

TENDER SPECIFICATION

NO:- CLW/MS/3/030

ALT.	6	7	8	9	10	11	12	
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ENCLOSURES:

1. ANNEXURE:- I & II

2. DRG. NO.

TOTAL NO. OF SHEETS:- 89 (INCLUDING ALT. SHEET)

ALT.	7	8	9	10	11	12	
SHEETS	6	7	7	9	=		

SPECIFICATION FOR

COPPER TUBES FOR GENERAL ENGINEERING

PURPOSES, FOR 3-PHASE A.C. LOCOMOTIVE

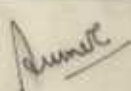
WAG/7 E' WAP/4 LOCOS.

ISSUED BY:

DY. CHIEF MECHANICAL ENGINEER/D&D

CENTRE FOR D&D

C.L.W./CHITTARANJAN

PREPD. BY	CHKD. BY	REVIEWED BY	APPROVED BY	SPECIFICATION FOR COPPER TUBES FOR GENERAL ENGINEERING PURPOSES, FOR 3 - PHASE LOCOMOTIVE.	CENTRE FOR D&D CHITTARANJAN LOCOMOTIVE WORKS CHITTARANJAN-713331 NO. CLW/MS/3/030 DATE: 21.1.02
					ALT. NO. 6 7 8 9 10 11 12
SE	SSE	AME/D&D	DYCME/D&D		

SPECIFICATION FOR COPPER TUBES FOR GENERAL ENGINEERING PURPOSES, FOR 3-PHASE A.C. LOCOMOTIVE

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1. SCOPE :

1.1 This specification prescribes the requirements for Half Hard(HB)/ Seamless Copper Tubes for compressed air Transmission purposes. Operating air pressure may be as high as 15 kg/Sq. Cm. Normal air pressure is 10 kg/Sq. Cm.

1.2 SCOPE OF SUPPLY :- The required dimensions of tubes and their respective quantities/set (loco) have been shown in Annexure-I.

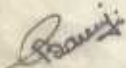
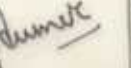
2. CLIMATIC AND ENVIRONMENTAL CONDITIONS:

- a) Maximum Atmospheric Temperatures : Under Sun 70°C
In Shade 50°C
- b) Humidity : 100% saturation during Rainy season.
- c) Reference site : i) Ambient Temp. Max. 47°C, Min. 0°C
conditions ii) Humidity : 60%
iii) Altitude : 160 m. above sea level.
- d) Rain Fall : Very heavy in certain areas. The locomotive will be designed to permit its running at 10 km/h in flood water level of 102 mm above Rail level.
- e) Atmosphere during hot weather : Extremely dusty and desert terrain in certain areas.
- f) Coastal Area : Locomotive and x equipment will be designed to work in coastal areas in humid and salt-laden atmosphere.
- g) Vibration : The equipment, sub-system and their mounting arrangement will be designed to with stand vibrations and shocks encountered in service as specified in corresponding IEC publications unless otherwise prescribed.

3. DIMENSIONS & TOLERANCES:- The tubes shall be designated by the outside diameter and the wall thickness. The relevant tolerances should be as specified in IS:5493-1981.

4. CONDITION:

4.1 The tubes shall be supplied in Half-Hard(HB)/ condition. Grade of material is DPA (IS:191 (Part-X) - 1980). The tubes shall be cold-drawn and seamless.

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 SE	 SSE	 A ME/D&D	 DY.CME/D&D		ALT. NO. 8 9 10 11 12

4.2 The tubes shall be supplied in straight lengths of 6(six) meters and the ends shall be cut clean and square with the axis of the tubes.

4.2.1 In no case tubes shall be redrawn from used tubes.

5. FREEDOM FROM DEFECTS:

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

6. CHEMICAL COMPOSITION :

6.1 The chemical composition of tubes shall be as described in clause 9 & 9.1 of IS:2501-1995(Third Rev.) for Grade DPA(IS:191(Part-X)-1980)

6.2 The chemical composition, determination should be as per clause 9.2 of IS:2501-1995(Third Rev.)

7. MECHANICAL TESTS:

7.1 Tensile Test :- Selection of test-piece, method of testing and tensile strength values obtained should be as per clause 10.1.1 of IS:2501-1995(Third Rev.)

7.2 Flattering & Doubling over tests :- Selection of sample test-piece, methods of testing and values obtained should be as specified in clauses 10.2, 10.2.1, 10.2.1.1, 10.2.1.2 of IS:2501-1995(Third Rev.). The test piece shall not develop crack.

7.3 Drifting expanding Test. Selection of test-piece sample, methods of carrying the test and the relevant test data should be as per clauses 10.3.1, 10.3.2 of IS:2501-1995(Third Rev.)

