

[For uploading along with enquiry]

Duly filled Technical Pre-Qualification Requirements to be submitted along with the offer by vendor

Ref No: TME/PQR/TM4601/ Set of hardware

Dated:24/06/2025

Technical Pre-Qualification Requirements (PQR) for “Set of hardware”**Vendor should comply with the following clauses in order to qualify for supply of Set of hardware (duly filled PQR shall be submitted along with the offer by vendor):**

Cl. No.	Description	Vendor to comment	
		Complied / Not complied	Supporting relevant document to be submitted along with offer
1.	Vendor shall supply Set of hardware as per requirements mentioned in the enquiry.	Yes/No	Not Required
2.	Vendor should be a hardware manufacturer or authorized trader/distributor/dealer/agent of hardware manufacturer. In case vendor is a trader/distributor/dealer/agent, vendor to furnish authorization certificate from manufacturer of hardware for supply of its products. The hardware manufacturer must have in-house thread rolling facility. Details (machine name, make model, year of commissioning & accuracy) of in-house thread rolling facility for manufacturing of tendered item shall be furnished. Note: 1. One trader/dealer/distributor/agent cannot represent two manufacturers or quote on their behalf in the tender. 2. In case vendor is a trader/ dealer/ distributor/ agent, the documents for compliance of details of thread rolling facility shall be of hardware manufacturer (duly sealed and signed from hardware manufacturer's representative).	Yes/No	Details of in-house thread rolling facility
3.	Vendor should confirm that thread of bolts shall be manufactured by rolling process only. In case vendor is a trader/ dealer/ distributor/ agent, confirmation shall be from the hardware manufacturer (duly sealed and signed from hardware manufacturer's representative).	Yes/No	Not Required

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(Sign and Seal of Authorized representative of vendor)

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Dated:24/06/2025

Technical Pre-Qualification Requirements (PQR) for “Set of hardware”

Cl. No.	Description	Vendor to comment	
		Complied / Not complied	Complied / Not complied
4.	Vendor should have experience of successfully manufacturing & supplying: i. At least 160 nos. bolt/screw of size M20 (or above), in preceding 5 years from enquiry opening date. Vendor to ensure that document submitted against b) shall correlate with the submitted PO copy. In case vendor is a trader/ distributor/ dealer/ agent, vendor's experience details shall be for the supply of same make of hardware, for which vendor has submitted details of in-house manufacturing facility, against clause 2 above.	Yes/No	a. PO copies. b. Supply proof i.e. invoice.
5.	For verification of information furnished by vendor, additional documents proofs etc. may be required by BHEL. Vendor to confirm providing the same.	Yes/No	Not Required

Notes:

1. Compliance of all the points in above T-PQR is mandatory. In absence of compliance of above, vendor's offer is liable to be rejected.
2. **Information / compliance / documents submitted by vendor shall be authentic in all aspects. In case any deviation / false information / forged documents are observed, BHEL is free to initiate appropriate punitive proceeding against the supplier.**

Important: This document is to be filled and submitted along with the offer. This document must be signed by authorized representative of the vendor and should contain the name of representative & seal of the company.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY
WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

REV.	DATE	ALTERED 	REV.	DATE	ALTERED 	REV.	DATE	ALTERED -SD-	ADDITIONAL INFORMATION		
43	23.02.15	CHECKED 	42	13.03.13	CHECKED 	41		CHECKED -SD-			
		APPROVED 			APPROVED 			APPROVED -SD-			
ZONE	ITEM 35, BOLT LENGTH 30 MM CHANGED TO 25 MM.		ZONE	FIG. 2 WAS FIG. 1. STD AGAINST 'T' IN IT. 033,034& 035 WERE NOT ON.		ZONE	IN BOM IT. 036 WAS NOT ON. DRG. DIGITIZED.		STATUS OF DRAWING		
REV.	DATE	ALTERED 	REV.	DATE	ALTERED 	REV.	DATE	ALTERED 	DISTRIBUTION OF PRINTS TME-1, TXM-3, TNX-1		
44	08.08.16	CHECKED 	45	24.10.16	CHECKED 	46	24.11.16	CHECKED 	REV.	DATE	ALT 
		APPROVED 			APPROVED 			APPROVED 	47	14.05.18	CKD 
ZONE	ITEM 36, BOLT HEAD THICKNESS 8 MM CHANGED TO 6 MM.		ZONE	ITEM-36, BOLT HEAD THICKNESS 7 MM WAS 6 MM.		ZONE	IN ITEM-36, BOLT HEAD THICKNESS 8MM WAS 7 MM.				APPD 
									ZONE	NOTE 3 & 4 MODIFIED.	

NOTES:-

- ALL BOLTS/SCREWS ARE TO IS:1364 (TABLE2) AND IS:1367 (P8.8),THREADS AS PER IS 4218 "6g" EXCEPT FOR:-
(a) BOLTS TO FIG.1 TO HAVE DRILLED HOLE OF ϕ 'D' ON STANDARD HEAD.
(b) BOLTS TO FIG. 2 WITH REDUCED HEAD THICKNESS 'T' AND SHOULD NOT BE CHAMFERED ON HEAD.
2. ALL BOLTS/SCREWS TO BE PARKER-ISED TO AA0673616.
3. ITEMS 4 TO 8, 10 TO 12,14,16,19,20,25, 27,28,31 TO 33 & 36 ARE TO BE 100% MCD. TESTED TO BP0850178.
4. FOR ALL BOLTS/SCREWS THREADS TO BE MANUFACTURED BY ROLLING PROCESS ONLY.

