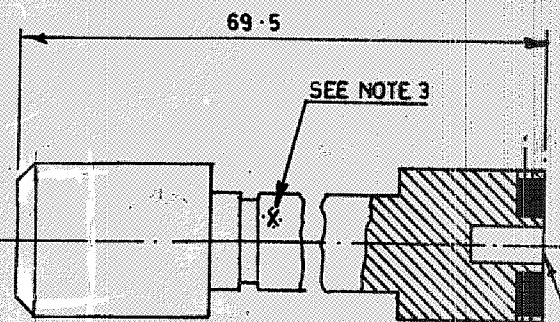
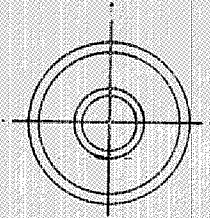


1582914/2023/HEP-SWM20915

1E00 E 50 889 E

ON DRG



PART SECTION VIEW

OPEN OUT TO $\phi 2.7$ FLAT BOTTOM
DEEP 5.55 ± 0.08 AFTER BONDING

NOTES ON TEST REQUIREMENTS:-

1. FOR RUBBER —

1.1. TEST SLAB IS TO BE TESTED FOR CONFORMITY WITH THE SPEC.

2. FOR VALVE STEMS:-

2.1. ENDURANCE TEST:- AT RANDOM 3 NOS. OF THE SUPPLY OF VALVE STEMS TO BE SELECTED AND SUBJECTED TO AN ENDURANCE TEST OF 200,000 OPERATIONS SEPARATELY

2.2. LEAKAGE TEST:- THE SAME VALVE STEMS AS USED FOR TEST UNDER NOTE 2-1 ABOVE TO BE SUBJECTED TO THE FOLLOWING LEAKAGE TEST AFTER ENDURANCE TEST. CYLINDERS USED FOR OPERATING APPARATUS EQUIPED WITH VALVE STEMS TO BE CONNECTED TO A RESERVOIR HAVING A VOLUME IN LITRES NOT GREATER NUMERICALLY THAN 0.02 TIMES THE DIAMETER OF THE CYLINDER IN MM. WITH A MINIMUM OF 1 LITRE CHARGED TO A PRESSURE OF 5 Kg f/cm^2 (70 P.S.I.). AIR TIGHTNESS OF VALVE STEMS TO BE CONSIDERED SATISFACTORY IF THE PRESSURE IN THE RESERVOIR DOES NOT DECREASE BY MORE THAN 5 PERCENT OF THE ORIGINAL PRESSURE AFTER 10 MINUTES ON TEST.

STYLE LIST

STYLE	ITEM INCLUDED	DESCRIPTION OR REMARKS	RECORDED	
			SIG	DATE
851341	001	RUBBERISED VALVE STEMS	<i>Moh</i>	27-4-84

TOOL LIST

ITEM	TOOL	DESCRIPTION
001		

NOTE:-

1. FACE AND SIDE TO BE CLEANED UP BY TURNING USING MINIMUM CUT TO REMOVE EXCESS RUBBER ONLY.
2. ITEM TO BE FILLED WITH POLY URETHENE RUBBER TO RDSO'S SPEC. NO. RDSO/M&C RP-115 OF 1980, COMPOUND 'B'
3. SUPPLIER SHOULD ENGRAVE THE NAME OF HIS FIRM IN THE PLACE MARKED THUS *. LETTER 'P' ALSO ENGRAVED TO INDICATE POLY URETHENE MATERIAL.

51	VAR. NO.	64	65	75	78	79	25	27	29	58	59	60	77	29	31	34	45	55	58	68	72						
52	REMARKS	53	VAR. NO.	54	ITEM NO.	55	DESCRIPTION	56	STD.	57	DRAWING NO.	58	VAR.	59	IT. NO.	60	MATL. CODE	61	UNIT	62	UNIT WT.						
59		60		61		62		63		64		65		66		67	MATL. SPECN	68	UNIT	69	QTY.						
CARD TYPE-3											CARD TYPE 1					CARD TYPE 2 R/13/84											
ADDITIONAL INFORMATION											TYPE OF PRODUCT																
STATUS OF DRAWING											NAME OF CUSTOMER/PROJECT																
DISTRIBUTION OF PRINTS											INDIAN RAILWAYS																
OFFICE COPY											BHARAT HEAVY ELECTRICALS LTD.																
SWM											BHOPAL																
TCX (SWM)											DRN																
REV. DATE											NAME																
01 28 80											MATHW C. K.																
CHECKED											SIGN																
STEP AT L.H. END											V.P.A.																
DELETED											DATE																
D1144											6-5-84																
DEPT. C.G.E.											SCALE																
CODE 410											WEIGHT (Kg.)																
											REF. TO ASSY. DRG.																
											1 588 05 3 0003																
											ITEM NO.																
											010																
											75 77																
											No. OF ITEMS																
											22 23 24																
											REV.																
											1 CARD 3																
											DRAWING NO.																
											3 588 05 3 0031																
											SHEET NO. 1																
											NO. OF SHEETS 1																

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm.)

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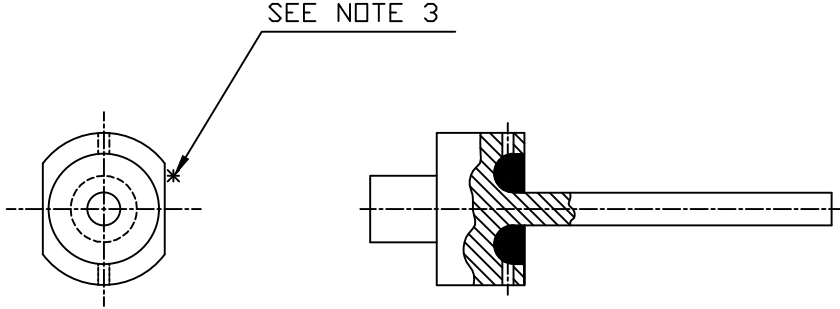
35880530020 IT.001
REF. DRG. NO.C 719

SIGN. & DATE

INVENTORY No.