7.4 Bend Test:- The tubes shall be capable of bent-cold(without filling) at 2D thro' 90° without showing crack, fracture or collapsing. These tests are mandatory and shall be conducted during all routine examinations.

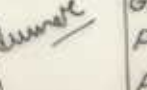
8. NON-DESTRUCTIVE TESTS:

8.1 Hydraulic Test:

Each tube when subjected to an internal hydrostatic pressure as described in clause 10.4.2 of IS:2501-1995(Third Rev.) shall not show signs of weeping, leaking or permanent increase in diameter at any point.

8.2 Pneumatic Test:

As per clause 10.4.3 described in IS:2501-1995 (Third Rev.). The test method used shall permit easy visual detection of any leakage, such as by having the tube under water or by the pressure differential method. Any evidence of leakage shall be cause for rejection.

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 SE	 SSE	 AME/D&D	 DY.CME/D&D		ALT.NO. 6 7 8 9 10 11 12

These tests are required to be done only for the prototype testing.

9. RE-TESTS :

- 9.1 If a test result of chemical analysis fails to satisfy the requirements for any of the constituents, two more tests for that constituent shall be done on the same sample in order to confirm that the analysis has been done properly. If both the test results satisfy the relevant requirements the lot shall be considered as conforming to the specification, otherwise not.
- 9.2 If the test result on any $\times$ sample for mechanical tests fails to satisfy the requirements for any of the mechanical properties, two more tests shall be done. If both the test results satisfy the relevant requirements the lot shall be considered as conforming to the specification, otherwise not.

10. SAMPLING AND CRITERIA FOR CONFORMITY :

- 10.1 Lot : The meaning of the term 'Lot' should be as per clause 11.1 of IS:2501-1995(Third Rev.)
- 10.2 Dimensional Tolerances. : As per clause 11.2 described in IS:2501-1995 (Third Rev.)
- 10.3 Chemical and Mechanical properties requirements. : As per clause 11.3 described in IS:2501-1995(Third Rev.)
- 10.4 Hydraulic/Pneumatic Test. : As per clause 11.4 described in IS:2501-1995(Third Rev.)
- 10.5 Microscopic examination/Hydrogen embrittlement Test. : One sample from each lot shall be tested for microscopic/Hydrogen embrittlement test without any failure.

11. IDENTIFICATION :

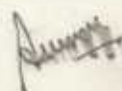
- 11.1 Each tube may be marked suitably to identify the grade, temper (when applicable) name of the manufacturer, mass, size and any other information required.

~~11.1.1 Each tube may also be marked suitably to identify the grade, temper~~

- 11.1.1 Each tube may also be marked with I.S.I certification Mark, conforming to BIS Act 1986.

12. PACKING:

- 12.1 The tubes shall be suitably covered with a polythene sheet and to be packed in such a manner to avoid movements, rubbing, and damage of their ends. Each package shall be of convenient mass for easy handling.

PREP'D. BY	CHKD. BY	REVIEWED BY	APPROVED BY	SPECIFICATION FOR COPPER TUBES FOR GENERAL ENGINEERING PURPOSES. FOR 3- PHASE LOCOMOTIVE	CENTRE FOR D&D CHITTARANJAN LOCOMOTIVE WORKS CHITTARANJAN-713331 NO. CLW/MS/3/030 DATE: 21.1.02 ALT. NO.
 SE	 SSE	 AME/DE'D	 DY.CMG/D&D		6 7 8 9 10 11 12

13. LIABILITY PERIOD :

- 13.1 The manufacturer/Contractor is required to guarantee the material and its satisfactory performance for a period of 5 (five) years after commissioning of the locomotive or 6 (six) years after supply whichever is earlier. All aspects of workmanship and material will be covered by the guarantee.
- 13.2 The material which fail during the guarantee period must be replaced by the manufacturer/contractor free of cost.

14. DOCUMENTS TO BE SUPPLIED :

All test results including chemical composition to be supplied along with materials, as well as at the time of Prototype/Routine inspection of the materials.

15. REFERENCE :

The Equipment used by M/s. ABB Transportation for WAG - 9 Class (CoCo) Electric Locomotives is supplied by -

M/s. White George & Co. Pty. Ltd.
P.O. Box 5226
1, Treforest Drive
Clayton 3168

PREP'D. BY	CHK'D. BY	REVIEWED BY	APPROVED BY	SPECIFICATION FOR COPPER TUBES FOR GENERAL ENGINEERING PURPOSES, FOR 3- PHASE LOCOMOTIVE	CENTRE FOR D&D CHITTARANJAN LOCOMOTIVE WORKS CHITTARANJAN-713331 NO. CLW/MS/3/030 DATE: 21.1.02
<i>[Signature]</i> SE	<i>[Signature]</i> SSE	<i>[Signature]</i> AME/D&D	<i>[Signature]</i> DYCME/D&D		ALT. NO. 6 7 8 9 10 11 12

ANNEXURE-I

REQUIREMENTS OF COPPER TUBES FOR WAG 9 LOCO. E' WAP - 5 LOCO.