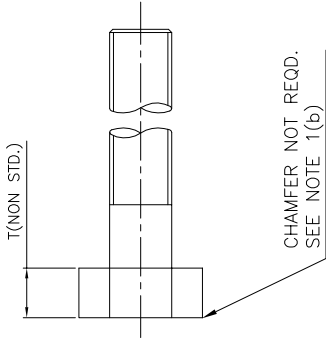


FIG-2

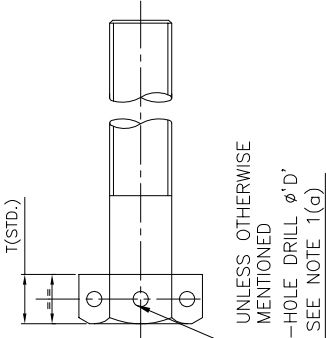


FIG-1

ITEM	FIG.	DESCRIPTION	STYLE NO.	TOOL NO.	'D'	'T'	M/C REF.	ASSY. DRG. NO.
1	1	BOLT HEX. M10x65-P8.8			2.5	STD.	GB-12A/M	04350016001
2	1	SCREW HEX. M10x25-P8.8			2.5	STD.	GB-12A/M	04350016001(18)
3	1	BOLT HEX. M12x50-P8.8			2.5	STD.	GB-12A/M	04350016001(22)
4	2	SCREW HEX. M30x65-P8.8	ST. 452253		-	13	165/M	04393200001(07)
5	2	SCREW HEX. M24x60-P8.8			-	10	TM3601AZ,133AW	F4625440(6) E4700736(1)
6	2	SCREW HEX. M20x45-P8.8	ST. 452254		-	8	165/M TM4303BY,DY	04394001001(15)
7	1	SCREW HEX. M20x45-P8.8	ST. 450137		2.5 1-HOLE	STD.	TG10931AZ/M	04314059001(2) 04314016001(2)
8	2	SCREW HEX. M20x40-P8.8			-	7	TM4601AZ	24394341001(9) 14394337001(2)
9	1	SCREW HEX. M12x55-P8.8	ST. 90445 44322		2.5	STD.	TM4601AZ	04390237001(4)
10	2	SCREW HEX. M24x40-P8.8				10	TM4601AZ	14393237002(7)
11	2	SCREW HEX. M24x65-P8.8				12	TM5001AZ	G4515487(9)

TABLE OF PARTICULARS



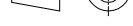
BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE	NO. OF VAR.
DRN.	—SD—	—SD—		
CHD.	—SD—	—SD—		
APPD.	—SD—	—SD—		
GHT (G.)	REF. TO ASSY. DRG.		ITEM NO.	NO. OF ITEM
	DRAWING NO. C450062			REV. 47
	SHT. NO. 01		NO. OF SHT. 03	

[illegible]

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

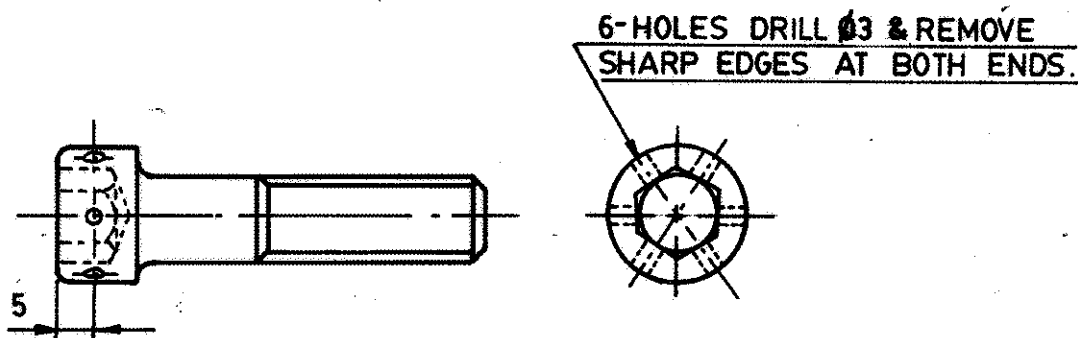
	NAME	SIGN	DATE	NO. OF VAR.
DRN.				
CHD.				
APPD.				

DEPT.	UNTOL. DIMS. GR.		SCALE	WEIGHT	REF. TO ASSY. DRG.	ITEM NO.	NO. OF
TME			NTS	(K.G.)			ITEM
CODE							
405							
TITLE					DRAWING NO.		REV.
BOLTS & SCREWS					C450062		
					SHT. NO.	NO. OF SHT.	
					03	03	

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

REV.	DATE	ALTERED	REV.	DATE	ALTERED	ADDITIONAL INFORMATION ----- STATUS OF DRAWING DISTRIBUTION TME-3 TXM-3 TMX-1 OF PRINTS
		CHECKED	01	24 ³ / ₉₃	CHECKED <i>SKB</i>	
			BOM UPDATED.			



TOOL LIST

ITEM	TOOL	DESCRIPTION
001	1457390	DRILL JIG.

B-4900475
REP-DRG. No.MODIFY AS SHOWN
ST.NO. 454113

001

HEX. SOCKET HEAD CAP
SCREW M12 X 40 P 12-9

1

AA 712 3123

KG 0.08

REMARKS	ITEM No.	DESCRIPTION	STD.	MATL CODE	MATL SPECN.	UNIT	UNIT WT.	QTY.

CARD TYPE 3 28 28 CARD TYPE 1 28 CARD TYPE 2



BHARAT HEAVY ELECTRICALS LTD.

BHOPAL

DRN	YR. NAME	SIGN	DATE
CHD	SGD	<i>SGD</i>	25-8-88
APPD	SKB	<i>SKB</i>	27-8-88

DEPT. TME	GRADE OF UN. TOL.	SCALE	WEIGHT (Kg.)	REF. TO ASSY. DRG.	ITEM No.	75 77
CODE 405	DIM. $\pm$ /M/	NTS.	0.08	2-439-43-41-001	006	No. OF ITEMS 001

TITLE HEX. SOCKET HEAD SCREW

DRAWING No.
4 439 43 41 00122 23 24
REV. 01

SIGN & DATE

INVENTORY No.

	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 PAGE 1 OF 7; Cl 3.0 COMPLIANCE WITH NATIONAL STANDARDS Year of IS reference is modified as follows: IS:3618-66 (Reaffirmed 1997)					
Please see Instructions on the reverse.					
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

	AMENDMENT -NOTIFIFCATION	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) 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

	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

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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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- 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.



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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.

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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

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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.

