PAGE 2 of 6

CORPORATE STANDARD

Teknobrite CZ 920 Brightener

Purisol

M/s. Artek Surfin Chemicals (P) Ltd., Mumbai

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 b) For barrel	6-8 12-15	2-6 10-15	3-6 12-16	2-5 10-15
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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

AA0673603

Rev. No. 04

PAGE 4 of 6

CORPORATE STANDARD

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.

	CORPORATE STANDARD	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

PAGE 6 of 6

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			

AA0673604

Rev. No. 05

PAGE 2 of 3

CORPORATE STANDARD**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 INSTRUCTIONS**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 cautious 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.

	<p align="center">CORPORATE STANDARD</p>	AA0673604
		Rev. No. 05
		PAGE 3 of 3

<p>7.3 Age Hardening</p> <p>No article shall be used in assemblies within 24 hours of age hardening after passivation.</p> <p>Note:</p> <p>After passivation, no heat treatment of the plated articles shall be done.</p> <p>8 INSPECTION</p> <p>8.1 Visual</p> <p>All the jobs shall be tested visually the passivated film shall have a greenish iridescent or greenish yellow iridescent appearance, free from areas of unconverted zinc or cadmium plating.</p> <p>8.2 Adhesion (IS 8602)</p> <p>Adherence may be determined after age hardening by rubbing the surface with white paper. The paper must not show more than a slight trace of stain and the treated surface shall not show signs of having been rubbed through.</p> <p>8.3 Chromate Film Test (IS 1573)</p> <p>The chromate film shall be free from bare (unconverted zinc) patches and shall be adherent.</p> <p>9 REFERRED STANDARDS (Latest Publications Including Amendments)</p> <p>1) IS 1340</p> <p>2) IS 1573</p> <p>3) IS 8602</p> <p>4) AA54101</p> <p>5) AA54102</p> <p>6) AA54104</p> <p>7) AA55612</p>

	AMENDMENT -NOTIFICATION		AA 067 36 16		Rev. No. 01	
			PAGE 1 OF 1			
<p align="center"> AA 067 36 16: PROCESS FOR MANGANESE PHOSPHATING OF FERROUS SURFACES BY IMMERSION PROCESS </p> <p> PAGE 1 OF 7; Cl 3.0 COMPLIANCE WITH NATIONAL STANDARDS </p> <p> Year of IS reference is modified as follows: </p> <p> IS:3618-66 (Reaffirmed 1997) </p>						
<p align="center">Please see Instructions on the reverse.</p>						
Ref : Cl; 31.11.19 of MOM of MRC-C		Amd No. 03	Approved MRC- C	Issued CORP. R&D	Date 15.10.2002	Cum.Sr.No. A 3170

165209/2024/HFR

TXM20581

AA 067 36 16

REV. No. 01



AMENDMENT -NOTIFIFCATION


PAGE 1 OF 1

AA 067 36 16: PROCESS FOR MANGANESE PHOSPHATING OF FERROUS SURFACES BY IMMERSION PROCESS

- 1) PAGE 5.7; CI 8.3:
Ferrous ION given in the title is modified as "ferrous iron"
- 2) PAGE 6.7; CI 8.3.3:
Ferrous ION given in the first sentence is modified as "ferrous iron"

Please see Instructions on the reverse.

Ref : CL No. 28.16.19 of MOM of 28 th MRC(C)	Amd No. 02	Approved MRC (C)	Issued CORP. R&D	Date 15.10.2000	Cum.Sr.No. A 2868
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	AMENDMENT - NOTIFICATION		AA 067 36 16 Rev. No. 01		
			PAGE 1 OF 1		
AA 067 36 16 : PROCESS FOR MANGANESE PHOSPHATING OF FERROUS SURFACES BY IMMERSION PROCESS					
1.0 Page 3 of 7 Cl. 6.1.3 “ 9 Mmersion Time “ is replaced by “Immersion Time”					
2.0 Page 5 of 7					
2.1 Cl. 8.2 The existing matter is replaced by the following: “The concentration of bath solution shall be regularly checked depending upon the use of bath and maintained as detailed below”.					
2.2 Cl. 8.3 The title is replaced by the following: “Ferrous ion concentration maximum 0.5%”.					
2.2 Cl 8.3.2, “The existing matter is replaced by the following” No. of ml of 0.1 N Potassium Permanganate consumed x 0.056 = Percentage of Ferrous Iron.					
3.0 Page 6 of 7 CL. 8.3.3 In the 1 st sentence “when ferrous ION concentration reaches....” is replaced by the following: “ when ferrous ion concentration reaches....”					
Please see Instructions on the reverse.					
Ref ; Cl 27.4.3 of MOM of MRC (C)	Amd. No. 01	Approved MRC (C)	Issued CORP. R&D	Date 15-08-99	Cum.Sl.No. A 2587



CORPORATE STANDARD

AA 0673616

Rev.No. 01

PAGE 1 OF 7

PROCESS FOR MANGANESE PHOSPHATING OF FERROUS SURFACES
BY IMMERSION PROCESS

1. GENERAL:

This standard details the process for producing a black, non-metallic crystalline, antifriction, coating of manganese - iron phosphate on steel and iron surfaces and its subsequent treatment in oil and varnish.

