

**SPECIFICATION FOR  
STAINLESS STEEL PIPE FITTINGS OF PNEUMATIC SYSTEM  
FOR WAG-9H & WAP-7 3-PHASE ELECTRIC LOCOMOTIVE**

**SPECIFICATION NO.:- CLW/MS/03/053 ALT. 21**

**ISSUED DATE :- 15.05.1997**



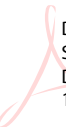
**ISSUED BY:-**

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**ALTERATION SHEET**

SN	Date	Clause No.	Page No.	Description	Alt.	Approved By
1.	24.08.98			Items at sl. nos. 64, 65, note-1 in Annexure-A (sheet no. 7) 7 Alteration sheet no.1 (Sheet no.8) added. Item at sl. no. 2, 53 deleted.	1	
2.	24.08.99			Qty. of Equal Tee Ø22 at sl. no. 8 was 2/loco set. Qty. of Reducing Union Tee Ø22/Ø22/Ø15 at sl. no. 13 was 04/loco set.	2	
3.	6.3.2000			Item at sl. no. 66 added. Qty. of item at sl. no. 26 was 6/Loco set. Qty. of item at sl. no. 3 was 6/Loco set. Item at sl. no. 59 deleted.	3	
4.	08.10.01			The entire specification except alt. sheet has been revised & updated, superseding specn. no. CLW/MS/3/053 alt. 3.	4	
5.	19.03.02			Item sl. no. 51 added. Drg. sl. no. of items from sl. no. 21 to 28 rectified.	5	
6.	26.04.02			Sheets 8 & 9 deleted & detached from and sheets 8A & 9A (Revised Annexure-I) included in the specification. Based on Joint note made by Shop-16 & C-D&D on 18.04.02 & countersigned by WM/ELA-I & AME/D&D-II.	6	
7.	15.11.02			Items at sl. nos. 3, 8, 9 & 46 deleted. Quantities of items at sl. nos. 1, 4, 6 & 10 were 14, 20, 14 & 26 respectively. Based on joint note made by shop-16 & C-D&D on 31.09.02 & counter signed by AME/D&D-II. This is due to deletion of wheel flange lubrication system on loco.	7	
8.	19.12.02			Items at sl. nos. 16 deleted. Qty. of items at sl. no. 46 re-insisted. Based on joint note made by shop-16 & C-D&D on and counter signed by AME/D&D-I.	8	
9.	01.10.13			“i.e. between 85 HRB to 90 HRB” added to the last sentence under Clause 5.2 drg. no. against item sl. no. 47 was 1209-18.406-026. To specify ferrule hardness item drg. no. corrected.	9	DY.CEE/ ELA
10.	13.07.04			Item sl. no. 49, 50 added. Item no. 49 re-item no. 50 added in lieu of ¾” Brass Socket as per WM/ELA’s letter no. DCME/ELA/43/3Ø Dated 12.11.13.	10	DY.CEE/ D
11.	05.05.05			Item sl. no. 51 added. Qty. of item at sl. nos. 33, 34, 36 were 5, 10, 5. Due to modified pipe layout for anti spin valve vide RDSO’s letter no. EL/3.1.35/2 dt. 28.01.03.	11	
12.	21.08.06			Note 1 added in sheet 9A as per Shop’s requirement.	12	

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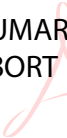

13.	28.11.09			Qty. of item sl. no. 23 was 11 & sl. no. 43 deleted due to abolition of K port line from U/F.	13	DY.CEE/D
14.	20.10.10			Qty./Loco Column deleted from specn. WAG-9 changed as WAG-9H and WAP-7 added. To avoid conflict in Cat. Book & Specn.	14	DY.CEE/D
15.	04.04.11			Item sl. no. 52 newly added only for WAP-7 due to new pipe layout for air dryer for WAP-7.	15	DY.CEE/D
16.	16.11.11			Annexure 'A' (Page No 8A & 9A) Deleted to avoid the mismatch Between Cat. Book & Specification.	16	DY.CEE/D
17.	14.02.12			Sheet 8A sl. no. 18, 19, 26 and sheet no 9A sl. no. 31 & 35 size 10 was 3/8" O/D sheet no 3 grade - 1018 added.	17	DY.CEE/D
18.	17.01.14			Sheet 9B added and drg. no. 1209-18.406-036, 1209-18.406-026, 029 revised/updated.	18	DY.CEE/ PROJ/ CON
19.	26.03.15			Item sl. no. 61 added in sheet no. 9B. Approved by CEE/LOCO on note no. ELDD/3606 dt. 10.03.2015.	19	DY.CEE/ D-I
20.	14.02.17			Specification has been revised as per ASTM-F1387-99 and ICF specification.	20	DY.CEE/ D-I
21.	14.01.2022			Value of cycles of vibration in pressure impulse cum vibration test corrected as $10 \times 10^6$ cycles at clause no. f) (iii).	21	DY.CEE/D/ CONV.