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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°C $\pm$ 2 in cup-4 to IS:3944 shall be 30 $\pm$ 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	AA 067 36 16
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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			AA7123123		
				Rev. No. 07		
				PAGE 1 of 3		
SCREWS, CAP, HEXAGON SOCKET HEAD, PRODUCT GR. A, COARSE PITCH, STEEL, PROPERTY CLASS 12.9 (M3 - M36)						
1 DESIGNATION						
A hexagon socket head, cap screw of nominal size M10, length 30mm, coarse pitch, product grade A and of property class 12.9 shall be designated as:						
1.1 On drawings						
i) Material specification column: AA7123123 ii) Description column: SCRU CAP SOCK A M10 X 30 – 12.9						
1.2 On indents						
Screw Hex socket head, cap A M10 X 30 – 12.9: AA7123123						
1.3 For issuing enquiries and on purchase orders						
While issuing enquiries and purchase orders, delete BHEL standard number from above description and add the information given under clause 2.						
2 COMPLIANCE WITH STANDARDS						
2.1 Dimensions, Tolerances & General Requirements						
As per IS: 2269 - 2006						
2.2 Mechanical properties						
To conform to property class 12.9, as specified in table 3 of IS: 1367, Part 3						
2.3 Threads						
Pitch-coarse to IS: 4218, Part 2 Tolerance quality: Medium Tolerance class: 5g - 6g						
2.4 Identification Marking						
As stated in clause 9 of IS: 1367, Part 3 (except for sizes up to M10)						
2.5 Surface Discontinuity						
As per IS: 1367, Part 9						
2.6 Finish						
Plated as specified in BHEL order.						
Revisions: As per Clause. 29.1.2 of 29th MOM of WG-F				APPROVED: INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC (F)		
Rev. No. 07	Amd. No.	Reaffirmed	Prepared	Issued	Dt. of 1 st Issue	
Dt: 15-04-2011	Dt:	Year: 2019 15	HEP, Bhopal	Corp. R&D	01-01-1977	

AA7123123

Rev. No. 07

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CORPORATE STANDARD**3 NOTE**

- 3.1** Length and diameter combination (refer Table 1) between the bold lines should only be used.
- 3.2** Sizes to the left side of the dotted lines are threaded to the head within 3P.
- 3.3** For screw threads, general (Metric) refer to BHEL standard AA0231800
- 3.4** For tolerance grade, position and class refer to BHEL standard AA0230201
- 3.5** Screws to this standard would be unplated, divisions wishing to have plated screws would have to get them plated.
- 3.6** Weights given in this standard are for general reference only and are not meant for commercial transactions.
- 3.7** The screws to this standard can also be supplied with diamond / straight knurling on the external side of head.
- 3.8** 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: 1367, Part 3, 9 & 17
- 2) IS: 4218, Part 2
- 3) AA0230201
- 4) AA0231800
- 5) AA0231850

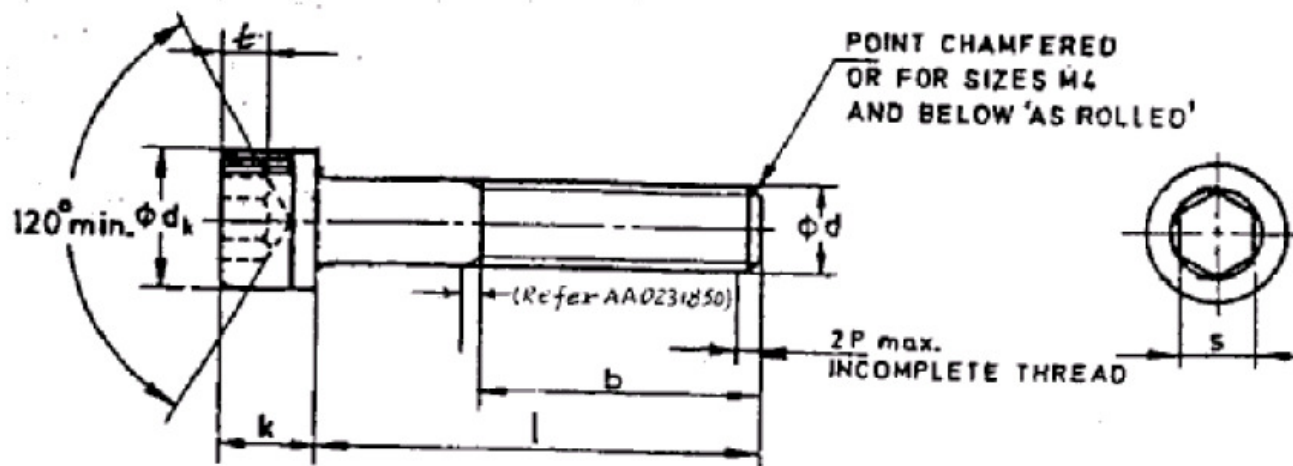


FIG. 1

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All dimensions are in mm

4) Lengths above the thick dashed line are threaded to the headed within 3P

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	CORPORATE STANDARD			AA7121124	
				Rev. No. 06	
				PAGE 1 of 3	
SCREWS, HEXAGON HEAD, PRODUCT GRADE 'B' COARSE PITCH, STEEL, PROPERTY CLASS 8.8 (M30–M36)					
1.0 DESIGNATION A product Gr.B hexagon head, steel screws of thread M30, length 65 mm, coarse pitch and conforming to property class 8.8 shall be designated as					
1.1 On drawings i) Material specification column : AA7121124 ii) Description column : SCRU HEX B M30 x 65 – 8.8					
1.2 On indents Screws Hex B M30 x 65 – 8.8; AA7121124					
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 2.0					
2.0 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					
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					
2.6 Finish As specified in BHEL order.					
Revisions: Clause 2.1, 2.4 and Table data			APPROVED: INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC (F)		
Rev. No. 06	Amd. No.	Reaffirmed	Prepared	Issued	Dt. of 1 st Issue
Dt: 18-03-2022	Dt:	Year:	18BAP, Ranipet	Corp. R&D	05-01-1977

AA7121124	CORPORATE STANDARD	
Rev. No. 06		
PAGE 2 of 3		

3.0 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 unplated, 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