2. APPLICATION:

This corrosion resistant coating reduces wear on moving parts such as piston, piston rings, gears, liners, bolts, nuts, tools, camshafts, compressor shafts, lubrication boxes, cylinders and all types of machine parts where ever wear is a constant factor to be considered.

3. COMPLIANCE WITH NATIONAL STANDARDS:

This standard has reference to the following national standards in respect of surface condition and quality of deposits.

IS: 3618-1966 : Phosphate treatment of iron and steel
(Reaffirmed 1991) for protection against corrosion.

4. MATERIALS:

Material	CPS.No.	IS No.	Avialable From
4.1 Insulating Oil (Low viscosity)	: AA 27101	(IS : 335)	
4.2 Chromic Acid	: AA 54104	(IS : 330)	
4.3 Rusto-proof pc-19	: AA 55608	M/s.Peddington Chemical Industry, Bombay.	
4.4 Trichloroethylene (Technical)	: AA 56706	(IS : 245)	

Revisions: C1.26.6.9 MOM OF MRC (C)

Approved:
INTERPLANT MATERIAL RATIONALISATION
COMMITTEE - MRC (C)

Rev.No. 01	Amd.No.	Reaffirmed	Prepared	Issued	Dt. of 1st Issue
Dt. 15-11-97	Dt.	Year:	BHOPAL	CORP. R&D	JAN' 85

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AA 067 36 16

Rev. No. 01

PAGE 2 OF 7

CORPORATE STANDARD



- 4.5 Sufix MN - 641 : M/s.Grauer & Weil (I) LTD.,
Bombay.
- 4.6 Kemfix Mn 741 : M/s.Artek Surfin Chemicals (P) Ltd.
Bombay.
- 4.7 Black Stain Shellac Varnish : M/s.C.I.T. BHÉL, Bhopal and
M/s.Shalimar Paints, Bombay.

5. **EQUIPMENT:**5.1 **Phosphating Tank:**

Mild steel tank preferably lined with hard rubber or propylene and fitted with a water supply, an over flow and a drain system. Thermostatically controlled heating arrangement shall be provided in the tank.

5.2 **Chronic Acid Tank:**

Mild steel tank preferably lined with hard rubber and fitted with a water supply, an over flow and a drain. Thermostatically controlled heating arrangement must be provided in the tank.

5.3 **Rinsing Tank:**

Mild steel tank provided with a water supply, an overflow and a drain.

5.4 **Air Blowing:**

A high pressure of cool air supply may be provided for initial drying.

5.5 **Staining Tank:**


Mild steel tank fitted with a mild steel lid and a drain cock.

5.6 **Oil Tank:**

Mild steel tank fitted with a mild steel lid and a drain cock.

5.7 **Jigs And Racks:**

Jigs, brackets and suspension hooks must be made of mild steel, stainless steel or bakelite.

	CORPORATE STANDARD	AA 067 36 16
		Rev. No. 01
		PAGE 3 OF 7

6. **PREPARATION OF BATH SOLUTIONS AND OPERATING CONDITIONS:**

6.1 **Phosphating Solution:**

6.1.1 Rusto-Proof PC 19 : 5% (V/V)
Operating Temperature : 95 to 99 C.
Immersion Time : 10 to 30 minutes.

6.1.2 Surfix MN-641 : 7% (V/V)
Operating Temperature : 95 to 99 C.
Immersion Time : 10 to 30 minutes.

6.1.3 Kemfix MN - 741 : 7% (V/V)
Operating Temperature : 95 to 99 C.
Immersion Time : 10 to 30 minutes

6.1.4 The phosphating tank must be thoroughly cleaned before making up the solution.

6.1.5 The clean phosphating tank shall be half filled with clean water and then add the necessary quantity of RUSTO-PROOF PC-19 or SURFIX MN-641 or Kemfix MN 741 to the bath according to the clause 6.1.1, or 6.1.2, or 6.1.3. Bring the solution to working level by adding more water and mix well by stirring and heat to 65 to 70°C.

6.1.5 The bath shall be aged by introducing preferably 50 to 100 gm of cleaned steel wool or scrap iron pieces per 100 litres of bath solution for 30 to 50 minutes. The steel wool shall then be removed and the bath is heated to operating temperature.

