

SHEET-1

TENDER SPECIFICATION
No.CLW/TS/99/CF/5
TOTAL No. OF SHEETS-8

Alt. No.	8						

SPECIFICATION
FOR BRASS PIPE FITTINGS OF PNEUMATIC BRAKE SYSTEM
USED FOR ELECTRIC LOCOMOTIVE

THIS SPECIFICATION SUPERSEDS (1) SPECN.
NO.CLW/TS/99/CF/5 Alt.7.(2) SPECN. NO.CLW/MS/3/066 Alt-13
&
(3)SPECN. NO.CLW/MS/10/0016 ALT-8.

ISSUED BY
DY. C.E.E./D-I
C.L.W./CHITTARANJAN

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SPECIFICATION FOR BRASS PIPE FITTINGS FOR USE IN ELECTRIC
LOCOMOTIVE

1. **SCOPE:**

This specification covers the manufacture and supply of Brass Pipe Fittings for compressed air transmission system viz. Pneumatic brake system in Electric Locomotive manufactured at CLW (Indian Railways). Operating air pressure may be as high as 11.5 km/cm2. Normal working pressure is 10 kg/cm2.

2. **SCOPE OF SUPPLY:**

01 (one) set of Brass Pipe Fittings shall consist of all items indicated in Category Book in quantities equal to quantity per loco set of individual items indicated therein.

3. **CLIMATIC AND ENVIRONMENTAL CONDITIONS:**

- * Maximum Atmospheric Temperature : Under Sun - 70°C
- * Humidity : In Shade - 50°C
- * Reference sit conditions : 100% saturation during rainy season

- i) Ambient Temp
- ii) Humidity
- iii) Altitude
- * Rain Fall

- : Max. 47°C Min. 0°C
- : 60%
- : 160m above mean seal level
- : Very heavy in certain areas. The locomotive will be designed to permit its running of 10 Km/hour in flood water level of 102 mm above rail level.

* Atmosphere during hot weather : Extremely dusty and desert terrain in certain areas

* Coastal Area

: Equipment will be designed to work in coastal areas in humid and salt laden atmosphere.

* Vibration

: The equipment sub-system and their mounting arrangement will be designed to withstand vibration and stocks encountered in service as specified in corresponding IEC-77 publications unless otherwise prescribed.

4. **STANDARDS:**

- i) IS:320 Gr.II
- ii) IS:191 (DPA/DHP Grade)
- iii) IS:2501-1995
- iv) IS:5493 v).ISO : 7/1 vi) ISO : 228/1.

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5. GENERAL AND TECHNICAL DATA:

- 5.1 The fittings are to be used/swaged with high quality seamless half hard copper tubes made of DPA grade copper (IS:191) conforming to IS:2501-1995 and IS:5493.
- 5.2 All pipe fittings body and ferrule shall be made from brass conforming to IS:320 Gr.II. Ferrules are to be made from bar stock. The hardness of the ferrules must be greater than that of copper tubes by 5-10 HRB.
- 5.3 The bodies of the straight fittings are to be made from forged bar stocks and the angle fittings from forged blocks/gravity dis-casting and properly machined. The body of the fittings shall have no step on forged body and any cracks/shrink holes/cold sets/pits/sloppy edges/machining mark.
- 5.4 The size by which the fittings are designated shall be the outer diameter of the tube with which they are to be used.
- 5.5 Taper and parallel threads shall conform to ISO : 7/1 and ISO: 228/1 respectively or as indicated in accompanying drawings.