4.0 REFERRED STANDARDS (Latest Publications including Amendment)

1) IS: 1367 Part 3, 9 & 17

2) IS: 4218, Part 2

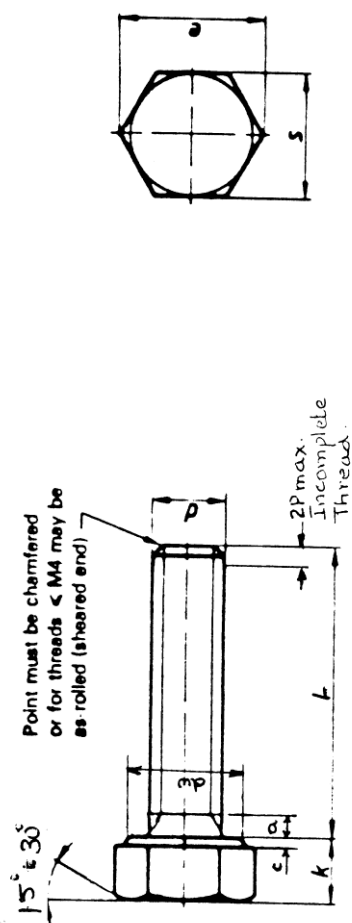
3) AA0231800

4) AA0230201

5) AA0231850

19

PAGE 3 of 3



- 1) Corporate sub codes are shown in the Table.
- 2) Weights have been shown in kg per 1000 Nos.
- 3) For threaded run outs refer AA0231850

All dimensions are in 'mm'

Table-1

[illegible]



CORPORATE STANDARD

AA7111124

Rev No.08

PAGE 1 of 3

BOLTS, HEXAGON HEAD, PRODUCT Gr: 'A' COARSE PITCH, STEEL, PROPERTY CLASS 8.8 (M20 – M24)

1.0 DISIGNATION:

A product Gr.A, hexagon head, steel bolt to M20, length 80 mm, coarse pitch and conforming to property class 8.8 shall be designated as:

1.1 On drawings:

- i). Material specification column : AA7111124
- ii). Description column : BOLT HEX A M20 X 80 – 8.8

1.2 On indents: Bolt Hex A M20 X 80 – 8.8: AA7111124

1.3 For issuing enquiries and on purchase orders:

While issuing enquiries and purchase orders, delete BHEL standard number from above description and add the information given under clause 2.0

2.0 COMPLIANCE WITH STANDARDS:

2.1 Dimensions, Tolerances & General Requirements:

As per IS 1364 : Part 1 : 20018

2.2 Mechanical Properties:

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

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(F)

Rev No.08

Amd No.

Reaffirmed

Prepared

Issued

Dt. of 1st Issue

Dt:20-03-2021

Dt:

Year:

21HEEP, Haridwar

Corp.R&D

December1976

AA7111124	CORPORATE STANDARD	
Rev. No.08		
PAGE 2 of 3		

3.0 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 Bolts 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 meant 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

4.0 REFERRED STANDARDS (Latest publications including amendment):

1) AA0231850

2) IS 1367 : Part 3, 9 : Sec 1 & 17

3) IS 4218 : Part 2

4) AA0231800

5) AA0230201

EXPLANATORY NOTE

The following changes have been made in this revision:

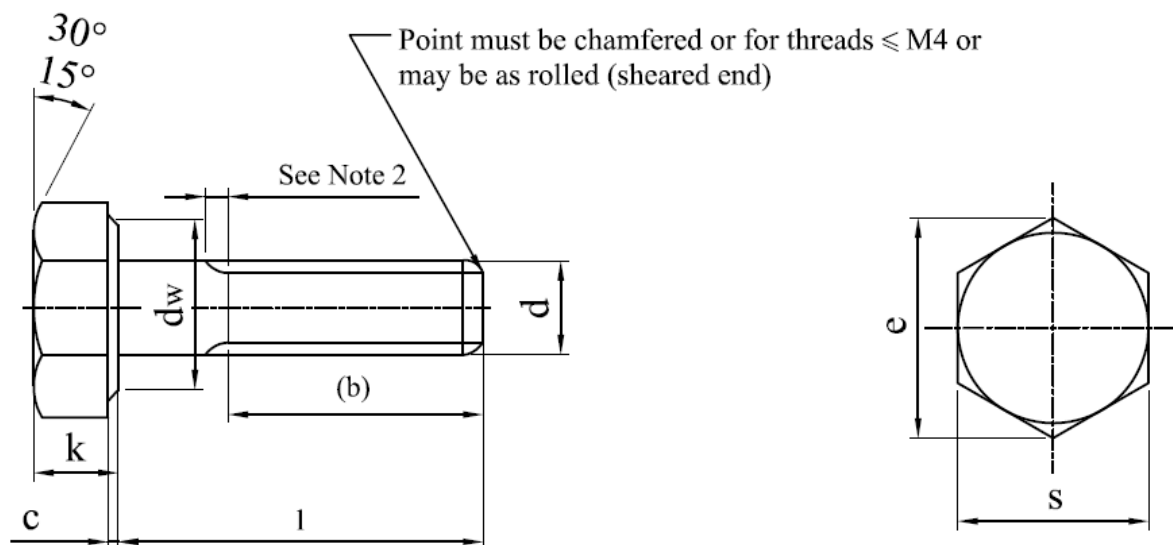
- In Clause 2.1, year of IS updated to 2018

- In Clause 2.4, clause 10 in place clause 9.

- In Clause 2.5, applicable Section of IS added.

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	CORPORATE STANDARD	AA7111124 Rev. No.08 PAGE 3 of 3
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Note:

- 1) Corporate code numbers are shown below.
- 2) For thread runout refer AA0231850
- 3) Weights have been shown in kg per 1000Nos
- 4) Symbol Δ denotes non-preferred size.

