



PLANT PURCHASING SPECIFICATION BHOPAL

BP 19898

Rev No. 05

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**SUPERSEDES
BP19898, Rev.04**

COPPER - CHROMIUM ALLOY FORGINGS

1. GENERAL:

The specification governs the quality of specially heat treated, high conductivity, high tensile, copper chromium alloy forgings.

2. APPLICATION:

For components of transformers and motors requiring high strength, current carrying and current transfer purposes.

3. CONDITION OF DELIVERY:

Forgings shall be supplied in heat treated condition.

4. COMPLIANCE WITH NATIONAL STANDARDS:

There is no Indian Standard covering this type of material. However assistance has been drawn from " IS: 3347 (Pt. V / Section 2) -1979 " in preparing this standard.

5. DIMENSIONS AND TOLERANCES:

The dimensions of the forgings shall be in accordance with the drawing / order.

6. MANUFACTURE:

By any convenient process of forging.

7. FINISH:

As specified in the drawing/order.

8. FREEDOM FROM DEFECTS:

Forgings shall be free from flaws, cracks & other harmful defects.

Revision :
Reviewed & brought upto date.

Issued by :

**STANDARDS AND MATERIALS GROUP
TECHNICAL SERVICES DEPARTMENT**

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9. CHEMICAL COMPOSITION:

The chemical composition of the material, when analysed in accordance with any suitable instrumental/chemical method shall be as follows:

Chromium	:	0.3 - 1.2 Percent
Impurities	:	0.3 Percent Max.
Copper	:	Remainder

10. TEST SAMPLES:

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

10.2 In any consignment, all the pressings/forgings produced from the same batch of raw material under similar conditions shall be grouped together to constitute a lot. One sample per heat/lot shall be taken for mechanical tests. The test pieces shall be taken directly from forgings and shall receive no further heat treatment.

10.3 Electrical conductivity measurement shall be performed on each sample.

11. MECHANICAL PROPERTIES:

11.1 Tensile :

The test bar when tested in accordance with IS:1608 (Method for tensile testing of copper and copper alloys) shall show the following properties.

Tensile Strength : 370 N/mm² Min.

0.1 % Proof Stress : 270 N/mm² Min.

Elongation on
5.65 √So Gauge Length : 13 percent Min.

11.2 Hardness (Brinell):

When tested in accordance with IS:1500, the material shall show a Brinell Hardness of 125 HB Minimum.

12 ELECTRICAL CONDUCTIVITY:

When tested in accordance with ASTM E1004, Eddy current probe test method, the material shall have an electrical conductivity of not less than 81 % IACS at 20°C.

Refer IS : 613 Appendix B for temperature correction factor.



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13 TEST CERTIFICATES:

Unless otherwise stated on the order three copies of test certificates shall be supplied.

In addition, the supplier shall ensure to enclose one copy of the test certificate alongwith their dispatch documents, to facilitate quick clearance of the material.

The test certificate shall bear the following information.

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BHEL Order No.

Supplier's Name.

Drawing No.

Method of Manufacture.

Consignment / Identification No.

Results of tests :

Results of chemical analysis, mechanical test, electrical conductivity, dimensional tolerances and all other tests called for in this specification /order.

14 PACKING AND MARKING:

The pressings/forgings shall be suitably packed to prevent corrosion and damage during transit. Machined surfaces, if any, shall be properly protected with anticorrosive compounds.

Each package shall be marked with the following information.

BP 19898 : Copper - Chromium Alloy Forgings.

BHEL Order No.

Identification No.

Weight.

Supplier's reference / Name.



PRODUCT STANDARD

SWITCHGEAR ENGINEERING DIVISION

SG 12713 REV.02

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COPPER - CHROMIUM (CuCr) TERMINALS

1.0 INTRODUCTION

Copper Chromium terminals are used for current collection from the moving stem of Vacuum Interrupters in the assembly of VCB moving portion. These terminals provide a high conductive path for current and have spring characteristics for their easy assembly / disassembly functions.

The corrosion resistance of chromium copper alloys is better than that of pure copper because chromium improves the chemical properties of the protective oxide film. Chromium copper has excellent cold formability and good hot workability. It can be used in applications such as resistance welding electrodes, seam welding wheels, switch gears, cable connectors, circuit breaker parts, molds, spot welding tips, and electrical and thermal conductors that require strength. Chromium copper alloys are designated as UNS C18050 through C18600, the cast alloys are C81400 through C81540.

2.0 MATERIALS :

These terminals shall be chill castings in solution treated and precipitation hardened (at elevated temperatures) condition. The castings shall be free from microporosities and gross inclusions. The material shall be equivalent to following standards:

Grade		Standard
- CC1 - TF	of	BS EN 1982 : 2008
(Group B)		
or		
- CuCrF35	of	DIN17655:1981

3.0 PROPERTIES :

CHEMICAL

Cr = 0.3 to 1.25 %, Cu = Remainder; Cu + Cr > 99.5%

PHYSICAL

Density = 8.9 ± 0.1 gm/cubic cm

MECHANICAL

Tensile strength	= 350 N/sq. mm (min)
0.2 % yield strength (Rp 0.2)	= 275 N/sq. mm (min)
Ultimate Elongation (A)	= 15 % (min)
Hardness	= 100 HB (min)


ELECTRICAL

Conductivity at 20°C = 80 % IACS(min)

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ALTD.	AA/RG	Issue Online		RKS		
APPD.	MAK			PREPARED	ISSUED	DATE
DATE.	26.03.14			SMM	RKK	17.07.95

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		<p>4.0. <u>SUPPLY CONDITION OF MATERIAL /COMPONENTS:</u> Material/components shall be supplied on fully finished basis. No tools, jigs & fixtures will be provided by BHEL.</p> <p>5.0 <u>QA PLAN:</u> QA Plan shall be submitted alongwith offer & must be approved by BHEL. This shall include tests & measurements on raw material and semifinished /finished product, details of manufacturing process followed including tools, jigs & fixtures /gauges used at different stages to ensure quality of end product.</p> <p>6.0 <u>ACCEPTANCE CRITERIA:</u> - Suppliers to submit their inspection & test report as per approved QA Plan & detailed dimensional report as per drawing. - TESTS AT BHEL : Following tests shall be conducted for each lot of supply: a) Hardness Test b) Electrical conductivity test c) Chemical composition. The tests shall be conducted on 1% samples or min 3 numbers per supply lot. - DIMENSIONAL CHECKS: As per drawings. - Consignments duly packed as per Cl.no.8.0 discussed below. - Identification marking as per Cl.no.7.0 discussed below.</p> <p>7.0 <u>IDENTIFICATION MARKING FOR TRACEABILITY :</u> Following markings shall be punched on the unmachined side of the terminal casting as indicated in the item drawing. - Supplier's logo. - Purchase Order Number.</p> <p>8.0 <u>PACKING-</u> Terminal shall be packed individually in bubble polythene and further packed in corrugated sheets to prevent any physical damage.</p>		
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