6.2 **Chromic Acid Solution:**

6.2.1 Chromic acid : 0.05% (W/V)
Operating temperature : 85 to 90 C.
Immersion time : 0.5 to 1 minute.

6.3 **Black Stain Shellac Varnish:**

The varnish shall be supplied ready for use at room temperature.

6.4 **Insulating Oil:**

The oil shall be supplied ready for use at room temperature.

AA 067 36 16

Rev. No. 01

PAGE 4 OF 7

CORPORATE STANDARD

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**7. PROCESS:****7.1 Cleaning:**

The articles that are to be phosphated shall be free from oil, grease, rust, scale etc. For manganese phosphating rust and scales shall be preferably removed by shot blasting. In case shot blasting is not possible, cleaning shall be done as per Corporate Standard AA 067 36 01.

7.1.1 All articles shall be placed in a basket or jig or otherwise suitably suspended and the dipped in trichloroethylene for few seconds before immersing it in the phosphating bath.

7.2 Phosphating:

All articles shall then be phosphated in the specified operating conditions as mentioned in clause 6.1 and rinsed in clean running water for 15 to 30 seconds.

7.3 Passivation:

After rinsing articles shall be dipped in the Chromic Acid passivation solution for 0.5 to 1 minute.

7.4 Drying:

The articles shall then be dried at high pressure of cool air supply.

7.5 Staining:

Where necessary, after cooling but within two hours of air drying as above, the articles, shall be immersed in black stain shellac varnish for 3 to 5 seconds, removed and allowed to drain and dry in air for atleast 30 minutes.

7.6 Oiling:

After staining, the articles shall be immersed in low viscosity insulating oil for 3 to 5 seconds at room temperature. It shall then be removed from oil and allowed to drain.

8. TESTING & MAINTENANCE :**8.1 Testing of Phosphating Solution:**

The solution shall be tested at suitable intervals by the following procedure:

8.1.1 Clean water shall first be added to the solution, if necessary, to restore the latter to the correct working level, followed by stirring to ensure complete mixing.



CORPORATE STANDARD

AA 06736 16

Rev. No. 01

PAGE 5 OF 7

8.1.2 10 ml. of the working solution shall then be transferred to the 250 ml conical flask. Two or three drops of Alcoholic 1% Phenol-Phthalein indicator must then be added, with shaking.

8.1.3 Sodium Hydroxide 0.10 N shall then be added in with occasional shaking or stirring until a permanent colour change (to pink) is just obtained.

8.1.4 The volume of 0.10 N NaOH in ml required shall be noted. The volume in ml is pointage.

8.2 Maintenance Of Solution Strength/Pointage:

The concentration of bath solution shall be regularly checked depending upon the use of bath and maintainance as detailed below.

8.2.1 If the solution is at the correct working strength/pointage the volume obtained in clause 8.1.4 will lie between 30 and 35 ml. for RUSTO-PROOF PC-19 solution and between 40 & 50 for SURFIX MN- 641, and Kemfix MN-741 solution. If the above tests show any deviation from this range, the strength of the solution shall be adjusted as follows:-

8.2.1.1 If the volume is greater than 35 ml. for RUSTO-PROOF PC-19 or greater than 50 ml for SURFIX MN-641 or Kemfix MN-741 sufficient quantity of the solution shall be removed from the tank and replaced by clean water to reduce the volume within the working range;

8.2.1.2 For Rusto-proof PC-19:

If the volume is less than 30 ml., then for each ml.(pointage) below 30, add 2 litres of PC-19 solution per 1000 litres of bath solution.

For Surfix Mn-641 OR KemFix MN-741:

If the volume is less than 40 ml., then for each ml.(pointage) below 40, add 1.75 litre of Surfix -Mn-641 solution per 1000 litres of bath solution.

8.3 Ferrous ION Concentration Maximum 0.5%:

The following procedure shall be followed for testing.

8.3.1 10 ml. of bath solution shall be taken into a 250ml. conical flask, add 1-2 ml. of 50 % H₂ SO₄ solution to it. Titrate against 0.1 N Potassium Permanganate till colour changes from colourless to pink, persisting for a least 15 seconds.

8.3.2 No.of ml of 0.1 N Potassium Permanganate consumed X 0.056 =
Percentage of Ferrous ION.

AA 067 36 16

Rev. No. 01

PAGE 6 OF 7

CORPORATE STANDARD



8.3.3 When ferrous ION concentration reaches above 0.5% (i.e. consumption of 0.1 N Potassium permanganate is 9 ml.) the phosphate bath should be partially replaced with fresh solution or if required completely discarded.