30032 05 889 3
DRAWING NO./चित्र संख्या

SEE NOTE 3



PART SECTION VIEW

NOTES:-

- FACE AND SIDE TO BE CLEANED UP BY TURNING USING MINIMUM CUT TO REMOVE EXCESS RUBBER ONLY.
- ITEM 001 TO BE FILLED WITH POLY URETHENE RUBBER TO RDSO'S SPEC. NO. RDSO/M&C RP-115 OF 1980, COMPOUND 'B'.
- SUPPLIER SHOULD ENGRAVE THE NAME OF HIS FIRM IN THE PLACE MARKED THUS* LETTER 'P' ALSO ENGRAVED TO INDICATE POLY URETHENE MATERIAL.

NOTES ON TEST REQUIREMENTS :-

- FOR RUBBER :-
 - TEST SLAB IS TO BE TESTED FOR CONFORMITY WITH THE SPEC.
- FOR VALVE :-
 - ENDURANCE TEST :- AT RANDOM 3 NOS. OF THE SUPPLY OF VALVE STEMS TO BE SELECTED AND SUBJECTED TO AN ENDURANCE TEST OF 200,000 OPERATION SEPARATELY.
 - LEAKAGE TEST :- THE SAME VALVE STEMS AS USED FOR TEST UNDER NOTE 2-1 ABOVE TO BE SUBJECTED TO THE FOLLOWING LEAKAGE TEST AFTER ENDURANCE TEST.CYLINDERS USED FOR OPRATING APPARATUS EQUIPED WITH VALVE STEMS TO BE CONNECTED TO A VOLUME INLITERS NOT GREATER NUMERICALLY THAN 0.02 TIMES THE DIAMETER OF THE CYLINDER IN MM. WITH A MINIMUM OF 1 LITER CHARGED TO A PRESSURE OF 5kg. f/cm² (70 P.S.I.) AIR TIGHTNESS OF VALVE STEMS TO BE CONSIDERED SATISFACORY IF THE PRESSURE IN THE RESERVOIR DOES NOT DECREASE BY MORE THAN 5 PERCENT OF THEORIGINAL PRESSURE AFETR 10 MINUTES ON TEST.

STYLE LIST

STYLE	ITEM INCLUDED	DESCRIPTION OR REMARKS	RACORDED	
			SIG.	DATE
851340	001	RUBBERISED VALVE	Sd/-	27.4.84

TOOL LIST

ITEM	TOOL	DESCRIPTION
001	-	-

VAR. 00	REMARKS	VAR NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.	IT. NO.	MATL. CODE.	A/C	UNIT	UNIT WT.	QTY.	CS.
			001	VALVE STEM		3 588 05 30032	001						

COMPUTERISED DRAWING

	CHD.	APPD.
NAME	B.K.T.	R.K.S.
SIGN.		
DATE	03.08.12	03.08.12

DISTRIBUTION OF PRINTS
OFFICE COPY - 1,
SWM - 4
TCX (SWM)-1

REVDATEALTERED
CHECKED
APPROVED

उत्पाद का प्रकार या ग्राहक/परियोजना का नाम
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
भोपाल
BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

वज्रपा DRN.
जोड़ा CKD.
स्वीकृत APPD.

नाम /NAME
C.K.M.
I.S.R.
V.P.A.

हस्ता/ SIGN.
Sd/-
Sd/-
Sd/-

दि./DATE
27.04.84
05.05.84
06.05.84

वेरि की संख्या NO. OF VAR.
—

विभाग DEPT. SWE
कोड CODE. 409

उत्प.टोल.नाप की त्रुटि UNTOL. DIMS. GR.
CG 06503

अनुपात SCALE
2:1

भार कि. ग्रा. WEIGHT (K.G.)
—

उसे. ड्राईंग का संदर्भ REF. TO ASSY.
1 588 05 30003

मद संख्या ITEM NO.
009

मद संख्या NO. OF ITEM
001

शीर्षक/TITLE
RUBBERISED VALVE

ड्राईंग क्र./DRAWING NO.
3 588 05 30033

पुन./REV.
00

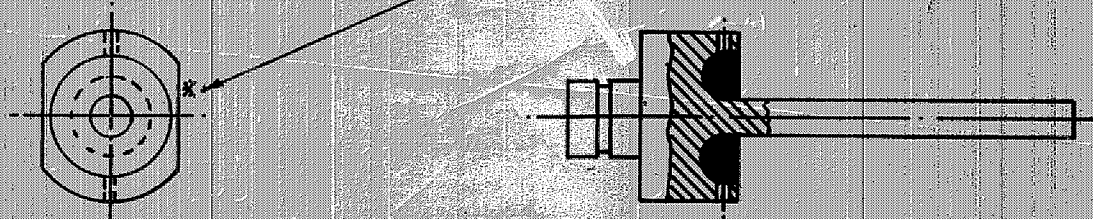
शीट क्र /SHT.NO 01

शीटों की सं./NO.OF.SHT.01

3 588 05 3 0035

DRG. NO.

SEE NOTE 3



PART SECTION VIEW

- NOTE:**
1. FACE AND SIDE TO BE CLEANED UP BY TURNING USING MINIMUM CUT TO REMOVE EXCESS RUBBER ONLY.
 2. IT.001 TO BE FILLED WITH POLY URETHENE RUBBER TO RDSO'S SPEC. NO. RDSO/M&C/RP-115 OF 1980, COMPOUND B.
 3. SUPPLIER SHOULD ENGRAVE THE NAME OF HIS FIRM IN THE PLACE MARKED THUS * LETTER 'P' ALSO TO BE ENGRAVED TO INDICATE POLY URETHENE MATERIAL.