TABLE-1

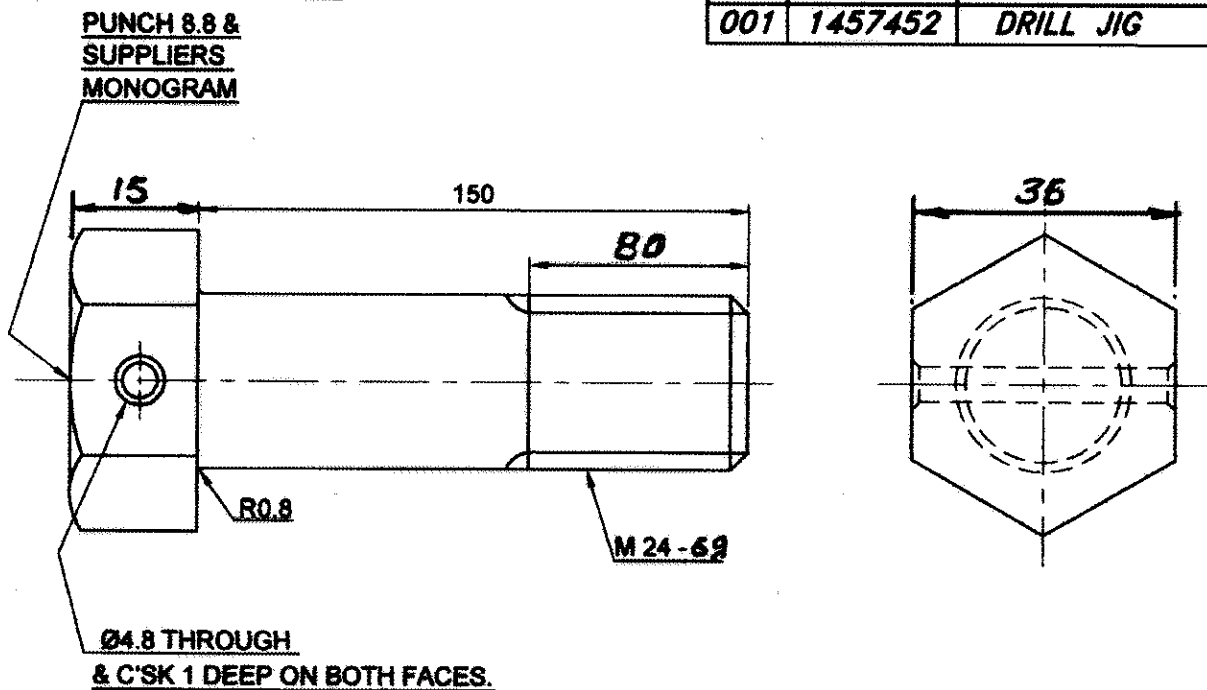
(All dimensions are in 'mm')

Thread Size d	Head			Washer		Thread Length b			Nominal Length (l)										
	Flats s Max.	Crns e Min.	Tkns k Max.	Dia. dw Min.	Tkns c Max.	For Nom. Length ≤125	For Nom. Length >125 & ≤200		65	70	75	80	90	100	110	120	130	140	150
	Min	Min.	Min.	Min.	Min.														
M 20	30.0	33.53	12.72	28.2	0.8	46	52	Sub Code	014 Δ	235 Δ	049 Δ	057	065	022	073	081		090	103
	29.67		12.28		0.2			Weight	220	232	243	255	282	307	331	356		392	428
M24	36.0	39.98	15.22	33.6	0.8	54	60	Sub Code	111 Δ			120 Δ	138	030	146	154	162		170
	35.38		14.78		0.2			Weight	330			384	419	455	490	526	560		629

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REV. 06	DATE 10.6.10	ALTERED <i>m</i>	REV. 05	DATE 28.03.09	ALTERED KANSARA	ADDITIONAL INFORMATION B 4900427
		CHECKED <i>m</i>			CHECKED <i>m</i>	
		APPROVED <i>m</i>			APPROVED <i>m</i>	
DIMS. 15 & 36 WERE NOT ON.			DRAWING UPDATED & DIGITIZED.			STATUS OF DRAWING
						DISTRIBUTION TME - 1, TXM - 3 OF PRINTS TNX - 1
REV. 07	DATE 18.6.11	ALTD CUBD				
		CRD <i>m</i>				
		APPD <i>m</i>				
DIM 80 WAS 60.						

TOOL LIST		
IT.	TOOL NO.	DESCRIPTION
001	1457452	DRILL JIG

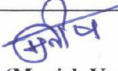


NOTES:-

1. BOLTS ARE TO BE 100% CRACK DETECTED TO BP 0850178.
2. DIMN. TOLERANCES AS PER IS 1364.

STYLE LIST		
VAR	IT.NO.	ST NO.
-	002	BP9094760339

REF. DRG. NO.	001		HEX. BOLT M 24 X 150 — 8.8		KG.		0.60																
	REMARKS		ITEM NO.	DESCRIPTION	STD	MATL. CODE	UNIT	UNIT WT.															
						MATL. SPCN.		QTY.															
SIGN. & DATE	28 — CARD TYPE-3		28 — CARD TYPE-1		28 — CARD TYPE-2																		
			BHARAT HEAVY ELECTRICALS LTD. BHOPAL		<table border="1"> <tr> <th>NAME</th> <th>SIGN</th> <th>DATE</th> <th>NEL OF VAR.</th> </tr> <tr> <td>VRD</td> <td>Sd</td> <td>13.10.87</td> <td></td> </tr> <tr> <td>SGD</td> <td>Sd</td> <td>13.10.87</td> <td></td> </tr> <tr> <td>SKB</td> <td>Sd</td> <td>21.5.88</td> <td></td> </tr> </table>				NAME	SIGN	DATE	NEL OF VAR.	VRD	Sd	13.10.87		SGD	Sd	13.10.87		SKB	Sd	21.5.88
NAME	SIGN	DATE	NEL OF VAR.																				
VRD	Sd	13.10.87																					
SGD	Sd	13.10.87																					
SKB	Sd	21.5.88																					
INVENTORY NO.	DEPT TME CODE 405	GRADE OF UNTOL. DIM. G/M/F		SCALE NTS	WEIGHT (K.G.) 0.60	REF. TO ASSY. DRG. 0 439 14 41 001	ITEM NEL 005	NEL OF ITEM 001															
	TITLE AXLE CAP SPECIAL BOLT TM4501AZ/TM4603AZ/TM 4601AZ					DRAWING NO. 4 439 14 41 001		REV. 07															
					SHT. No. 01		NEL OF SHT. 01																

