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# PRODUCT STANDARD

## GAS INSULATED SWITCHGEAR

PSGSG/15-16/006

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### SPECIFICATION OF ELECTROLYTIC TOUGH PITCH PITCH COPPER (ETP)

- 1. General:**  
This specification governs the quality requirements electrolytic tough pitch copper wire bars, ingots, continuously cast wire rods and extruded sections for electrical purposes.
- 2. Application:**  
This material is used in high voltage switchgear applications.
- 3. Compliance with National/International standards :**  
The material shall comply with the requirements of the following national standard and also meet the requirements of this specification.
  - A. INDIAN : IS : 191:2007
- 4. Dimensions and Tolerances:**  
As per drawings/Purchase order
- 5. Finish:**
  - a. Surface finish of the components shall be at least Ra 0.8.
  - b. The component shall be free from dirt, grease and loose particles.
  - c. Drawn profiles, to size, only shall be used for direct welding. No smithy is allowed for formation/ matching of profiles in view of defect inception.
  - d. Weld splatter, if any, shall be removed by chipping or grinding on completion of the weld(if allowed in drawing).
  - e. Any sharp corners shall be removed as per the drawing. Wherever not specified in the drawing, a radius of R1 shall be provided at the sharp corners and edges.
  - f. Parallelism of the tube must be maintained within 0.1 degree and any deviation shall be subjected to rejection in supply.

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REV.		PRINTS TO:- Issued online	APPROVED – MMRAO		
ALTD.			PREPARED	ISSUED	DATE
APPD.			N.Shashikanth		03.09.2015
DATE.					



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### 6. Properties :

Sl. No	Parameter	Test method	Unit	Value (Minimum)
1.	Chemical a) Copper b) Bismuth c) Lead d) Oxygen	IS 191	%	Remainder 10ppm 0.005 0.045
2.	Density, minimum	IS 191	g/cm <sup>3</sup>	8.89
3.	Tensile strength, Minimum	IS 1608	MPa	210
4.	Brinell Hardness	IS 1608	HB	10-62
5.	Elongation	IS 1608	%	4-55
6.	0.2 percent Proof-Stress	IS 1608	N/mm <sup>2</sup>	120-260
7.	Electrical Conductivity at 20°C (Minimum)	IS 191	% IACS	100

### 7. Test Methods

Unless otherwise specified, the tests shall be conducted in accordance with relevant methods as mentioned against clause 7.

### 8. Sample for Tests

The set of test specimens prepared from same batch and in same manner as consignments shall be supplied for testing and approval. The test sample size should be as per requirement specified in relevant test method of clause 7.

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### 9. Test Certificate

The supplier shall submit copy of test certificate for tests specified in clause 7 giving the following information:

- a. Results of chemical analysis, mechanical and all other tests as called for in this specification/order

### 10. Packing

The components shall be packed in high density cardboard boxes, with a primary wrapped in polyethylene and packed individually in dust free boxes after degreasing. The components shall be guaranteed against all manufacturing defects.

### 11. Acceptance criteria:

- a. Dimensional Report as per drawing.
- b. Finish as per clause 5.
- c. Test samples as per clause 9.
- d. Test certificate as per clause 10.
- e. Packing as per clause 11.

### 12. Rejection and Replacement:

In the event of the material proving defective in the course of manufacture, such material shall be rejected notwithstanding any previous certification of satisfactory testing and/or inspection.

The supplier shall undertake to replace the material. Repairing of material is not acceptable.

### 13. Guarantee Certificate:

Guarantee certificate for the period of 12 Months from the date of supply shall be furnished along with the supply.