NOTES ON TEST REQUIREMENTS:-

1. FOR RUBBER

11. TEST SLAB IS TO BE TESTED FOR CONFORMITY WITH THE SPEC.

2. FOR VALVE

*21. ENDURANCE TEST:- AT RANDOM 3 NOS. OF THE SUPPLY OF VALVES TO BE SELECTED AND SUBJECTED TO AN ENDURANCE TEST OF 200,000 OPERATIONS SEPARATELY

22. LEAKAGE TEST:- THE SAME VALVES AS USED FOR TEST UNDER NOTE 2-1 ABOVE TO BE SUBJECTED TO THE FOLLOWING LEAKAGE TEST AFTER ENDURANCE TEST. CYLINDERS USED FOR OPERATING APPARATUS EQUIPED WITH VALVES TO BE CONNECTED TO A RESERVOIR HAVING A VOLUME IN LITRES NOT GREATER NUMERICALLY THAN 0.02 TIMES THE DIAMETER OF THE CYLINDER IN MM. WITH A MINIMUM OF 1 LITRE CHARGED TO A PRESSURE OF 5 kg f/cm² (70 P.S.I). AIR TIGHTNESS OF VALVES TO BE CONSIDERED SATISFACTORY IF THE PRESSURE IN THE RESERVOIR DOES NOT DECREASE BY MORE THAN 5 PERCENT OF THE ORIGINAL PRESSURE AFTER 10 MINUTES ON TEST.

STYLE LIST

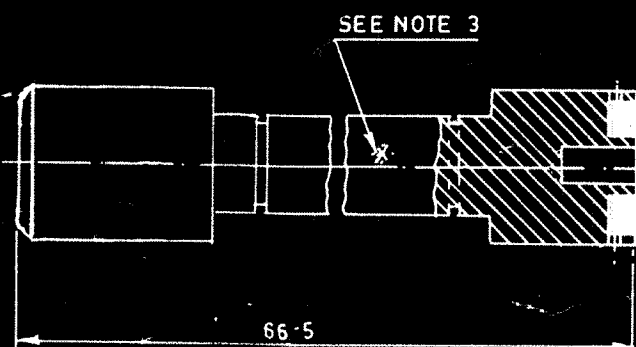
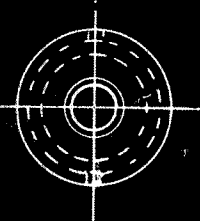
STYLE	ITEM INCLUDED	DESCRIPTION OR REMARKS	RECORDED
BP9058554031	001	RUBBERISED VALVE	SIG DATE
			27-4-84

TOOL LIST

ITEM	TOOL	DESCRIPTION
001		

59	64	65	75	78	79	25	27	29	53	59	63	77	29	31	34	45	55	56	58	65	72
VAR 00			REMARKS	VAR NO.	ITEM NO.				DESCRIPTION	STD	DRAWING NO.		IT. NO.	VAR	MATL. CODE	MATL. SPECN	UNIT	UNIT WT.	QTY.		
CARD TYPE-3				CARD TYPE 1				CARD TYPE 2													
ADDITIONAL INFORMATION										TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT											
STATUS OF DRAWING										INDIAN RAILWAYS											
DISTRIBUTION OF PRINTS OFFICE COPY SWM TCX (SWM)										BHARAT HEAVY ELECTRICALS LTD. BHOPAL											
REV. DATE										NAME SIGN DATE											
01 24-3-98										MATHW C. K. 27-4-84											
ALTERED										V. P. A. 6-5-84											
CHECKED																					
GRADE OF UN. TOL. DIM. C/M/F										WEIGHT (Kg.)											
2:1										REF. TO ASSY. DRG.											
STYLE NO. WAS IN 6 DIGIT										2 588 05 3 0001											
TITLE										DRAWING NO.											
RUBBERISED VALVE										3 588 05 3 0035											
SHEET NO. 01										NO. OF SHEETS 01											

DRG. NO. 3 588 05 3 0029



PART SECTION VIEW

SEE NOTE 3

OPEN OUT TO $\phi 2.7$ FLAT BOTTOM
DEEP $7.55^{+0.09}_{-0.06}$ AFTER BONDING

NOTES ON TEST REQUIREMENTS:-

1. FOR RUBBER:-

1.1. TEST SLAB IS TO BE TESTED FOR CONFORMITY WITH THE SPEC.

2. FOR VALVE STEMS:-

2.1. ENDURANCE TEST:- AT RANDOM 3 NOS. OF THE SUPPLY OF VALVE STEMS TO BE SELECTED & SUBJECTED TO AN ENDURANCE TEST OF 200,000 OPERATIONS SEPARATELY

2.2. LEAKAGE TEST:- THE SAME VALVE STEMS AS USED FOR TEST UNDER NOTE 2-1 ABOVE TO BE SUBJECTED TO THE FOLLOWING LEAKAGE TEST AFTER ENDURANCE TEST. CYLINDERS USED FOR OPERATING APPARATUS EQUIPED WITH VALVE STEMS TO BE CONNECTED TO A RESERVOIR HAVING A VOLUME IN LITRES NOT GREATER NUMERICALLY THAN 0.02 TIMES THE DIAMETER OF THE CYLINDER IN MM. WITH A MINIMUM OF 1 LITRE CHARGED TO A PRESSURE OF 5 Kg f/cm^2 (70 P.S.I). AIR TIGHTNESS OF VALVE STEMS TO BE CONSIDERED SATISFACTORY IF THE PRESSURE IN THE RESERVOIR DOES NOT DECREASE BY MORE THAN 5 PERCENT OF THE ORIGINAL PRESSURE AFTER 10 MINUTES ON TEST.

