

	<b>CORPORATE PURCHASING SPECIFICATION</b>		AA 120 16																				
			Rev. No. 05																				
			PREFACE SHEET																				
<p><b>SOLID DRAWN COPPER TUBES AND PIPES</b></p> <p><b>FOR INTERNAL USE ONLY</b></p> <p><b>REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS</b></p> <p><b>Comparable Standards:</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 40%;">1. INDIAN</td> <td style="width: 10%; text-align: center;">:</td> <td style="width: 50%;">IS:2501-1995 Gr: Cu-DHP</td> </tr> <tr> <td>2. BRITISH</td> <td style="text-align: center;">:</td> <td>BS EN 1057-96</td> </tr> </table> <p><b>Probable/Suggested Suppliers and Grades:</b></p> <p>Refer plant vendors list.</p> <p><b>User Plant References:</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 40%;">1. BHOPAL</td> <td style="width: 10%; text-align: center;">:</td> <td style="width: 50%;">PS 12011</td> </tr> <tr> <td>2. HEEP, HARDWAR</td> <td style="text-align: center;">:</td> <td>IS: 2501 - 1972, Gr: DHP</td> </tr> <tr> <td>3. HYDERABAD</td> <td style="text-align: center;">:</td> <td>ASTM B 75 - 1976 DHP 122 IS: 2501 - 1972, Gr: DHP</td> </tr> <tr> <td>4. TIRUCHY</td> <td style="text-align: center;">:</td> <td>ASTM: B75-1976, DHP 122</td> </tr> </table>						1. INDIAN	:	IS:2501-1995 Gr: Cu-DHP	2. BRITISH	:	BS EN 1057-96	1. BHOPAL	:	PS 12011	2. HEEP, HARDWAR	:	IS: 2501 - 1972, Gr: DHP	3. HYDERABAD	:	ASTM B 75 - 1976 DHP 122 IS: 2501 - 1972, Gr: DHP	4. TIRUCHY	:	ASTM: B75-1976, DHP 122
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<b>Revisions :</b> Cl: 19.10.15 of MOM of MRC-NFCW+HE			<b>APPROVED :</b> <b>INTERPLANT MATERIAL RATIONALISATION</b> <b>COMMITTEE-MRC (NFCW+HE)</b>																				
Rev. No. 05	Amd.No.	Reaffirmed	Prepared	Issued	Dt. of 1st Issue																		
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## CORPORATE PURCHASING SPECIFICATION

AA 120 16

Rev. No. 05

PAGE 1 OF 6

### SOLID DRAWN COPPER TUBES AND PIPES

#### 1.0 GENERAL:

This specification governs the quality requirements of solid drawn copper tubes and pipes.

#### 2.0 APPLICATION:

General engineering purposes.

#### 3.0 CONDITION OF DELIVERY: Half Hard (HB).

#### 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 : 2501- 1995 : Solid drawn copper tubes for general engineering purposes  
Gr: Cu DHP

#### 5.0 DIMENSIONS AND TOLERANCES:

##### 5.1 Sizes:

The tubes and pipes shall be supplied as per the dimensions specified in BHEL order/drawing. Unless otherwise specified, tubes/ pipes shall be supplied in random lengths of 3 of 6 meters.

##### 5.2 Tolerances:

The tolerances on out side diameter, wall Thickness, length, roundness and straightness of tubes/pipes shall be as per IS : 5493, given below:

##### 5.2.1 Tolerance on mean outside diameter:

<u>Outside diameter, mm</u>		Tolerances, ± mm
Over	Upto and incl.	
-	10	0.08
10	18	0.10
18	32	0.12
32	50	0.15
50	80	0.20
80	125	0.25
125	200	0.50
200	250	0.80
250	315	1.00

#### Revisions :

Cl: 19.10.15 of MOM of MRC-NFCW+HE

#### APPROVED :

INTERPLANT MATERIAL RATIONALISATION  
COMMITTEE-MRC (NFCW+HE)

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**5.2.2 Tolerance on wall thickness:**

The mean thickness of the tube shall not vary from the specified thickness by more than  $\pm 12.5\%$  of the specified wall thickness.

**5.2.3 Tolerance on length:**

Length, meters		Tolerance on length, mm
Over	Upto and incl.	
-	5	+ 2.5
5	7	+ 3.0
7	-	+ 4.0

**5.2.4 Roundness Tolerance:**

The difference between major and minor diameters as determined at any one cross section expressed in terms of % of specified O.D of the tube shall be as follows:

t / D*, mm	Roundness Tolerance on O.D%
0.01 - 0.03	1.5
Over 0.03 - 0.05	1.1
Over 0.05 - 0.10	0.8 or 0.05 mm whichever is greater
Over 0.10	0.7

\* Where t is wall thickness and D is outside diameter (O.D).

**5.2.5 Tolerance on Straightness:**

Permissible maximum deflection shall be 3 mm on any one meter length,

**6.0 MANUFACTURE:**

The tubes shall be solid drawn and subsequently annealed. In no case tubes shall be redrawn from used tubes. The ends shall be cut clean and square with the axis of the tubes.

**7.0 FREEDOM FROM DEFECTS:**

The tubes shall be reasonably straight, round, clean, smooth, uniform in diameter and free from cracks, seams, scales, slivers and other harmful defects.



