



## CORPORATE PURCHASING SPECIFICATION

AA 120 09

Rev. No. 03

PREFACE SHEET

### COPPER FOIL – ANNEALED TINNED/UNTINNED

FOR INTERNAL USE ONLY  
REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS

#### Comparable Standards:

1. INDIAN : IS : 3331 – 1977 , Gr.O – Annealed.

#### Suggested/Probable Suppliers and Grades:

Refer plant vendors list.

#### User Plant References:

1. BHOPAL : PS 12070  
PS 12078 (for foils)
2. HEEP, HARDWAR : ---

#### Revisions :

Cl: 20.10.10 of MOM of MRC-NFCW+HE

#### APPROVED :

INTERPLANT MATERIAL RATIONALISATION  
COMMITTEE-MRC (NFCW+HE)

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### COPPER FOIL – ANNEALED TINNED/UNTINNED

#### 1.0 GENERAL:

This specification governs the quality requirements of bright annealed bare Copper Foil- Annealed –Tinned/Untinned upto 0.16 mm and width upto 630 mm.

#### 2.0 APPLICATION:

Used in making static rings, line shields, etc in transformers, flexible connections in rectifiers and in condenser bushings.

#### 3.0 CONDITION OF DELIVERY:

Annealed – Tinned/Untinned as specified in BHEL order.

The foil shall be supplied in coils on drums with straight parallel edges.

#### 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: 3331 – 1977 : Copper and Brass Strips/Foils for Radiator Cores.

Condition: O - Annealed

With the additional requirement of tinning as per clause 6.0, whenever specified.

#### 5.0 DIMENSIONS AND TOLERANCES:

5.1 **Sizes:** Copper foil shall be supplied to the dimensions as specified in BHEL order:

#### 5.2 Tolerances:

5.2.1 Tolerances on thickness of foil upto 0.15 mm thick shall be  $\pm 7\%$  of thickness.

#### 5.2.2 Width :

Tolerance on thickness, width and length shall be as follows,

Width/Thickness, mm		Tolerance, $\pm$ mm
Over	up to & including	
-	100	0.10
100	300	0.15
300	500	0.25
500	630	0.40

#### Revisions :

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**6.0 MANUFACTURE:**

The materials shall be manufactured from copper of ETP grade conforming to IS:191.

The conductor shall be manufactured from ETP grade copper conforming to BHEL specification: AA 12024: Electrolytic Tough Pitch Copper Wire/Bars/Ingots/Continuously cast wire rods.

**NOTE:** It is preferable to manufacture conductor from continuously cast copper rods provided all other parameters and conditions remain same.

Tinning shall be done by electro-tinning process, with the tin conforming to Gr:Sn 99.5 of IS : 26 (AA 12801). The thickness of the tin coating shall be 3 microns minimum

**7.0 FREEDOM FROM DEFECTS:**

The material shall be clean, bright, smooth and free from fins, silvers, spills, scaling blisters, cracks and other harmful defects.

**8.0 CHEMICAL COMPOSITION:**

The analysis of copper when annualized in accordance with IS:440 or any other conventional/instrumental methods shall be as follows:

Element	Percent, min.	Percent, max.
Copper and Silver	99.90	--
Bismuth*	--	0.001
Lead*	--	0.005
Total of all impurities excluding silver and oxygen excl. silver and oxygen	--	0.030

\* These elements need not be determined when the material supplied conforms with mechanical and electrical properties specified in this specification. However, the supplier shall ensure that the composition of the material lies within the limits specified above.

**9.0 TEST SAMPLES:**

One sampling per size per melt per consignment of 3 tonnes or part thereof shall be taken for chemical, mechanical and electrical tests.

The sample shall be cut off cold and shall receive no further treatment before being tested.

**10.0 Hardness (Vickers):**

When tested in accordance with IS:1501, the material shall have Vickers hardness not greater than 60 HV.

**11.0 Electrical Resistivity (As Received):**

When measured in accordance with IS: 3635, the electrical resistivity at 20<sup>0</sup> shall not be Greater than 0.01739 ohm mm<sup>2</sup> / metre, which is equivalent to an electrical conductivity of 99%, minimum of IACS standard. (Refer Appendix B of IS: 613 for temperature correction factor)

Alternatively, the method of measurement employing Eddy Current probes as per ASTM E 1004 is also acceptable..

**12.0 Inspection At Supplier's Works:**

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

The supplier shall offer BHEL 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 tests 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 final acceptance of the material shall be based on these test results.

**13.0 TEST CERTIFICATES:**

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

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

The test certificate shall bear the following information:

AA 120 09, Rev 03: Copper foil– Annealed Tinned / untinned.

BHEL Order No,

Manufacturer's/Supplier's Name :

Trade mark, if any.

Lot/Identification/Batch/Melt No.

Sizes and Quantity Supplied

Results of dimensional inspection, chemical analysis, mechanical and electrical tests as per this specification.

**14.0. PACKING AND MARKING:**

The material shall be supplied in coils or drums and suitably packed to avoid damage during Transit. No defects detrimental to fabrication and use shall appear in normal handling and transport. The minimum eye of the coil or barrel diameter of drum shall be 250 mm.

Each package shall be legibly marked or labeled with the following information.

AA 12009 : Copper foil-Annealed. Tinned/untinned.

BHEL Order No

Manufacturer's/Supplier's Name

Lot/Identification/Batch/Melt No.

Size and Quantity supplied

**15.0 REFERED STANDARDS (Latest Publication Including Amendments)**

- |              |              |              |                |
|--------------|--------------|--------------|----------------|
| 1) IS : 26   | 2) IS : 191  | 3) IS : 440  | 4) IS : 613    |
| 5) IS : 1501 | 6) IS : 3331 | 7) IS : 3635 | 8) ASTM E 1004 |
| 9) AA 12801  | 10) AA 12024 |              |                |