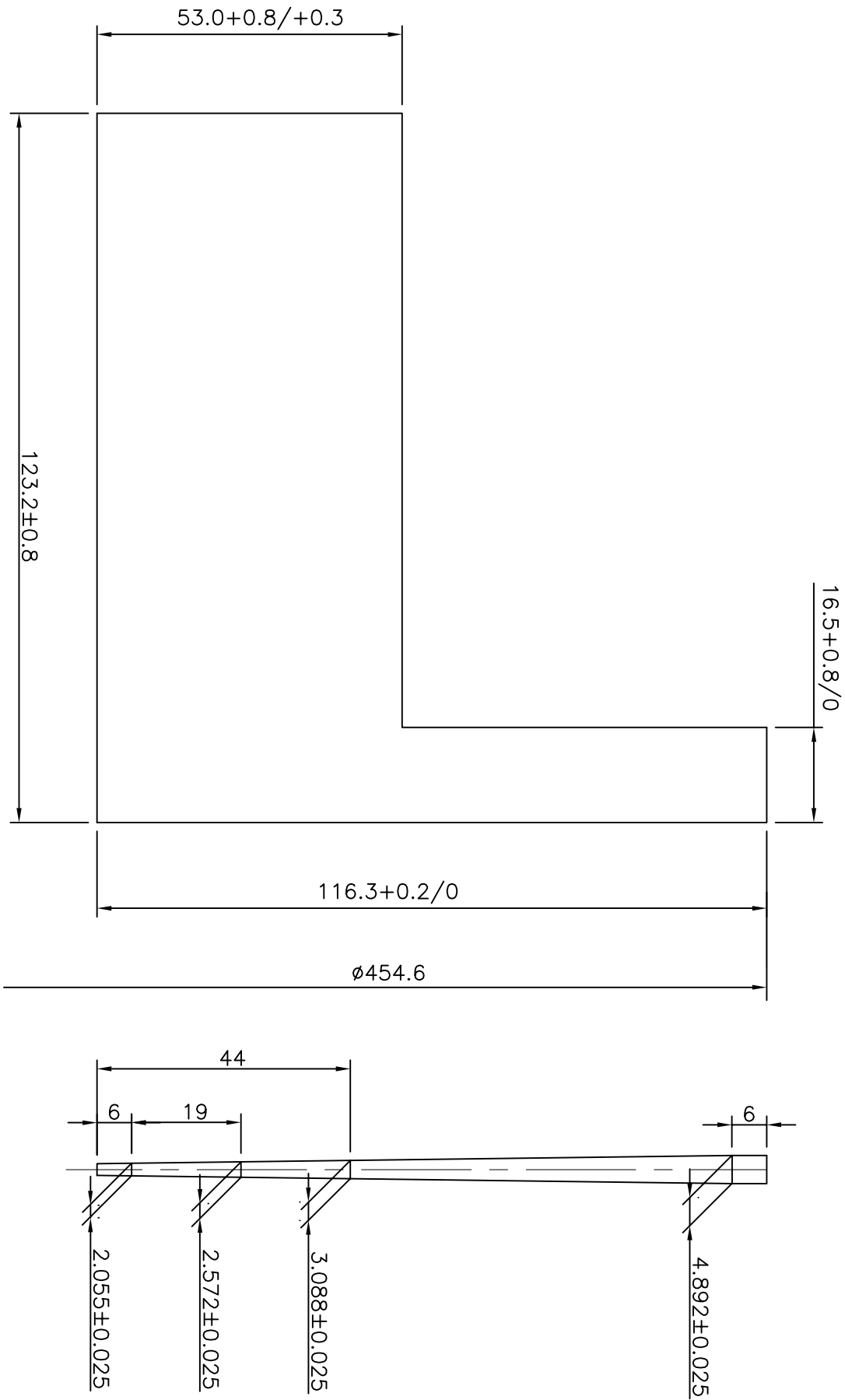


34394241002

DRG. NO.