## CORPORATE PURCHASING SPECIFICATION

AA 120 16

Rev. No. 05

PAGE 3 OF 6

### 8.0 CHEMICAL COMPOSITION:

The chemical composition of the material. When analyzed in accordance with IS:440 (Methods for chemical analysis of copper ) or any other conventional/ instrumental method shall be as follows:

Element	Percent	
	min	max
Copper (any silver to be counted as copper )	99.80	-
*Antimony	-	0.005
*Arsenic	-	0.05
*Bismuth	-	0.003
*Iron	-	0.03
*Lead	-	0.01
*Nickel	-	0.10
*Selenium and Tellurium	-	0.02
*Tellurium	-	0.01
*Tin	-	0.01
Phosphorus	0.015	0.10
*Total impurities excluding Silver, Nickel, Arsenic and Phosphorus	-	0.06

**\*Note:** These elements need not be determined when the material supplied conforms with the mechanical 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:

9.1 The chemical analysis shall be performed on each heat.

9.2 Tubes of one size and thickness shall be grouped in batches of 300 tubes or 1000kg or part thereof and one tube from each batch shall be selected at random for mechanical testing.

**Note:** For tubes with wall thickness <1 mm, lot will be of 2000 tubes or part thereof.

9.3 For embrittlement , one tube shall be selected from a lot of 100 tubes or part thereof.

**10.0 MECHANICAL PROPERTIES:****10.1 Tensile test:**

A piece of tube selected for test, suitably plugged or flattened sufficiently for gripping, when tested in accordance with IS:1608 shall show the following tensile properties.

Condition	Tensile strength, N/mm <sup>2</sup> , min.	Elongation on 5.65 $\sqrt{S_0}$ gauge length, percent, minimum
As such	235	25
Strip cut from tube	225	25

**10.2 Flattening And Doubling Over Test:**

The test pieces shall not show any crack, when tested in accordance with clause 10.2 of IS: 2501.

**10.3 Drift Expanding Test (For tubes not exceeding 100 mm in O.D):**

The tubes, when tested as per Cl. 10.3 of IS: 2501, shall be capable of undergoing drifting without showing either crack or flaw.

**11.0 NON DESTRUCTIVE TEST:**

All tubes shall meet the requirement of eddy current or by hydraulic / pneumatic test as per Clause No. 4 of IS: 2501.

**12.0 OPTIONAL TEST:****12.1 HYDROGEN EMBRITTLEMENT TEST:**

Test specimen of tubes shall be capable of meeting the requirements of hydrogen embrittlement test as per IS: 6243 (Method of hydrogen and embrittlement test of copper)

**13.0 RETESTS:**

Should any of the test pieces first selected, fail to pass the prescribed tests mentioned under various clauses in this specification, two further samples from the same batch shall be selected for testing, one of which shall be from the same component from which the original test sample was taken, unless that component has been withdrawn by the supplier.



## CORPORATE PURCHASING SPECIFICATION

AA 120 16

Rev. No. 05

PAGE 5 OF 6

Should the test pieces from both these additional samples pass the batch represented by the test sample shall be accepted. Should the test pieces from either of these additional samples fail, the batch represented by the test sample shall be rejected.

Should any specimen fail under above tests, all the tubes referred by the sample shall stand rejected. However, they may be resubmitted for inspection after stress relief treatment.

### 14.0 TEST CERTIFICATES:

Unless otherwise specified on order, three copies of test certificates shall be supplied. In addition, supplier shall be sure to enclose one copy of test certificate along with despatch documents to facilitate quick clearance of material.

The test certificate shall bear the following information:

BHEL Order No.

AA 12016, Rev. No. 05: Solid Drawn Copper Tubes / Pipes

Batch No.

Identification Mark / No.

Weight

Supplier's Reference and Name

Results of Chemical, mechanical, hydraulic and all other tests called for.

### 15.0 PACKING AND MARKING:

The material shall be suitably packed in wooden crates to prevent corrosion and damage during transit.

Each crate shall be legibly marked with the following information.

BHEL Order No.

AA 12016

Batch No.

Identification Mark /No.

Weight

Supplier's Reference and Name

### 16.0 REFERRED STANDARDS (Latest Publications Including Amendments):

1) IS: 440    2) IS: 2501    3) IS: 1608    4) IS: 5493    5) IS: 6243.



## ANNEXURE - A

**CHECK LIST FOR AA 120 16: SOLID DRAWN COPPER TUBES / PIPES**  
**(To be filled by Supplier)**

- A. Name of Principal Supplier :
- B. Name of Indian Agent :
1. Grade of material as per specification : Yes/No
  2. Tolerance on diameter/ Width/thickness/ length and flatness as per specification and : Yes/No
  3. Straightness as per specification : Yes/No
  4. Chemical composition as per specification : Yes/No
  5. Mechanical properties as per specification : Yes/No
  6. Tests :
    - (1) Drift expanding : Yes/No
    - (2) Flattening : Yes/No
    - (3) Mercurous Nitrate test : Yes/No
  7. NDT tests offered :
    - (1) Hydraulic test :Yes/No
    - (2) Eddy Current test :Yes/No
    - (3) Pneumatic. :Yes/No
    - (4) Hydrogen Embrittlement :Yes/No
  8. Quality plan on BHEL format enclosed :Yes/No
  9. Details of previous experience enclosed :Yes/No.  
(For New suppliers only)
  10. Lifting Beam offered :Yes/No
  11. Packing box drg. Enclosed :Yes/No
  12. End guides included (Both ends) :Yes/No
  13. Deviations taken (Please specify clearly, if any ) :Yes/No.
    - 1
    - 2
    - 3

Date:

Place:

Signature  
and  
Seal of Supplier