STYLE LIST

STYLE	ITEM INCLUDED	DESCRIPTION OR REMARKS	RECORDED	
			SIG	DATE
855404	001	VALVE STEMS	Mathew	27.4.84

TOOL LIST

ITEM	TOOL	DESCRIPTION
001		

- NOTE:-
1. FACE AND SIDE TO BE CLEANED UP BY TURNING USING MINIMUM CUT TO REMOVE EXCESS RUBBER ONLY.
 2. ITEM TO BE FILLED WITH POLY URETHENE RUBBER TO RDSO'S SPEC. NO. RDSO/M&C/RP-115 OF 1980, COMPOUND B
 3. SUPPLIER SHOULD ENGRAVE THE NAME OF HIS FIRM IN THE PLACE MARKED THUS * LETTER P ALSO TO BE ENGRAVED TO INDICATE POLY URETHINE MATERIAL.

59	64	65	75	78	79	25	27	29	58	59	60	77	29	31	34	MATL. CODE	UNIT WT.
VAR 00			REMARKS		VAR. NO.	ITEM NO.		DESCRIPTION	STD.		DRAWING NO.		32	33	46	MATL. SPECN	QTY.

28 → CARD TYPE-3

28 → CARD TYPE 1

28 → CARD TYPE 2

ADDITIONAL INFORMATION

STATUS OF DRAWING

M

DISTRIBUTION OF PRINTS

OFFICE COPY

SWM

TCX (SWM)

TYPE OF PRODUCT

OR

NAME OF CUSTOMER/PROJECT

INDIAN RAILWAYS



BHARAT HEAVY ELECTRICALS LTD.

BHOPAL

DRN	NAME	DATE	SIG.	COB
MATHEW	C.K.	27.4.84		
CHD	S.R.			
APPD	V.P.H.			

REV.	DATE	ALTERED
01	28/6/90	CHECKED

STEP AT L.H. END
DELETED

DEPT.	GRADE OF
C GE	UN: TOL,
CODE	DIM. C/M/F
410	



SCALE

2:1

WEIGHT (Kg.)

REF. TO ASSY. L

2 588 05 3 0001

ITEM	NO
NO	OF

TITLE

RUBBERISED VALVE STEM

CARD
CODE

DRAWING NO.

3 588 05 3 0029

SHEET NO. 1

NO. OF

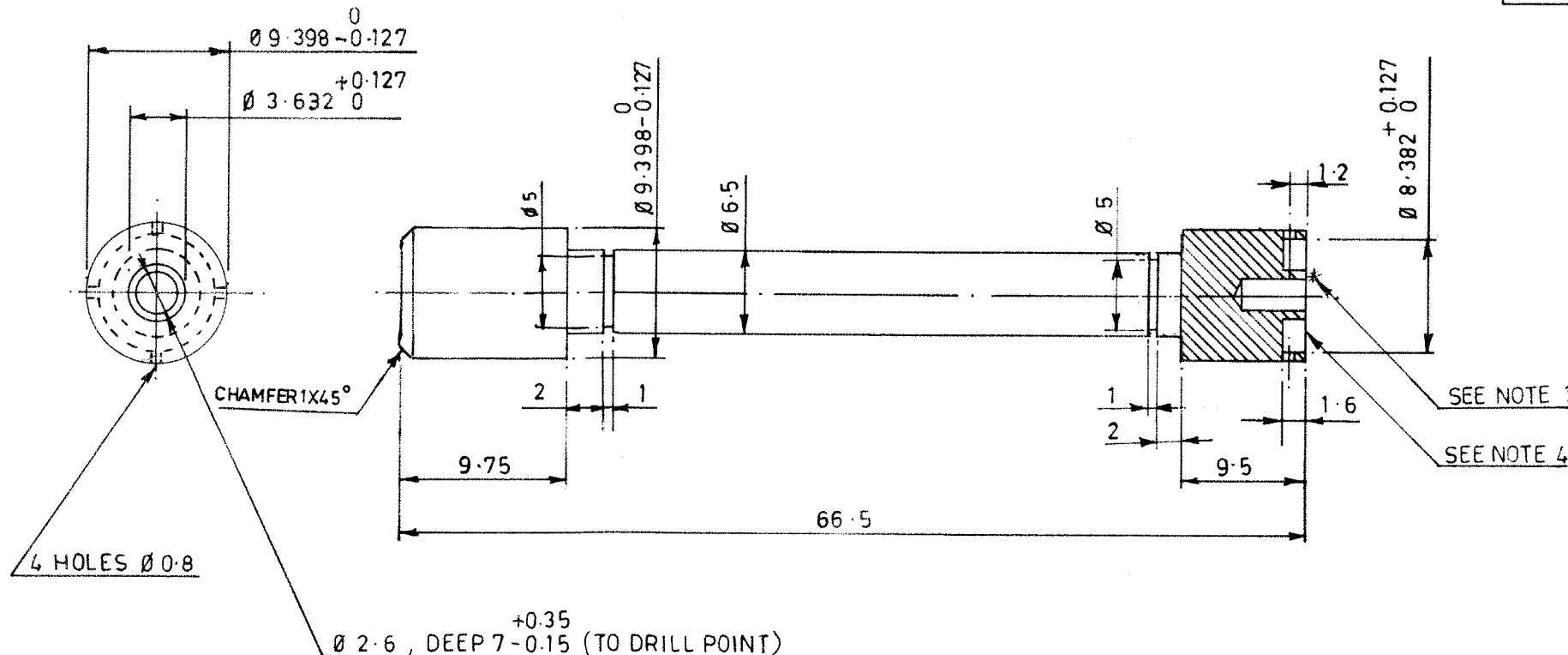
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3 588 05 3 00081T001
REF. DRG. NO. C 719

SIGN. & DATE

INVENTORY NO.

DRG. NO. 3 588 05 3 0028



STYLE LIST				
STYLE	ITEM INCLUDED	DESCRIPTION OR REMARKS	RECORDED	
	001	VALVE STEM	SIG	DATE
			27-4-84	

- NOTE:-
- * THIS SURFACE TO BE SQUARE WITH THE AXIS.
 - ALL DIAMETERS TO BE CONCENTRIC TO WITH IN 0.13.
 - ALL SHARP CORNERS TO BE REMOVED.
 - THE INSIDE SURFACE OF THE GROOVE FOR RUBBER INSERTION SHOULD BE ROUGHENED TO ENSURE PROPER ADHESION OF RUBBER INSERTION.