STYLE LIST		
VAR	IT.NO.	ST.NO.
—	001	BP9044760017



- NOTES:-

1. NUMBER OF SEGMENT PER COMMUTATOR = 230
2. TOLERANCES ON COMMUTATOR BAR AS PER BS 1434, UNLESS STATED OTHERWISE.
3. DEPARTURE ANGLE TO BE WITHIN $0/-0.020$ MM AS PER BS:1434 (CLAUSE 6.5)
4. CONVEXITY/CONCAVITY TO BE WITHIN ± 0.020 MM AS PER BS:1434 (CLAUSE 6.6)
5. CORNERS TO BE ROUNDED OFF EDGES TO BE DEBURRED.

[illegible]

CORNERS TO BE ROUNDED OFF.									
EDGES TO BE DEBURRED									
SIGN. & DATE									
REF. DRG. NO.									
CARD TYPE-3									
CARD TYPE-1									
CARD TYPE-2									
ADDITION INFORMATION									
STATUS OF DRAWING									
DISTRIBUTION OF PRINT									
TME-1									
TNX-1									
TXM-3									
BHARAT HEAVY ELECTRICALS LTD.									
BHOPAL									
TM4601BX, TM4603BZ, TM4605BZ									
KG. 0.19									
UNIT WT.									
ZONE									

INVENTORY NO.																	
	REV	DATE	ALTERED	A.JHARIA	REV	DATE	ALTERED	-SD-	DEPT.	TME	GRADE OF UNTOL.	SCALE	WEIGHT (kg)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEMS	
	05	04.03.19	CHECKED	B.K.T.	04	17.02.09	CHECKED	-SD-	CODE 405	DIM. C/M/F M		NTS	0.19	44394241002	001	001	
	TYPE OF PRODUCT UPDATED & DRG. DIGITIZED.		APPROVED	B.K.T.	APPROVED	-SD-											
			DRG. UPDATED & DIGITIZED.		APPROVED	-SD-											
TITLE										DRAWING NO.		REV.					
COMMUTATOR BAR BLANK										7		22		23		24	
										SHEET NO.		01		NO. OF SHEET		01	

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.

	PLANT PURCHASING SPECIFICATION BHOPAL	BP 12070
		REV NO. 06
		PAGE 1 of 04
<u>SILVER BEARING HARD DRAWN COPPER COMMUTATOR SEGMENT Ag 0.08 to 0.15%</u>		SUPERSEDES BP12070 Rev 05
1. GENERAL This specification <i>governs</i> the quality of silver bearing hard drawn copper commutator segments, over 6 mm in height & upto 15 mm thick in which the inclination of the two surfaces is constant throughout the height. 2. COMPLIANCE WITH NATIONAL STANDARDS This specification shall comply, in general ,with the requirements of the following National Standards and also meet the requirement of this specification : <u>Material:</u> IS : 5885-1977 (Reaffirmed 2016) Grade: Copper silver alloy, (except silver content) 3. <u>Dimensions and Tolerances</u> BS : 1434-1985 (Reaffirmed 2017). 3.1 <u>Sizes</u> All sizes shall be according to the drawing accompanying our order. 3.2 <u>Tolerance</u> The tolerances on dimensions and shapes shall comply with C1.6 of BS : 1434 -1985 (Reaffirmed 2002)as detailed below and in addition shall comply to the following. The measurement shall be made by a suitable programme co-ordinate measuring machine and readings shall be recorded in Test Certificate (C1.9).		
Revision : Reviewed & IS,BS Reaffirmed		Issued by : STANDARDS AND MATERIALS GROUP TECHNICAL SERVICES DEPRTMENT
Rev. 06	Date : 07.11.2019 ²	Date of first Issue : June 1988



TSD 6207A

PLANT PURCHASING SPECIFICATION BHOPAL

BP 12070

REV NO. 06

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- 3.2.1 End Squareness To cl. 6.2
- 3.2.2 Height To cl. 6.3
- 3.2.3 Thickness To cl. 6.4
(Close Gr.)
- 3.2.4 Angle To cl. 6.5
(Close Gr.)
- 3.2.5 Shape of side faces-Convexity or concavity To cl. 6.6
(Close Gr.)
- Note:-** Convexity or concavity may also be Checked on computer aided profile projector
- 3.2.6 Straightness To cl. 6.7
- 3.2.7 Twist To cl. 6.8

BS:1434-85
(Reaffirmed 2017)

3.2.8 Segment Length

For bars ordered as segments for assembly, the length when measured at any position across the width of the bar shall not deviate from the specified length by more than ± 0.8 mm.