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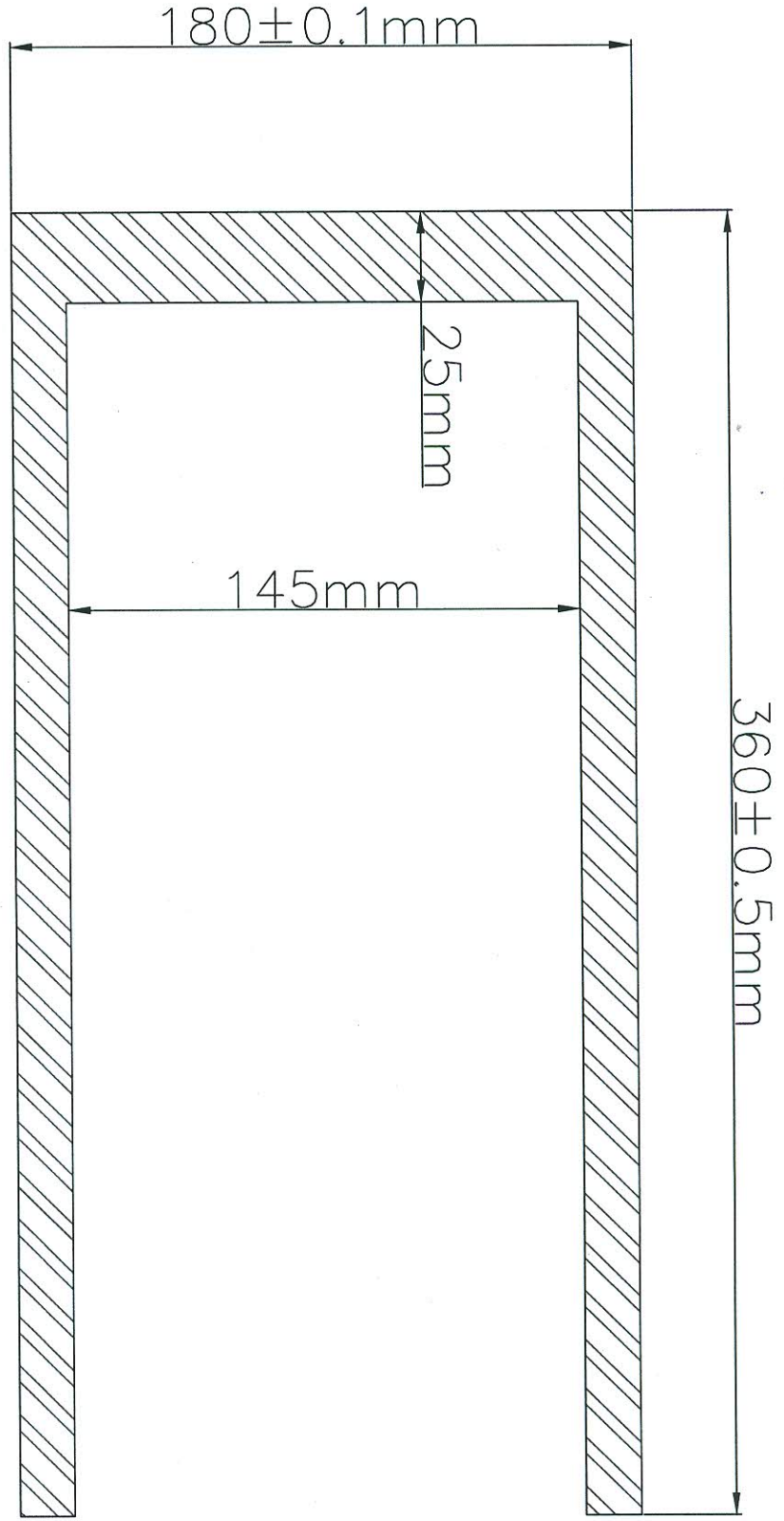
INVENTORY NO.      SIGN. AND DATE      REF. DRG. NO.

DRG NO. RD DG 435 030915

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

(~1.6)



VAR. NO.	REMARKS

VAR. NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.	ITM. NO.	MATL. CODE	MATL. SPECN.	A	C	UNIT	WT.	QTY.	ZONE

TYPE OF PRODUCT  
NAME OF CUSTOMER

**BHARAT HEAVY ELECTRICALS LTD.**  
HYDERABAD

DEPT. CODE:      GRADE OF TOL. DIM:      SCALE:      WEIGHT(KG):  
COPPER BUSH      NTS      6.8 KG

DRAWING NO. RD DG 435 030915  
SHEET NO.      NO. OF SHEETS

REV.	DATE	ALTERED CHECKED	REV.	DATE	ALTERED CHECKED

REV.	DATE	ALTERED CHECKED	REV.	DATE	ALTERED CHECKED

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