59	64	65	75	78	79	25	27	29	58	59	60	77	28	31	34	45	55	56	58	65	72
VAR 00			REMARKS			VAR. NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.			IT. NO.	VAR.	MATL. CODE	MATL. SPECN	A/C	UNIT	UNIT WT.	QTY.	

CARD TYPE-3												CARD TYPE 1												CARD TYPE 2													
ADDITIONAL INFORMATION												TYPE OF PRODUCT												OR													
STATUS OF DRAWING												NAME OF CUSTOMER/PROJECT												INDIAN RAILWAYS													
DISTRIBUTION OF PRINTS												BHARAT HEAVY ELECTRICALS LTD.												BHOPAL													
OFFICE COPY												NAME												SIGN													
SWM												DRN												DATE													
TCX (SWM)												CHD												APPD													
REV. DATE												DEPT. C G E												GRADE OF UN: TOL. DIM. C/M/F													
02 28/90												SCALE												WEIGHT (Kg.)													
ALTD. CKD.												REF. TO ASSY. DRG.												ITEM NO.													
8.1.90												3 588 05 3 0029												001													
STEP $\phi 8.7$ & DIMN. 5 AT L.H. END DELETED.												TITLE												DRAWING NO.													
DIMS. 1, 2 & $\phi 5$ WERE SHOWN AT ONE END. ONLY ASSY DRG. REF. WAS 25880530031 IT.001 IN ERROR.												VALVE STEM												3 588 05 3 0028													
D1144												CARD CODE												SHEET NO. 1													
																								NO. OF SHEETS 1													

SECTION

(ALL DIMENSIONS ARE IN mm.)

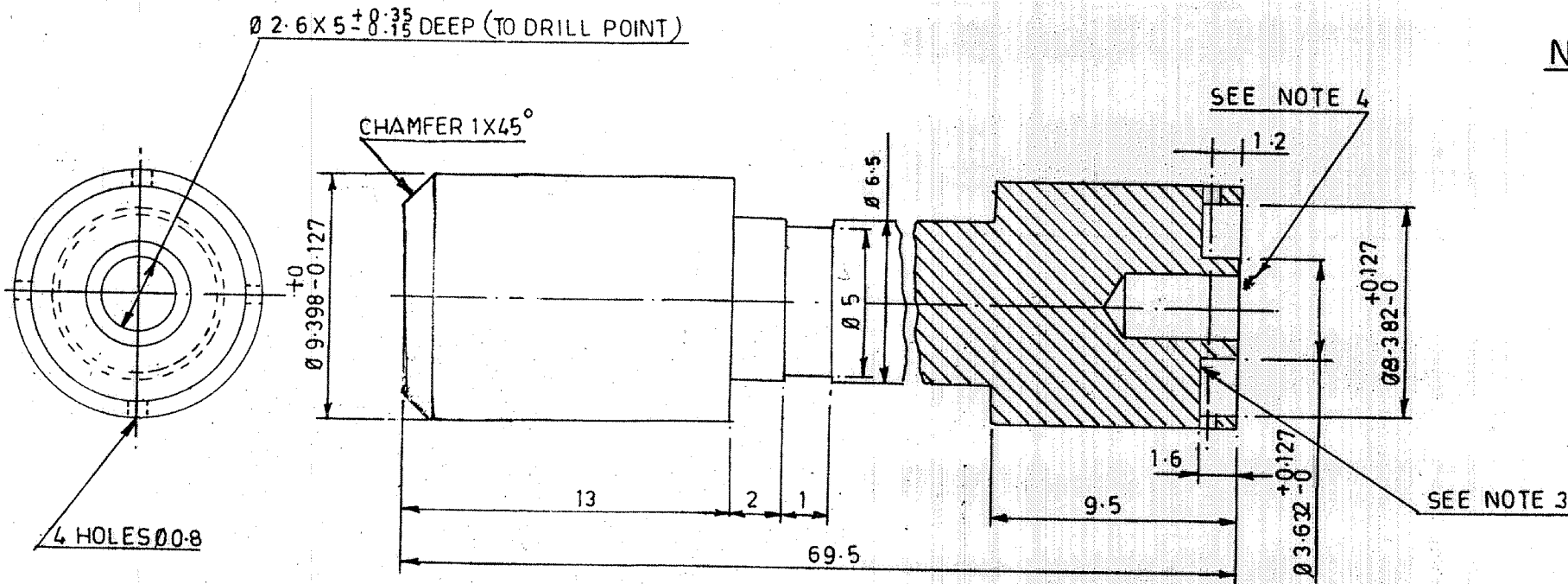
DRG.

