



# CORPORATE PURCHASING SPECIFICATION

AA 199 02

Rev. No. 03

PREFACE SHEET

## HIGH CONDUCTIVITY COPPER CASTINGS - GR -2

FOR INTERNAL USE ONLY  
REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS

### Comparable Standards:

INDIAN : IS: 9805-1981 Gr - 2

### User Plants & Replaced Plant Specifications/References:

1. BHOPAL P.S. 12045

#### Revisions:

Cl.24.1 of MOM of MRC (NFCW+HE)

#### APPROVED:

INTERPLANT MATERIAL RATIONALISATION  
COMMITTEE-MRC (NFCW+HE)

Rev. No. 03

Amd No.

Reaffirmed

Prepared  
BHOPAL

Issued  
Corp. R&D

Dt Of 1<sup>st</sup> Issue  
Nov. '77

Dt.: 07.06.2012

Dt:

Year:



# CORPORATE PURCHASING SPECIFICATION

AA 199 02

Rev. No. 03

PAGE 1 OF 3

## HIGH CONDUCTIVITY COPPER CASTINGS - GR -2

- 1. GENERAL:**  
This specification governs the technical requirements of high conductivity (80% IACS) copper castings.
- 2. APPLICATION:**  
For components for transformers and switchgears, requiring high electrical conductivity.
- 3. CONDITION OF DELIVERY:**  
'As cast' unless otherwise specified.
- 4. COMPLIANCE WITH NATIONAL STANDARDS:**  
This specification is technically identical to:  
IS: 9805 - 1981 : High Conductivity  
Gr-2 Copper Castings  
with an additional requirement of hardness.
- 5. DIMENSIONS AND TOLERANCES:**  
The dimensions and tolerances of the castings shall be in accordance with the drawings supplied with the BHEL order.
- 6. MANUFACTURE:**  
Castings shall be made from virgin copper and preferably be melted in induction furnace. For deoxidation purpose, phosphor copper shall not be used. Instead calcium—boride, lithium or magnesium boride may be used.
- 7. HEAT TREATMENT:**  
The castings shall be supplied in annealed condition and the test bars, representative of these castings shall also undergo the same treatment.
- 8. FINISH:**  
The castings shall be properly fettled and dressed and shall be thoroughly cleaned. The castings shall be supplied either in unmachined, rough machined or finish machined condition, as specified in the BHEL order/drawing.
- 9. 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, electrical conductivity and utility of the castings. Castings shall not be shotpeened, plugged or impregnated to cover the surface defects.

### Revisions:

CI.24.1 of MOM of MRC (NFCW+HE)

### APPROVED:

INTERPLANT MATERIAL RATIONALISATION  
COMMITTEE-MRC (NFCW+HE)

Rev. No. 03

Amd No.

Reaffirmed

Prepared  
BHOPAL

Issued  
Corp. R&D

Dt Of 1<sup>st</sup> Issue  
Nov. '77

Dt.: 07.06.2012

Dt:

Year:

**10. CHEMICAL COMPOSITION:**

The chemical composition of the material, when analysed in accordance with IS: 440 or any other conventional/ instrumental methods shall be as follows:

Element	Percentage Min.	Max.
Copper + Silver	99.80	—
*Lead	—	0.01
*Bismuth	—	0.001
*Antimony	—	0.005
*Iron	—	0.03
*Phosphorus	—	0.03
*Arsenic	—	0.05
*Nickel	—	0.10
*Tin	—	0.01
*Selenium + Tellurium	—	0.02
*Tellurium	—	0.01
*Total Impurities excluding *Silver, Nickel, Arsenic and *Phosphorus.	—	0.06

**\*Note:** The impurities need be determined only when the other properties do not meet the requirements of this specification.

**11. TEST SAMPLES:**

Test samples shall be cast separately, at the same time and from the same melt as the castings they represent and treated in the same manner. Alternatively, a test piece may be taken from the casting, but this shall be mutually agreed upon. Test samples shall be of such size, as to give, test pieces of 15mm diameter and 350mm long, after machining. The number of test samples required shall also be stated in the BHEL order/drawing.

**12. HARDNESS:**

The castings and the separately cast test bar when tested in accordance with IS: 1500 (Method for brinell hardness for metallic materials) shall show a hardness of 40 HB minimum.

**13. ELECTRICAL CONDUCTIVITY:**

The electrical conductivity of the castings shall be **80% IACS** "minimum" at 20°C, when tested as per ASTM E - 1004, by eddy current probe method.

**14. RETEST:**

If a specimen tested fails to meet the requirements of chemical and mechanical properties mentioned in this specification, two further test specimens representing the same heat may be selected and tested in the same manner. If both these additional test pieces meet the requirements of the tests, the castings represented thereby shall be deemed to comply with this specification. If any of the test pieces fails to meet the requirements, the castings represented thereby shall be rejected.

However, radiographic test, if called for, shall be performed on each casting.



## CORPORATE PURCHASING SPECIFICATION

AA 199 02

Rev. No. 03

PAGE 3 OF 3

### 15. REPAIR OF CASTING:

The castings shall not be repaired unless prior permission from BHEL in writing has been obtained.

### 16. TEST CERTIFICATES:

The supplier shall submit 5 copies of test certificates giving the following information. In addition, the supplier shall ensure to enclose one copy of the test certificates along with the despatch documents to facilitate quick clearance of the material.

BHEL Order No  
CPS NO AA 19902  
Supplier's reference and Name  
Results of chemical analysis, hardness and all other tests  
as called for in this specification/order  
Heat No  
Drawing/Pattern No  
Consignment/Identification No

### 17. PACKING AND MARKING:

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

BHEL Order No  
CPS NO AA 19902  
Heat No.  
Identification/Mark No  
Weight  
Supplier's reference/Name

### 18. REJECTION AND REPLACEMENT:

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

The supplier shall undertake to replace the material free of charge without any delay and arrange to take back the rejected material at his own cost.

### 19. REFERRED STANDARDS(Latest Publications Including Amendments):

1) IS: 440

2) IS: 1500

3) ASTM:E1004