Copyright and Confidential The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED It must not be used directly or indirectly in any way detrimental to the interest of the company	 PRODUCT STANDARD TME DIVISION, BHOPAL	TM 96225				
	TME/2018	PAGE 01 OF 04				
AUSTENITIC STAINLESS STEEL BOLTS 1. GENERAL : This specification governs the quality of Austenitic Stainless Steel Bolts. 2. APPLICATION : Special bolts for Traction Machines. 3. CONDITION OF DELIVERY : Head Forged, heat treated and manufactured as per drawing/enquiry requirement. Bolts shall comply with the tests called for in Clause 11. 4. COMPLIANCE WITH NATIONAL STANDARDS : The chemical composition shall comply with the requirements of : IS : 6603-2001 (Reaffirmed 2004) } Stainless Steel Gr: 04 Cr 18 Ni 10 Ti/Nb, Softened } Bars and flats. 5. DIMENSIONS AND TOLERANCES : 5.1 Sizes Sizes shall be as specified in the drawing/enquiry. 5.2 Dimensions, Tolerances and General Requirements : Shall comply to IS: 1364 Part – I, 2002 unless specified in the drawing. 5.3 Threads : Threads to be manufactured by rolling process only. Shall comply with Pitch - Coarse to IS:4218 Part-2 Tolerance Quality - Medium Tolerance Class - 6g 6. MANUFACTURE : The Steel shall be made by an electric process. Sufficient reduction and discard shall be made from each ingot to ensure freedom from pipe, harmful segregation and other defects.						
Revision : 02 Date: 31.05.2018		Distribution	Qty.	Approved :  (Manish Verma)		
Revision : 01 Date: 02.12.2017				Prepared (Mohit Parothia)	Checked (Anurag Sharma)	Date: 31.05.2018
Revision: 00 Date: 21.05.1996						

PRODUCT STANDARD
TME DIVISION, BHOPAL

TM 96225

TME/2018

PAGE 02 OF 04

7. HEAT TREATMENT :

The recommended heat treatment after head forging of the bolt is as follows :

Soften by water/oil quenching or cooling rapidly in air from a temperature of 1000-1120 deg. C.

8. FREEDOM FROM DEFECTS :

Bolts shall be free from internal and surface defects as per clause 11.1 & clause 11.4 and shall be free from twists, bends and any burr.

9. CHEMICAL COMPOSITION :

The ladle analysis of steel and the permissible variation in the composition of finished product from the ladle analysis shall be as per requirement mentioned in clause 4.

10. TEST SAMPLES :

A set of 5 no. test pieces (size: Bolt Dia.X150 length) to be supplied along with each batch for testing inside BHEL and hence the bolts along with five test pieces shall be heat treated together as one batch.

11. TESTS :

11.1 LIQUID PENETRANT EXAMINATION :

All bolts shall be tested in accordance with Corporate Standard AA085 01 31 and shall meet the Acceptance Standard, mentioned in corporate standard AA085 01 30.

11.2 MECHANICAL PROPERTIES :

11.2(a) Tensile :

One test piece selected from 5 no. test pieces per batch when tested in accordance with IS: 1608, shall show the following properties:

Tensile Strength : 490 N/mm² Min.

0.2% proof Stress : 210 N/mm² Min.

Elongation on 5.65 So gauge length. : 28% Min.

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	 PRODUCT STANDARD TME DIVISION, BHOPAL TME/2018	TM 96225
		PAGE 03 OF 04
COPYRIGHT AND CONFIDENTIAL The information on this documents the property of BHARAT HEAVY ELECTRICALS LIMITED It must not be used directly or indirectly in any way detrimental to the interest of the company	11.2 (b) <u>Hardness (Brinell)</u> : When tested in accordance with IS: 1500, bolts/test pieces shall show a Brinell Hardness of 285 HB maximum, at the tail portion. 11.3 <u>CHEMICAL</u> : One test piece/bolt per heat treatment batch selected at random, when tested shall meet the requirements of Clause 4. 12. <u>TEST CERTIFICATE</u>: Three copies of test certificate shall be supplied unless otherwise stated in the order. The supplier shall ensure to enclose one copy of the above test certificate along with dispatch document to ensure quick clearance of material. The test certificate shall bear the following information. <u>BHEL References</u>: TM96225 Rev.02 Order No. <u>Supplier's Reference</u>: Name Identification No. Details of Heat Treatment <u>Results of Tests</u>: Results of Chemical Analysis, Mechanical Test & Liquid Penetrant Examination.	

	 PRODUCT STANDARD TME DIVISION, BHOPAL TME/2018	TM 96225
		PAGE 04 OF 04
COPYRIGHT AND CONFIDENTIAL The information on this documents the property of BHARAT HEAVY ELECTRICALS LIMITED It must not be used directly or indirectly in any way detrimental to the interest of the company	13. <u>PACKING AND MARKING:</u> Bolts shall be suitably oiled in boxes to prevent damage during transit. Threads of each bolt shall be packed by plastic/foam sleeve to prevent damage to the threads. A metal label bearing the following information shall be securely attached to each box. TM96225 AUSTENITIC STAINLESS STEEL BOLTS BHEL Order. Identification No. Size and Weight Supplier's Name. 14. This standard supersedes spec. BP76122 & TM96225 Rev.01.	

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

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REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	ADDITIONAL INFORMATION
43	23.02.15	CHECKED	42	13.03.13	CHECKED	41		CHECKED	
		APPROVED			APPROVED			APPROVED	
ZONE	ITEM 35, BOLT LENGTH 30 MM CHANGED TO 25 MM.		ZONE	FIG. 2 WAS FIG. 1. STD AGAINST 'T' IN IT. 033,034& 035 WERE NOT ON.		ZONE	IN BOM IT. 036 WAS NOT ON. DRG. DIGITIZED.		STATUS OF DRAWING
REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	DISTRIBUTION OF PRINTS
44	08.08.16	CHECKED	45	24.10.16	CHECKED	46	24.11.16	CHECKED	TME-1, TXM-3, TNX-1
		APPROVED			APPROVED			APPROVED	
ZONE	ITEM 36, BOLT HEAD THICKNESS 8 MM CHANGED TO 6 MM.		ZONE	ITEM-36, BOLT HEAD THICKNESS 7 MM WAS 6 MM.		ZONE	IN ITEM-36, BOLT HEAD THICKNESS 8MM WAS 7 MM.		REV. DATE ALT CKD APPD
									47 14.05.18
									NOTE 3 & 4 MODIFIED.