6. DESIGN PRINCIPAL/MANUFACTURING:

- 6.1 All pipe fittings shall conform to accompanying drawings.
- 6.2 Pipe fittings shall have a safe and reliable, torque free, leak proof performance at all tubing connections.
- 6.3 All the tube fittings when swaged with recommended tubings (cl 5.1) must be capable of withstanding the following types of forces.
 - a) Internal pressure
 - b) Tension or axial pull
 - c) Compression or axial push
 - d) Torque or Twist
 - e) Vibration
 - f) Temperature variation
 - g) Any combination of these forces
- 6.4 Construction of the fittings must have the following features
 - a) No **Locking** of ferrules in Nuts before/after swaging
 - b) No axial movement of ferrules after swaging
 - c) No radial movement of back ferrule
 - d) Should not create torque or leave residual strain
 - e) Should have a residual spring condition so that temperature cycling will not cause leakage

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- f) Should not significantly reduce flow area.
- g) Should have enough tube support ahead of the seal to resist any vibration.
- h) One (1) micron finish on sealing surfaces and three (3) microns finish overall without any annular tool markings.
- i) The design of the fittings should be such that they need not require dis-assembly before assembly with tubings and should not require any special tools.

NB: The bidder shall indicate any deviations from design principle/manufacturing or any kind of technical deviation including scope of supply as indicated in this specification.

7. INSPECTION AND ACCEPTANCE:

7.1 Type Test

7.1 (a) General: The manufacturer shall submit one prototype sample set (consisting of all the items quantity-wise as indicated in Category Book for the purpose of inspection and conducting type testing at their works premises. These are to be witnessed by an authorised representative of the purchaser and the cost of the same will be borne by the manufacturer/bidder. Fittings being offered for prototype inspection shall have the capability of withstanding the following tests.

7.1 (b) Visual/Dimensional checking:

Fittings will be checked for overall finish, workmanship and dimensions. Dimensional checking will be carried out by properly calibrated measuring/checking instruments.





7.1 (c) Inspection during Test:

After each dis-assembly of the test assembly couplings the components and the tubings shall be examined for -

- i) Damage to 'O' ring - if any
- ii) Formation of Fatigue cracks at thread roots
- iii) Damage to Ferrules
- iv) Damage to sealing faces
- v) Damage to cracking of tubes

7.1 (d) Pneumatic Pressure Test:

Test assembly consisting of male connector, union, union tee, elbow and cap to 6 to 8 inches tube (as described in cl. 5.1) length of desirable O.D. (Total 4 assemblies) tightened 1 ¼ turn past snug and pressure each test assembly to 40 kg/sqcm (pneumatic pressure) and to be held at that pressure for 15 minutes. If no leak is found, the fittings are to be disassembled and shall be inspected as per cl. 7.1 (c).

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7.1 (e) Hydrostatic Test:

After the completion of pneumatic pressure test, re-assemble the fittings as stated in 7.1 (d) and pressurise each test assembly to 15 kg/sqcm and to be held at that pressure for 15 minutes. If no leak is found, the fittings are to be dis-assembled and to be inspected as per cl. 7.1 (c).

7.1 (f) Pressure impulse-cum-vibration Test:

After the completion of Hydrostatic test, re-assemble the fittings as stated in 7.1 (d) and the tests to be carried out are as follows:

- i) Each test assembly shall be subjected to vibration frequency of 60 Hz with amplitude of 5 mm, simultaneously pressure cycling at 100 kg/sqcm at 35 +5 impulse/minute with suitable hydraulic Fluid media.
- ii) Pressure impulse test shall run for 500000 cycles (minimum) and vibration for a minimum of 10×10^6 cycles.
- iii) On completion of test, dis-assemble the assembly and the fittings are to be inspected as per cl. 7.1 (c).





7.1 (g) Make & Brake hydrostatic Test:

After the completion of pressure impulse-cum-vibration test, re-assemble the fittings as stated in cl. 7.1 (d) and then -

- i) Assembled torque to be recorded
- ii) Dis-assemble & re-assemble the fittings to the original torque
- iii) Repeat make & break for 6 times
- iv) After 6th assembly, pressurise the assembly with suitable hydraulic media to 100 kg/sqcm with suitable copper tubing (as indicated in cl. 5.1) and hold the pressure for 5 minutes and observe the leak.
- v) If no leakage is found, release the pressure and continue this make and break test for 25 cycles.
- vi) After the end of 25 cycles, pressurise the test assembly to 200 kg/sqcm and hold the pressure for 15 minutes.
- vii) If no leakage is found, dis-assemble the test assembly, and the fittings shall be inspected as per cl. 7.1 (c). Any sample exhibiting damage or leakage 90% than tube bursting) shall be considered as failure.