ALT (12)

SL. NO.	DESCRIPTION	MATERIAL		OUTSIDE DIAMETER IN mm (INCH)	WALL THICKNESS IN mm	QTY./SET (LOCO) IN METRES	REMARKS	QTY./SET (LOCO) IN MM FOR WAP-5
		STANDARD	GRADE					
1.	COPPER TUBE SEAMLESS, COLD DRAWN	IS: 2501 1995	HALF HARD (HB)	38.1 (1 1/2")	1.651	21.0		19.0
2.	-DO-	-DO-	-DO-	25.4 (1")	1.651	124.00		83.0
3.	-DO-	-DO-	-DO-	12.7 (1/2")	1.245	122.0		68.0
4.	-DO-	-DO-	-DO-	10.0	1.245	0.5	ALT. (8)	06.0
5.	-DO-	-DO-	-DO-	9.52 (3/8")	1.245	92.0		-
6.	-DO-	-DO-	-DO-	9.52 (3/8")	0.889	142.0		218.0
7.	-DO-	-DO-	-DO-	6.35 (1/4")	0.889	198.0		03.0
8.	-DO-	-DO-	-DO-	6.0	0.889	6.0	ALT. (8)	16.0

ALT. (12) NOTE.

CU. PIPE FOR WAP-5 ADDED AND SUPERSEDES

SPECN. NO. CLW/MS/10/024 ALT (3) WITH IMMEDIATE EFFECT.

QTY/LOCO DELETED TO BE GOVERNED BY CATEGORY BOOK E' SCHEDULE OF TENDER.

PREP'D BY	CHK'D BY	REVIEWED BY	APPROVED BY	SPECIFICATION FOR COPPER TUBES FOR GENERAL ENGINEERING PURPOSES, FOR 3-PHASE LOCOMOTIVE.	CENTRE FOR D&D CHITTARANJAN LOCOMOTIVE WORKS CHITTARANJAN-713331
SE	SSE	AME/D&D	DY.CME/D&D		NO. CLW/MS/3/030 DATE: 21.1.02
					ALT. NO. 6 (7) (8) (9) (10) (11) (12)

REQUIREMENTS OF COPPER PIPE/TUBE FOR WAG-7 & WAP-4 LOCOS

ALT 12

Sl. No.	DESCRIPTION	MATERIAL		GRADE	Out side Diameter in mm (INCH)	WALL Thickness in mm	Qty/Set (Loco) in meters	REMARKS
		STANDARD	WAG-7				WAP-4	
1.	COPPER PIPE/TUBE SEAMLESS, COLD DRAWN	IS:2501-1995		HALF HARD (HB)	6 O/D	1 thk.	5.6 mtrs. 20.61 mtrs. ALT-II	17 mtrs.
2.	-do-	-do-		-do-	10 O/D	1.5 thk.	169.86 mtrs.	184.39 mtrs.
3.	-do-	-do-		-do-	16 O/D	2 thk.	54.47 mtrs.	31.05 mtrs.
4.	-do-	-do-		-do-	20 O/D	2 thk.	52.02 mtrs.	55.50 mtrs.

NOTE: COPPER PIPE /TUBE TO BE PROCURED AS PER CLW TENDER SPECIFICATION
No. CLW/MS/3/030 dtd: 21-1-02

PREP'D. BY.	CHEK'D. BY.	REVIEWED BY	APPROVED BY	SPECIFICATION FOR COPPER TUBES FOR GENERAL ENGINEERING PURPOSES FOR CONVENTIONAL LOCOMOTIVES.			
		Ambar 22/4/05	 22/4/05	CHITTARANJAN LOCOMOTIVE WORKS CHITTARANJAN-713331			
				NO. CLW/MS/3/030 DATED: 20.4.2005			
				ALT-NO.	8	10	12