3.2.9 Sharpness of Corners

Any loss of sharpness of corners shall not exceed 10% of bar thickness at thick edge. The min. & max. values being 0.25 and 0.76 mm.

4.0 FREEDOM FROM DEFECTS

The segment shall be clean, smooth & free from harmful defects.

5.0 CHEMICAL COMPOSITION

The copper used for the manufacture of this alloy shall be of ETP Gr. except silver content, as mentioned in IS:5885 / BS: 1434.

The material when analysed in accordance with IS:440 shall have following chemical composition:

Element	Percent
Silver	0.08 to 0.15
Copper and Silver	99.9 Min.

6.0 TEST SAMPLES

One sample per size per consignment of 3 tonnes or part there of shall be selected for testing.



TSD 6207A

PLANT PURCHASING SPECIFICATION BHOPAL

BP 12070

REV NO. 06

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7.0 MECHANICAL PROPERTIES

7.1 Tensile

Test sample when tested in accordance with IS: 1608 shall show the tensile strength as given below :

Thickness		Tensile Strength
Over mm	upto & incld mm -	Min. N/mm ²
-	5	310
5	10	280
10	-	255

7.2 Hardness:

The hardness shall be determined by the Vickers hardness test in accordance with IS:1601 Pt.1/BSEN 180:6507. Routine measurements shall be made on the side face of the bar segment or blank.

Thickness		Hardness Hv Min
Over mm	upto & incl. mm	
-	5	95
5	10	90
10	-	85

8.0 ELECTRICAL RESISTIVITY:

The resistance at 20°C shall be not greater than 0.01777 Ohm. mm²/m which is equivalent to 97% min. of electrical conductivity of IACS Standard when measured on the sample in as received condition.

Alternatively, the method of measurement employing eddy current probes.

As per ASTM-E 1004 shall also be acceptable.

Refer IS: 613 Appendix "B" for temperature correction factor.

9.0 TEST CERTIFICATE:

Unless otherwise specified, three copies of a test certificate shall be supplied along with each consignment.

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



TSD 6207A

PLANT PURCHASING SPECIFICATION BHOPAL

BP 12070

REV NO. 06

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The test certificate shall bear the following information:

BP12070 Rev.06 : Silver Bearing Hard Drawn Copper Commutator Segments.
(Ag 0.08 to 0.15%)

BHEL Order No.

Size

Batch No.

Test results obtained for electrical, mechanical properties and chemical composition.

Dimensional tolerance, measured by a suitable programme Co-ordinate measuring machine, as per specification & drawing.

10.0 PACKING AND MARKING:

Segments shall be adequately packed to prevent damage during transit.

Each bundle/package shall bear the following information

BP12070 : Silver Bearing Hard Drawn Copper commutator Segments.

(Ag 0.08 to 0.15%)

BHEL Order No.

Supplier's Name

Size & Weight



BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL

QUALITY ASSURANCE PLAN FOR COMMUTATOR BAR BLANK TO BHEL ORDERING SPECIFICATION/DRAWING

AS PER PO

QUALITY PLAN NO. – QAP/QTM/VENDORQAP/2022-23/ COMMUTATOR BAR BLANK DTD 07.02.2023 REV 00
Reference Document- PO DRAWING/SPECIFICATION

Page : 1 of 1

SL. NO	COMPONENT	CHARACTERISTICS	TYPE OF CHECK	QUANTAM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	INSPECTION AGENCY	REMARKS
				TP	TP/A					
1)	Raw material	a) Chemical properties	TC verification	100%	100%	BP12070	As per Specification	MTC	BHEL/TP/A	TEST LAB NABL/EQUIVALENT ACCREDITED/SOURCE MILL./Supplier to get the raw material TC correlated with material TC.
2)	Testing	a) Mechanical tests	TC verification	100%	1%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TP/A	3 test sample per batch to be submitted to BHEL duly punched by TP/A for mechanical testing at BHEL
		b) Electrical tests	test	100%	1%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TP/A	100 % RR & 1% Witness
3)	Dimension	Dimension	measurement	100%	2%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TP/A	100 % RR & 2% Witness
4)	Identification vendor name, PO & job serial no.	Verification	Visual	100%	10%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TP/A	Embossing as per drawing

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