7.1 (h) Temperature cycling Test:

After the completion of make & break test, re-assemble the fittings as stated in cl.7.1 (d) and then each test-assembly shall be subjected to 3 temperature cycles each of approximately 3 hours duration. Temperature should increase ambient to 100°C in 45+15 minutes and held for 60 minutes. Then the temperature should be reduced to ambient from 100°C in 45+15 minutes. On the completion of successful temperature

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cycling test, dis-assemble the assembly and the fittings shall be inspected as per cl. 7.1 (c).

NB: The manufacturer/bidder must have inhouse test facilities for carrying the tests (as indicated in cl. nos. 7.1 (c), (d), (e) & (g). For te remaining tests the manufacturer/bidder must submit relevant test certificates from RDSO/Rlys. approved test laboratory at the time of inspection. Expenditure towards these will be borne by the manufacturer/bidder.

7.2 ROUTINE TEST/INSPECTION:

- 7.2.1 10%of offered lot will be subjected to inspection as per cl 7.1(b) &7.1.(c). In case of rejection in the sample beyond 2%, Whole lot shall be rejected. 1 set of each fitting against each order shall be subjected to complete type test as per cl.7.1. (d),(e) &(g) . In case of not standing in the test, quality audit shall be done and remedial action will be implemented.
- 7.2.2 The tenderer shall indicated the sample size including minimum size for routine inspection of each lot and the acceptance criteria for acceptance by the purchaser.

8. SUPPLY OF DOCUMENTS:

- 8.1 Along with Tender offer:
 - (a) The tenderer shall submit dimensional manufacturing drawings indicating manufacturing tolerances, part drawings of individual items and sub-assemblies, part listing of Assembly/Sub-Assembly, Material specification, Technical data/Calculations in duplicate for purchaser's examination/checking, scrutiny and authentication.
 - (b) Any deviation from the specified value shall be spelled out clearly by the tenderer.
 - (c) The tenderers shall submit details of in-house test facilities available with them for both type and routine tests. He shall also clearly mention the tests to be carried out at Railway/RDSO approved test laboratory.
- 8.2 Along with supplies:
 - The successfully tenderer shall submit with supply the required copies of list of items supplied, certified copies of material and test certificates from Railway/RDSO approved testing house, and guarantee certificate for the supplied items.

9. QUANTITY ASSURANCE:

As per ISO:9001

10. MARKING:

- Each assembly/sub-assembly/component shall have clear readable marking (purchased/embossed) particularly on body and back nuts. The markings shall be as follows: -
- a) Manufacturer's name/trade mark
- b) Part number/size (in mm/inch)

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NB: Both front and back ferrules of sizes 25mm and above shall have manufacturer's name/trade mark engraved on them at suitable location.

11. GUARANTEE:

11.1 All fittings and its components shall be guaranteed for satisfactory performance for a period of 24 (twenty four) months from the date of delivery or 18 (eighteen) months from the date of commissioning of the locomotive, whichever is earlier. All aspects of workmanship and material will be covered by the guarantee.

11.2 The components/material which fails during the guarantee period must be replaced by the manufacturer/contractor free of cost.


12. **PACKING:** All pipe fittings shall be properly packed to avoid damage during transit and storage.

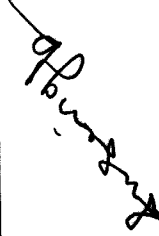



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ALTERATION SHEET

SPECIFICATION No. CLW/TS/99/CF/5

**FOR BRASS PIPE FITTINGS OF PNEUMATIC BRAKE SYSTEM
USED FOR ELECTRIC LOCOMOTIVE**

ALT. No.	DATE	DESCRIPTION	SIGNATURE OF DY. CEE/D-I	REMARKS
8.	05.12.2011	This specification supersedes. 1) Spcn no- CLW/TS/99/CF/5, Alt-7. 2) Spcn no- CLW/MS/3/066 Alt-13. 3) Spcn no- CLW/MS/10/0016 Alt-8 and to be followed with immediate effect.		

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