STYLE LIST

STYLE	ITEM INCLUDED	DESCRIPTION OR REMARKS	RECORDED	
			SIG	DATE
	001	VALVE STEM		

NOTE:-

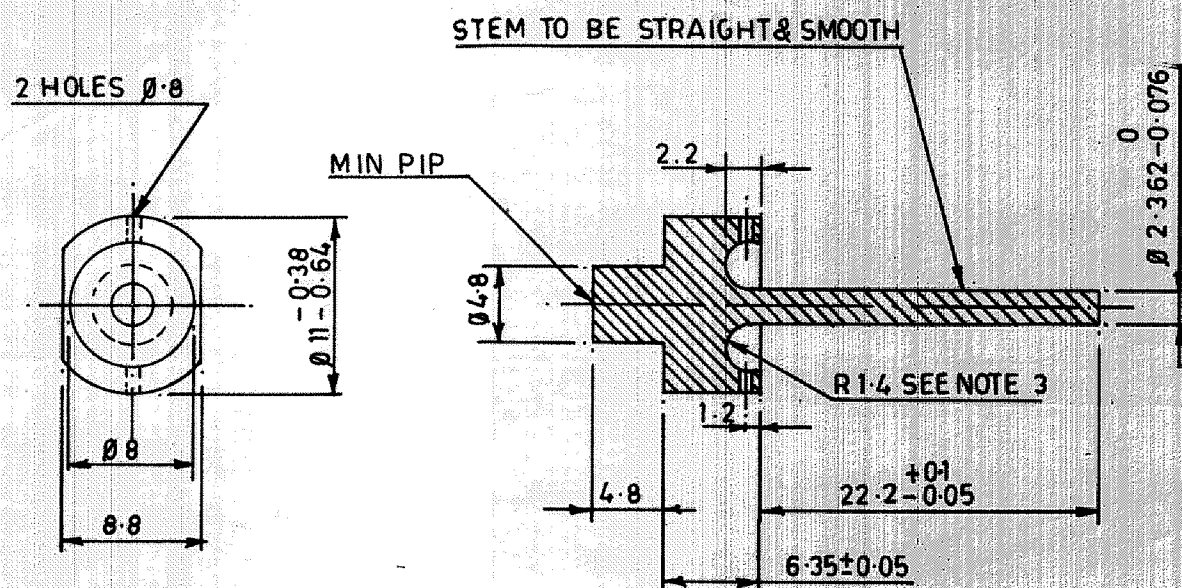
1. ALL DIAMETERS TO BE CONCENTRIC TO WITH IN 0.13
2. ALL SHARP CORNERS TO BE REMOVED.
3. THE INSIDE SURFACE OF THE GROOVE FOR RUBBER INSERTION SHOULD BE ROUGHENED TO ENSURE PROPER ADHESION OF RUBBER INSERTION
4. *THIS SURFACE TO BE SQUARE WITH THE AXIS.



001		12 DIA F.C BRASS ROD		AA 1210214 024		0.07 Kg.	
VAR 00		REMARKS		AA 12114		66.5	
59	64	65	75	78	79	25	27
VAR. NO.		ITEM NO.		DESCRIPTION		DRAWING NO.	
28		CARD TYPE-3		28		CARD TYPE 1	
28		CARD TYPE 2		28		CARD TYPE 2	
ADDITIONAL INFORMATION				TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT			
STATUS OF DRAWING				INDIAN RAILWAYS			
DISTRIBUTION OF PRINTS				BHARAT HEAVY ELECTRICALS LTD. BHOPAL			
OFFICE COPY				DRN NAME MATHAW C.K.			
SWM				CHD 1-5-84			
TCX (SWM)				APPD V.P.A. 18/2			
REV. DATE 01/28/80				DATE 27-4-84			
ALTERED				SIGN			
CHECKED				DATE 5-5-84			
STEP 8.7 & DIMN. 5 AT L.H. END DELETED				6-5-84			
D-1144				73 74 No. OF VAR.			
DEPT. C GE CODE 410				75 77 No. OF ITEMS			
GRADE OF UN: TOL. DIM. C/M/F				75 77 No. OF ITEMS			
SCALE 4:1				75 77 No. OF ITEMS			
WEIGHT (Kg.)				75 77 No. OF ITEMS			
REF. TO ASSY. DRG.				75 77 No. OF ITEMS			
3 588 05 3 0031				75 77 No. OF ITEMS			
ITEM NO. 001				75 77 No. OF ITEMS			
TITLE VALVE STEM				75 77 No. OF ITEMS			
1 CARD CODE				75 77 No. OF ITEMS			
7 DRAWING NO. 3 588 05 3 0030				75 77 No. OF ITEMS			
SHEET NO. 1				75 77 No. OF ITEMS			
NO. OF SHEETS 1				75 77 No. OF ITEMS			

(ALL DIMENSIONS ARE IN mm.)

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STYLE LIST				
STYLE	ITEM INCLUDED	DESCRIPTION OR REMARKS	RECORDED	
			SIG	DATE
	001	VALVE	M	26-5-84

NOTE:-

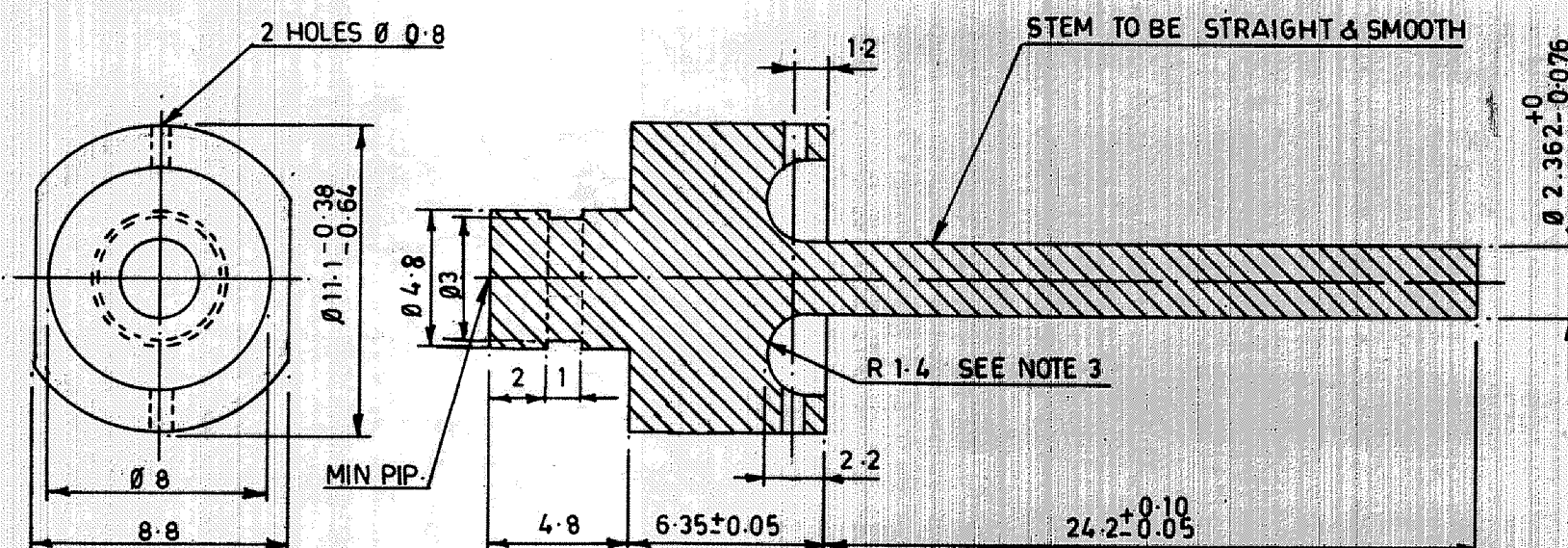
1. ALL DIAMETERS TO BE CONCENTRIC TO WITHIN 0.13
2. ALL SHARP CORNERS TO BE REMOVED.
3. THE INSIDE SURFACE OF THE R1.4 GROOVE SHOULD BE ROUGHENED TO ENSURE PROPER ADHESION OF RUBBER INSERTION.