8.4 Sludge Removal:
The sludge formed during processing shall be removed from the tank and the heating coils after every month. After such cleaning, the solution strength shall be tested as in 8.1 and necessary adjustments made.

8.5 Chromic Acid Solution:
This solution shall be replaced each week.

8.6 Black Stain Shellac Varnish:
The viscosity of varnish at 27 ± 2 in cup-4 to IS:3944 shall be 30 ± 5 seconds and to be tested each week.

8.7 Insulating Oil (Low Viscosity):
The working level of the oil shall be maintained by periodic addition of new oil.

8.8 Speed of Phosphate Coating:
5 to 7 microns of phosphate coating will be deposited in 30 minutes.

9. 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:

9.1 Sampling:
A minimum of 1% of each batch/load or part thereof shall be taken at random for testings. When the components are big and can not be subjected to any of the specified test, a test panel of suitable size of the same basis metal shall be phosphated along with component under identical condition for the purpose of test (approximate size of test panel 5 cm X 10 cm).

9.2 Freedom from Defects: (IS : 3618)

Phosphated surface shall be of mouse black / dark grey crystalline appearance. They shall be free from untreated patches and from flaky and uneven deposits, some time caused by excessive sludge in the bath. They shall be free from scratches, pits and residues of the processing solution as it may initiate deterioration of the organic coating or premature corrosion.

9.3 Weight of coating: (IS : 3618)

7.5 gm/m² minimum.

	CORPORATE STANDARD	<div>AA 067 36 16</div> <div>Rev. No. 01</div> <div>PAGE 7 OF 7</div>
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10. Referred Standards: (Latest Publication Including Amendments)

- 1) AA 27101 2) AA 54104 3) AA 56706 4) AA 55608
- 5) AA 0673601 6) IS : 330 7) IS : 335 8) IS : 245
- 9) IS : 3618



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:

HEEP, Haridwar

Corp. R&D

01-01-1977

AA7121123

Rev. No. 09

PAGE 2 of 3

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 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.



CORPORATE STANDARD

AA7121123

Rev. No. 09

PAGE 3 of 3

<p>Point must be chamfered or for threads \leq M4 may be as rolled (sheared end)</p>										<p>2P Max. Incomplete Thread</p>										<p>Note:</p> <ol style="list-style-type: none">Corporate sub codes are only given in the Table-1For thread runout refer AA0231850Weights have been shown in kg per 1000 No.Sizes beyond chain dotted lines are for Prod Gr. B										<p>All dimensions are in mm.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																									
Thread Size d	Head						Washer		Un-threaded length a max	Sub-Code	Nom. Length (l)																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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Table 1



CORPORATE STANDARD

AA7161001

Rev. No. 04

PAGE 1 of 3

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 st Issue
Dt: 15-04-2011	Dt:	Year: 2019	HPEP, Hyderabad	Corp. R&D	01-01-1977

AA7161001
Rev. No. 04
PAGE 2 of 3

CORPORATE STANDARD



4 REFERRED STANDARDS (Latest publications including amendment)

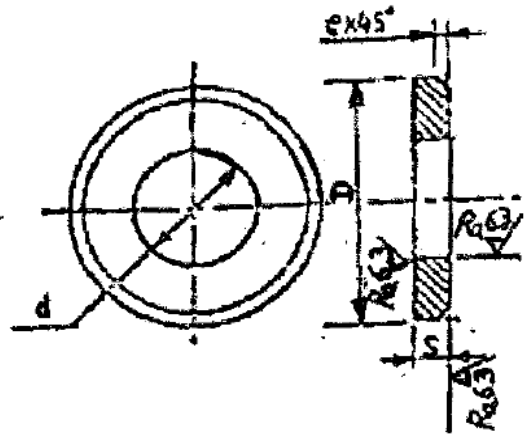
- 1) IS: 6821
- 2) AA0230408
- 3) AA7161002
- 4) AA7161004

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:

- 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



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 1st Issue
01-01-1977

Dt: 18-03-2022

Dt:

Year:

AA7171089

Rev. No. 07

PAGE 2 of 3

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.

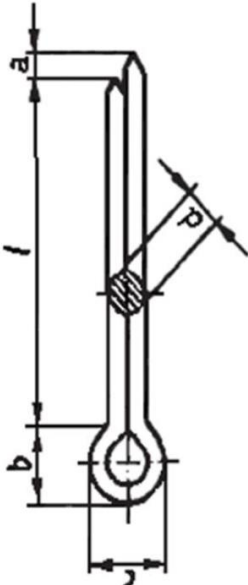
3.4 Weights given in this standard are for general reference only and are not meant for commercial transactions.

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

		Note: 1) Corporate sub code numbers are shown. 2) Weights have been shown in kg/1000 Nos.		All dimensions are in mm																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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