NOTES:-

- ALL BOLTS/SCREWS ARE TO IS:1364 (TABLE2) AND IS:1367 (P8.8),THREADS AS PER IS 4218 "6g" EXCEPT FOR:-
(a) BOLTS TO FIG.1 TO HAVE DRILLED HOLE OF ϕ 'D' ON STANDARD HEAD.
(b) BOLTS TO FIG. 2 WITH REDUCED HEAD THICKNESS 'T' AND SHOULD NOT BE CHAMFERED ON HEAD.
2. ALL BOLTS/SCREWS TO BE PARKER-ISED TO AA0673616.
3. ITEMS 4 TO 8, 10 TO 12,14,16,19,20,25, 27,28,31 TO 33 & 36 ARE TO BE 100% MCD. TESTED TO BP0850178.
4. FOR ALL BOLTS/SCREWS THREADS TO BE MANUFACTURED BY ROLLING PROCESS ONLY.

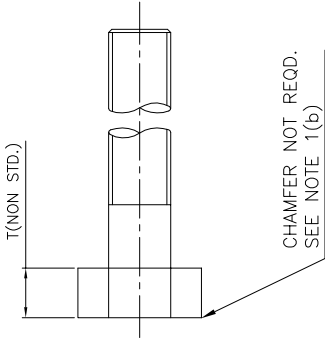


FIG-2

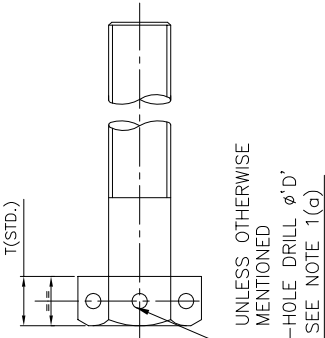


FIG-1

ITEM	FIG.	DESCRIPTION	STYLE NO.	TOOL NO.	'D'	'T'	M/C REF.	ASSY. DRG. NO.
1	1	BOLT HEX. M10x65-P8.8			2.5	STD.	GB-12A/M	04350016001
2	1	SCREW HEX. M10x25-P8.8			2.5	STD.	GB-12A/M	04350016001(18)
3	1	BOLT HEX. M12x50-P8.8			2.5	STD.	GB-12A/M	04350016001(22)
4	2	SCREW HEX. M30x65-P8.8	ST. 452253		-	13	165/M	04393200001(07)
5	2	SCREW HEX. M24x60-P8.8			-	10	TM3601AZ,133AW	F4625440(6) E4700736(1)
6	2	SCREW HEX. M20x45-P8.8	ST. 452254		-	8	165/M TM4303BY,DY	04394001001(15)
7	1	SCREW HEX. M20x45-P8.8	ST. 450137		2.5 1-HOLE	STD.	TG10931AZ/M	04314059001(2) 04314016001(2)
8	2	SCREW HEX. M20x40-P8.8			-	7	TM4601AZ	24394341001(9) 14394337001(2)
9	1	SCREW HEX. M12x55-P8.8	ST. 90445 44322		2.5	STD.	TM4601AZ	04390237001(4)
10	2	SCREW HEX. M24x40-P8.8				10	TM4601AZ	14393237002(7)
11	2	SCREW HEX. M24x65-P8.8				12	TM5001AZ	G4515487(9)



BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

DEPT.	TME	UNTOL. DIMS. GR.	SCALE	WEIGHT	REF. TO ASSY. DRG.	ITEM NO.	NO. OF
CODE	405		NTS	(K.G.)			VAR.
TITLE	BOLTS & SCREWS				DRAWING NO.		REV.
					C450062		47
					SHT. NO.	01	NO. OF SHT.
							03



PLANT STANDARD BHOPAL

BP 085 01 78

REV. NO. 02

PAGE 1 OF 3

MAGNETIC PARTICLE INSPECTION AND ACCEPTANCE STANDARD FOR CRITICAL FASTENERS

SUPERSEDES
BP 085 01 78 REV.01

1. SCOPE :

This standard covers the visual and magnetic particle testing procedure and acceptance standards for fasteners used for critical applications e.g. Commutator Bolts, Main Pole Bolts, Axle Cap Bolts of Traction Machines etc., to detect surface defects.

Testing shall be carried out on Fasteners in the fully fabricated & heat-treated condition, if any.

2. TESTING PROCEDURE :

2.1 Surface Finish

Fasteners shall be free from dust, grease, oil etc.

2.2 Operating Personnel

The operator performing the testing shall be fully conversant with magnetic particle testing technique and the acceptance standards laid down.

2.3 Visual Examination

Fasteners shall be visually examined after cleaning its surface and any defects observed shall be recorded.

2.4 Magnetic Particle Inspection

2.4.1 Fasteners shall be magnetic particle tested to ASTM-E-709 (BHEL Corporate Standard AA 085 01 33 in general .

2.4.2 When alternating current is used for circular magnetization, using direct contact method, the following current range shall be used.

For Fasteners upto 125 mm diameter

140 – 180 Ampere per centimeter of the diameter.

For Fasteners above 125 mm diameter and upto 375 mm diameter

100 – 140 Ampere per centimeter of the diameter.

Revision : Reviewed & Brought upto date

Issued by :

31

STANDARDS AND MATERIALS GROUP
TECHNICAL SERVICES DEPARTMENT

Rev 02

Date 18.03.2010

Date of first Issue : June 1989



PLANT STANDARD BHOPAL

BP 085 01 78

REV. NO. 02

PAGE 2 OF 3

3. NON – DEESTRUCTIVE TESTING :

At Supplier's Works

100 Visual and magnetic particle testing as per clause 2 (above) shall be carried out at the Supplier's works and necessary test certificates shall be supplied, to BHEL.

Only fasteners which meet the Acceptance standards laid down in clause 4 (below) shall be dispatched to BHEL, Bhopal.

4. ACCEPTANCE STANDARDS :

Fasteners on testing, shall comply with the following requirements :

Any defect not specifically covered by this acceptance standard shall be referred to Technical Services Department, BHEL, Bhopal , for its approval.

4.1 Linear Indications

Any Linear Indication, transverse to the longitudinal axis of the fasteners is not acceptable.

4.2 Cracks

Cracks of any type, in any location irrespective of the dimension, is not acceptable,

4.3 Seams

4.3.1 Seams found in the threaded portion of the fastener is not acceptable irrespective of the dimensions.

4.3.2 Seams found on the shank portion shall not have a depth more than $0.03 \times d$, where 'd' is the nominal diameter of the fasteners.