DETAILS OF ALTERATIONS

ALT. NO.	DATE	DESCRIPTION	SIGNATURE	REMARKS
①	15.4.98	GRADE OF THE MATERIAL ADDED IN CL.NO. 4.1 (SHEET 2) - SHEET 7 (ALTERATION SHEET) ADDED.	<i>[Signature]</i> 15.4.98	
②	26-2-99	QUANTITY OF CU.TUBES OF (1") 25.4 mm O/D DIA. 3 mtrs. & 109.5 mtrs. MERGED IN ONE, i.e. QTY./LOCO BECAME 112.5 METRS. THEREFORE NUMBER OF COPPERTUBES REDUCED TO SEVEN (7) SIZES INLIEU OF EIGHT (8) SIZES.	<i>[Signature]</i> 26/2/99	
③	30.5.2000	QTY./LOCO OF ITEMS AT SL.NOS. 2,3,5,6 & 7 IN ANNEXURE - I WERE 16.50, 109.50, 67.9 137.0 & 3.0 metres RESPECTIVELY.	<i>[Signature]</i> 30/5/2000	THE CHANGE IN QTY. OF TUBES IS INCORPORATED BASED ON ACTUAL REQUIREMENT OF SHOP-16 VIDE WM/ELA II'S LETTER NO. DCME/ELA/43/3-PHASE DT. 21.2.2000
④	30.10.2001	ITEM AT SL.NO. 8 (6.00 mm O/D TUBE) ADDED. CLAUSES (INCLUDING THEIR SUBCLAUSES) 1, 4, 6, 7, 8, 10 MODIFIED. CLAUSES 7.4, 10.5 ADDED. QTY./LOCO OF ITEMS AT SL.NOS. 12, 3, 5, 6 & 7 IN ANNEXPRE-I WERE 112.5, 18, 120, 84, 156 & 6.35 METRES RESPECTIVELY.	<i>[Signature]</i> 30/10/01	DUE TO REPLACEMENT OF 1/2" & 6 mm NYLON TUBES BY COPPERTUBES IN PARK BRAKE GAUGE & WIPER LINES.
⑤	26.11.2001	NEW QTY./LOCO SET COLOUMN ADDED. OLD QTY./LOCO SET COLOUMN DELETED.	<i>[Signature]</i> 26.11.01	BASED ON WM/ELA II'S LETTER NO. DCME/ELA/43/3 PHASE DT. 21.2.2000 & JOINT NOTE MADE BY SHOP-16 & C-D&D ON 23.11.2001
6.	21.1.02	THE ENTIRE SPECIFICATION EXCEPT ALT.SHEET (SHEET NO. 7) HAS BEEN REVISED & UPDATED, SUPERSEDING SPECN. NO. CLW/MS/3/030 ALT. 5	<i>[Signature]</i> 21.1.01	
⑦	31.1.04	QTY. OF ITEMS AT SL.NOS. 3 & 6 WERE 162 mts. & 162 mts. RESPECTIVELY.	<i>[Signature]</i> 31/01/04	CHANGE OVER FROM 1/2" TUBE TO 3/8" TUBE IN HORN LINE. <i>[Signature]</i> 31.01.04
⑧	21.4.05	ANNEXTURE - II (FOR WAG/7 E' WAP/4) ADDED AT SHEET NO 7 E' IN ANNEXTURE - I THE WALL THICKNESS OF 6 O/D E' 10 O/D CU.TUBE ALTERED VIDE LETT. NO. ELDD/3205/RPB DATED 18.4.2005.	<i>[Signature]</i> 22/4/05	<i>[Signature]</i> 22/4/05
⑨	02.3.06	ITEM SL.NOS. 3 & 4 (16 O/D & 20 O/D TUBES) IN ANNEXURE - II (Sheet-7) DELETED.	<i>[Signature]</i> 2/3/06	VIDE SMM/CON/CLW/CRT'S LETTER NO. MCO/3PL/04/ Cat. BOOK/M&T DT. 20.2.06.
PREPD. BY	CHKD. BY	REVD. BY	APPROVED BY	WAG/9 (Co-Co)
<i>[Signature]</i> 15.4.98	<i>[Signature]</i> 15/4	<i>[Signature]</i> 15.4.98	<i>[Signature]</i> 15.4.98	SPECIFICATION FOR COPPER TUBES FOR GENERAL ENGINEERING PURPOSES; FOR 3 PHASE A.C. LOCOMOTIVE
CDM	SUPDT.	AME/D&D	DY. CME/D&D	CHITTARANJAN LOCOMOTIVE WORKS CHITTARANJAN NO. CLW/MS/3/030
ALT. NO.	①	②	③	④
	⑤	⑥	⑦	⑧

PREPD. BY	CHKD BY	REVIEWED BY	APPROVED BY	SPECIFICATION FOR. COPPER TUBES FOR. GENERAL ENGINEERING PURPOSE. FOR 3 PHASE/ CONV. A.C. LOCOMOTIVE.	CHITTARANJAN LOCOMOTIVE WORKS CHITTARANJAN-713331 NO. CLW/MS/3/030.
			DY. CEE/ CON/TU	ALT NO. 10 11 12	