[illegible]

SIZE A3

DRG. NO. 3 588 05 3 0034

INVENTORY NO.



1. ALL DIAMETERS TO BE CONCENTRIC TO WITHIN 0.13
2. ALL SHARP CORNERS TO BE REMOVED.
3. THE INSIDE SURFACE OF THE R1.4 GROOVE SHOULD BE ROUGHENED TO ENSURE PROPER ADHESION OF RUBBER INSERTION.

59 VAR 00		64 65		75 78 79		25 27		29		58 59 60		77		29 31 IT. NO.		34		45 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100		AA 1210241013		AA 12141		0.035 Kg.		35.45	
REMARKS		VAR. NO.		ITEM NO.		DESCRIPTION		DTP.		DRAWING NO.		VAR.		MATL. CODE		MATL. SPECN		UNIT		UNIT WT.		QTY.					
28		CARD TYPE-3		28		CARD TYPE 1		28		CARD TYPE 2		28		CARD TYPE 2		28		CARD TYPE 2		28		CARD TYPE 2					
ADDITIONAL INFORMATION		STATUS OF DRAWING		M		TYPE OF PRODUCT		OR		NAME OF CUSTOMER/PROJECT		INDIAN RAILWAYS		DISTRIBUTION OF PRINTS		OFFICE COPY		SWM		TCX(SWM)		1 4 1					
REV.		DATE		ALTERED CHECKED		DEPT. C G E CODE 410		GRADE OF UN: TOL. DIM. C/M/F		SCALE 4:1		WEIGHT (Kg.)		REF. TO ASSY. DRG.		ITEM NO.		75 77 No. OF ITEMS		75 77 No. OF ITEMS		75 77 No. OF ITEMS					
TITLE		VALVE		1 CARD CODE		DRAWING NO.		3 588 05 3 0034		SHEET NO. 1		NO. OF SHEETS		22		23 24 REV.		22		23 24 REV.		22					



CORPORATE PURCHASING SPECIFICATION

AA 121 14

Rev. No. 03

PAGE 1 OF 4

FREE CUTTING BRASS BARS, RODS, WIRES AND SECTIONS (HALF HARD)

1.0 GENERAL:

This specification governs the quality requirements of Free cutting Brass Bars, Rods, Wires and Sections.

2.0 APPLICATION:

For screws and bushes.

3.0 CONDITION FO DELIVERY:

"Half Hard" wires upto 6mm diameter may be supplied in coils.

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

The material shall comply with the requirements of the following national standard and also meet the requirements of this specification.

IS : 319 - 89 (Reaffirmed 1996) : Free cutting Brass Bars, Rods and Sections
Gr: 1 (HB) - Half hard

IS: 8364-1989 (Reaffirmed 1996) : Free cutting Rods and Sections
Gr: 1 (HB) - Half hard

5.0 DIMENSIONS AND TOLERANCES:

5.1 Sizes:

The material shall be supplied to the dimensions specified in BHEL order:

5.2 Tolerances:

5.2.1 Wires:

Tolerances shall be as per Table-1 of IS:9861.

5.2.2 Bars/Rods and Sections:

Tolerances for round, square, rectangular and hexagonal rods shall be as given in Table-1, 2, 3 and 4 respectively of IS:2826.

Revisions :

Cl: 17.11.25 of MOM of MRC-NFCW+HE

APPROVED :

INTERPLANT MATERIAL RATIONALISATION
COMMITTEE-MRC (NFCW+HE)

Rev. No. 03

Amd.No.

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6.0 MANUFACTURE:

By rolling / extrusion / drawing.

7.0 FREEDOM FROM DEFECTS:

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

8.0 CHEMICAL COMPOSITION:

The analysis of copper when analysed in accordance with IS:3685 (Method for chemical analysis of brasses) or any other conventional/Instrumental methods shall be as follows:

Element	Percent	
	Min.	Max
Copper plus incidental nickel	56	59.0
Lead	2.0	3.5
*Iron	----	0.35
*Total Impurities (excluding Iron)	----	0.7
Zinc	Remainder	

Note: These elements need not be determined, when the materials supplied conform with mechanical properties specified.


9.0 TEST SAMPLES:

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

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

10.0 MECHANICAL PROPERTIES:

When tested in accordance with IS 1608, (Mechanical testing of metals-Tensile testing), the material shall show the following properties. The fractured test piece shall be free from pipes and such other defects.

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Cross sectional dimension, mm		Ultimate tensile strength, in N/mm ²	Percent, elongation
Over	upto & incld	min.	min.
-	10	410	4.0
10	12	405	4.0
12	25	395	6.0
25	50	355	12.0
50	---	325	17.0

- Upto 10 mm size, guage length shall be 100 mm. Above 10mm size gauge length shall be $5.65\sqrt{So}$.