4.4 Laps and Folds

Laps and folds of any depth or length are not acceptable, at the root of the threads.

If found, other than at the root of the threads, BHEL, Bhopal should be consulted, before dispatch of the material.

5. DEMAGNETISATION :

After the magnetic particle testing is over , demagnetization shall be carried out by using a suitable method.

6. PROTECTIVE COATING :

All fasteners after testing and demagnetization, shall be suitably protected by coat of rust preventive.



PLANT STANDARD BHOPAL

BP 085 01 78

REV. NO. 02

PAGE 3 OF 3

ANNEXURE - I

CHECK TEST AT BHEL WORKS

1) SAMPLING :

Random samples shall be taken, as detailed below, from each size and from each lot of fasteners, which have been supplied & certified as per clause 1 to 6 of this standard (Refer Page 1 & 2)

TABLE - A

For Established suppliers ('A' Class Suppliers)

Methods for sampling of fasteners, shall be following :

Sampling Plan Lot size Nos.	Sample Size Nos.	Acceptance No.
Upto 1000	5	0
Above 1000 upto 3000	8	0
Above 3000 upto 10,000	13	0
Above 10,000 upto 35,000	20	0
Above 35,000	32	1

TABLE - B

For other than Established suppliers / New Suppliers

The sampling size shall be double that of Table 'A' keeping the Acceptance Number same, as detailed below :

Sampling Plan Lot size Nos.	Sample Size Nos.	Acceptance No.
Upto 1000	10	0
Above 1000 upto 3000	16	0
Above 3000 upto 10,000	26	0
Above 10,000 upto 35,000	40	0
Above 35,000	64	1

2) NON - DESTRUCTIVE TESTING :

These samples shall be subjected to visual and magnetic particle examination as detailed in clause 2 (refer page 1)

3) EVALUATION :

The whole lot shall be accepted if the samples as mentioned in the above plans, (A and B) meet the acceptance standard mentioned in clause 4 (refer page - 2).

भारत भारी बिजली लिमिटेड, भोपाल
 क्वालिटी कंट्रोल विभाग
 अमित सेन/AMIT SEN

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
QUALITY CONTROL TRANSPORTATION
QUALITY ASSURANCE PLAN (QAP)

QA Plan for fasteners no.: QAP/QTm/VENDORQAP/2022-23/HARDWARES REV.01 DATED 25.05.2026

Sl. No.	Name of the Process	Parameters of Inspection	Quantum of check		Mode of Inspection/ Equipment used	Drawing No./Spec./Std	Acceptance Norms	Requirement from supplier
			TP/Supplier	TPIA/QC**				
1.	Melt analysis	Chemical composition	One Sample per heat	100% TC to be verified	Spectrometer/Wet analysis method	As per the specification	As per the specification	TC (as per specification) to be provided to BHEL.
2.	Mechanical testing	Mechanical properties (Tensile, hardness & impact) mentioned in the specification	One Sample per heat treatment batch	100% TC to be verified	Mechanical testing equipment	As per the specification	As per the specification	Three additional sample (Ø25x300mm) per heat per heat treatment batch is to be verified by TPIA (for heat & heat treatment batch punched by supplier matching with test certificate reports above) and provided to BHEL for chemical & mechanical testing at BHEL works.

अमित सेन/AMIT SEN
 वरि. अभियंता/Sr. Engineer
 क्यूटी.एम. विभाग/QTm Division
 बी.एच.ई.एल., भोपाल/BHEL, Bhopal

Sl. No.	Name of the Process	Parameters of Inspection	Quantum of check		Mode of Inspection/ Equipment used	Drawing No./Spec./Std	Acceptance Norms	Requirement from supplier
			TP/Supplier	TPIA/QC**				
3.	Microstructure	Hardened and tempered with no decarburisation	One sample per heat per heat treatment batch	100% TC to be verified	Metallurgical microscope	As per the specification	As per the specification	TC along with Photograph of microstructure
4.	NDT Testing	MPI/LPI	As per requirement mentioned in the BHEL drg./spec.	1%	NDT equipment	As per BHEL drawing /specification	As per BHEL drawing /specification	NDT test report
5.	Dimensions & tolerances	- Checking by go/no go gauge - Thread Length, Dia, Head size etc. - Hole for wire locking (if applicable)	5%	1%	Gauges & Instruments	As per BHEL drawing/ specification	As per BHEL drawing/ specification	Dimensional report
6.	Thread manufacturing	Threads to be manufactured by rolling process only	100%	-	Visual	-	Thread manufactured by rolling process only	Supplier to submit compliance certificate
7.	Visual Inspection	Free from visual defect	100%	1%	Visual	-	Fasteners shall be free from any surface discontinues such as dent etc.	-

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			TP/Supplier	TPIA/QC**				
8.	Identification marking	Vendor name Property class/grade	100%	1%	Verification	-	Embossing identification marking on bolt head	-
9.	Electroplating/ Parkerizing	Coating thickness	100%	1%	Coating thickness gauge	As per relevant BHEL Drawing /specification	As per relevant BHEL Drawing /specification	Coating thickness report
10.	Packing	Suitable packing	100%	-	Visual	TM24638	Packaging shall be such that during transit fasteners should not get damaged	1. Packing to be done in kit form as per PO. 2. Bolt threads shall be suitably packed to avoid damage in transit/storage.

Notes:

- 1) All the test records checked by TP, TP/TPIA/QC (dully signed & sealed) as per above QAP requirement shall be submitted along with consignment
- 2) Final acceptance will be based on inspection at BHEL, Bhopal.
- 3) (*) Quantum of inspection shall be in line with QAP unless otherwise mentioned in the drawing.
- 4) (**) job shall be randomly selected from offered lot.
- 5) Sample inspection of fasteners does not mean that the supplier will not meet drawing & specification requirements in remaining fasteners. In case a, any defect /non-conformance is observed at any stage (during processing or before and after fitment in any job), the same is liable to be rejected and same shall be replaced immediately by the supplier at BHEL or BHEL Customer site (wherever deficiency is observed).

Meaning of Legends: #-Supplier to submit test certificates & reports of above mentioned parameters.

Abbreviation: TP/TPIA- BHEL appointed third Party Inspecting Agency, TP-Task Performer (vendor), QC-QIX

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