11.0 MERCUROUS NITRATE TEST:

The mercurous nitrate test shall be carried out on a piece cut from each bar/rod selected for testing. When tested in accordance with IS: 2305, the test piece shall not show any sign of cracking. Should any specimen fail under mercurous nitrate test, all bars/rods submitted for inspection at the same time shall be withdrawn but may be resubmitted for inspection after stress relieving treatment.

12.0 OPTIONAL TEST:

If specified in the order/drawing, the material shall be tested for its electrical conductivity. The electrical conductivity shall be as per mutual agreement within BHEL and manufacturer. Refer ASTM B 193 , clause 6 for temperature correction factor.


13.0 RETEST:

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

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

14.0 INSPECTION AT SUPPLIER ' WORKS:

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

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The supplier shall offer BHEL's representative all reasonable facilities, without charge to satisfy the latter that the material is being furnished in accordance with this specification. The supplier shall prepare and provide necessary test specimens for testing to be carried out at his premises. If facilities are not available at his works, the supplier shall make necessary arrangements for carrying out the prescribed test elsewhere. The supplier shall notify BHEL in advance about the readiness of the material for inspection and testing.

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

15.0 TEST CERTIFICATES:

Unless other wise stated, three copies of certificates shall be supplied along with each consignment.

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

The test certificate shall bear the following information:

AA 12114 (Rev.03) Free cutting brass bars, rods, wires and sections (Half hard)
 BHEL Order No.
 Manufacturer 's/Supplier's Name:
 Lot/Identification/Batch/Melt No.
 Sizes and Quantity Supplied
 Results of dimensional inspection, chemical analysis, mechanical and all other tests as called for.

16.0 PACKING AND MARKING:

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

AA 12114 :
 BHEL Order No.
 Identification No:
 Size
 Weight
 Supplier's Reference and Name

17.0 REFERRED STADARDS : (Latest Publications Including Amendments):

1. IS:319	2. IS: 1608	3. IS: 3205
4. IS: 2826	5. IS: 3685	6. IS: 8364
7. IS: 9861	8. ASTM B 193	



CORPORATE PURCHASING SPECIFICATION

AA12141

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PHOSPHOR BRONZE RODS AND BARS FOR ELECTRICAL MACHINES

1 GENERAL

This specification governs the quality requirements of Phosphor bronze rods and bars greater than 6mm.

2 APPLICATION

Electrical machines.

3 CONDITION OF DELIVERY

As manufactured. The material shall be suitably stress relieved, if required.

4 COMPLIANCE WITH NATIONAL STANDARDS

The material shall comply with the requirements of the following national standard and also meet the requirements of this specification.

IS : 7811 – 2019 : Phosphor Bronze Rods and Bars.
Gr. CuSn5

5 DIMENSIONS AND TOLERANCES

The dimensions shall be as specified in the order. The tolerances shall be as given in IS:2826 - Dimensions and tolerances for copper & copper alloy rods, bars for general engineering purposes.

6 FREEDOM FROM DEFECTS

The material shall be free from porosity and other defects of a nature that may interfere with normal commercial operation.

7 CHEMICAL COMPOSITION

The analysis of copper when analysed in accordance with IS:4027 (Method for chemical analysis of bronzes) or any other conventional/Instrumental methods shall be as follows:

Element	Percent, min.	Percent, max.
Tin	4.2	5.5
Phosphorus	0.02	0.40
* Lead	--	0.05
* Zinc	--	0.30
*Total Impurities	--	0.5
Copper	Remainder	

8 TEST SAMPLES

For conducting tests all rods/bars of same dimensions and manufactured under similar conditions of production shall be grouped in batches as follows;

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Specified size (diameter or width across flats) in mm	Mass of batch in kg
Upto and including 12	250
Over 12 & upto and including 40	500
Over 40 & upto and including 80	1000
Over 80	2000

Upto and including 12	250
Over 12 & upto and including 40	500
Over 40 & upto and including 80	1000
Over 80	2000

One sample shall be selected from each batch or part thereof to provide necessary test pieces for chemical, Mechanical, Electrical resistivity.

9 MECHANICAL PROPERTIES

When tested in accordance with IS 1608 (Part-1), (Mechanical testing of metals-Tensile testing), the material shall show the following properties in as received condition:

Cross sectional thickness, mm		0.2% proof stress, min., in N/mm ²	Tensile strength min., N/mm ²	Elongation on G.L. of 5.65 $\sqrt{S_0}$, min., percent
Over	upto & incld.			
6	18	410	500	12
18	40	380	460	12
40	70	315	380	16
70	100	235	315	20
100	120	118	275	22
120	--	80	255	25

10 ELECTRICAL RESISTIVITY

The electrical resistivity at 20°C of a rod of 1 meter in length and uniform cross sectional area of 1 mm² shall be 0.108 ohm \pm 10%.

11 RETEST

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

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

12 INSPECTION AT SUPPLIER' WORKS

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

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

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

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

13 TEST CERTIFICATES:

Unless otherwise stated, three copies of certificates shall be supplied along with each consignment.

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

The test certificate shall bear the following information:

- AA12141, Rev.04: PHOSPHOR BRONZE RODS AND BARS FOR ELECTRICAL MACHINES
- BHEL Order No.
- Manufacturer 's/Supplier's Name:
- Consignment/Identification No.
- Sizes and Quantity Supplied
- Results of dimensional inspection, chemical analysis, mechanical, electrical and all other tests as called for.

14 PACKING AND MARKING

The material shall be supplied in bundles weighing about 50 kg and strapped with loops and suitably packed in wooden crates to prevent corrosion and damage during transit.

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

- AA12141 : PHOSPHOR BRONZE RODS AND BARS FOR ELECTRICAL MACHINES
- BHEL Order No.
- Identification No.
- Weight
- Supplier's Reference and Name

15 REFERRED STANDARDS (Latest publications including amendments)

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|-------------|------------|-------------|-------------|
| 1) IS: 1608 | 2) IS 2826 | 3) IS: 4027 | 4) IS: 7811 |
|-------------|------------|-------------|-------------|