**Specification have been digitized and all alterations have been incorporated.**

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**1. SCOPE :-**

This specification prescribes the requirements for stainless steel pipe fittings with S.S. Double Ferrule Fittings for compressed air transmission for braking purpose in three-phase electric locomotives (WAG-9/WAG-9H and WAP-7). Operating air pressure may be as high as 11.5 kg/cm<sup>2</sup>. Normal air pressure is 10 kg/cm<sup>2</sup>.

**2. SCOPE OF SUPPLY :-**

One set of S.S. Pipe fittings shall consist of all items indicated in Annexure-I of specification in quantity equal to quantity per loco of individual items as mentioned in category book/tender document.

**3. CLIMATIC AND ENVIORNMENTAL CONDITIONS :-****(a) Maximum Atmospheric Temperature:-**

Under Sun : 75° C

In Shed : 55° C

**(b) Humidity:-** 100% saturation during rainy season.**(c) Reference site condition:-**

Ambient Temp. : 47°C (Max.) & -5°C (Min.)

Humidity : 60%

Altitude : 160 m above sea level.

**(d) Rainfall:-**

Very heavy in certain areas. The locomotive will be designed to permit its running at 10 Km/Hr. 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 areas:-**

Locomotives and equipment shall 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 withstand vibration and shocks encountered in service as specified in corresponding IEC publication unless otherwise prescribed.

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#### 4. STANDARDS :-

4.1 Latest version of specification shall be applicable unless otherwise specified.

4.2 Material and Dimensional Standards referenced

- (i) ASTM A108 Gr.1018
- (ii) ASTM A276 SS 316
- (iii) ASTM A269 SS 316
- (iv) ASTM A105
- (v) ISO 7/1
- (vi) ISO 228/1
- (vii) CLW Spec. MS/3/029

4.3 Certification/Performance Standards referenced

- (i) ISO 9001:2015 (or latest version)
- (ii) ASTM F1387-99 (2012)
- (iii) ASTM A262
- (iv) IS 9844
- (v) IEC 60068-2-52
- (vi) IEC 61373

#### 5. GENERAL & TECHNICAL DATA:-

- 5.1 The fittings are to be used/swaged with annealed, high quality seamless austenitic stainless steel (Gr.TP 304) tubing conforming to ASTM A269 of hardness as per CLW Spec MS/3/029 Clause 5.9
- 5.2 All straight pipe fitting bodies shall be made from carbon steel conforming to ASTM A108 Gr. 1018.
- 5.3 Angle fittings will be manufactured from forged blocks conforming to ASTM A105 and there will be no step and pit marks on the forged body.
- 5.4 Fittings shall not have sharp edges and all parts of the fittings shall be cleaned to get rid of burrs, dirt, grease, etc. and to get a clean matt finish.
- 5.5 Ferrules are from stainless steel (Gr.316) conforming to ASTM A276 bar stock. The hardness of the ferrules must be greater than that of the tubing by 5-10 HRB.
- 5.6 The back ferrule shall be case hardened to a case depth of minimum 27 microns through a suitable case hardening process to achieve a minimum hardness of 1000 VPN HV. The back ferrule shall successfully complete the Intra-Granular corrosion test and 96 hours of corrosion performance as per clause 7.2 (o) and (m) respectively.
- 5.7 Each fitting shall be re-usable after dismantling & assembling for at least 25 times.
- 5.8 The fittings shall be able to produce a leak proof joint in either Pressure or vacuum service.
- 5.9 The size by which the fittings are designed shall be the outer diameter of the fittings with which they are to be used.

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## 6. DESIGN PRINCIPLE/MANUFACTURING :-

- 6.1 All pipe fittings shall confirm to accompanying drawing.
- 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 tubing (ref. clause 5.1) must be capable of withstanding the following types of forces:
- (a) Internal Pressure
  - (b) Tension or axial pull
  - (c) Compression of axial push
  - (d) Torque of Twist
  - (e) Vibration
  - (f) Temperature Variation
  - (g) Any combination of these forces
- 6.4 Construction of the fittings must have the following features:
- a) Self-aligning.
  - b) Work on thick or thin wall tubing.
  - c) No weakening of tube wall.
  - d) No locking of ferrule in nuts before and after swaging.
  - e) No Axial movement of ferrule after swaging.
  - f) No Radial movement of back ferrule.
  - g) Should not create torque or leave residual strain on tubing.
  - h) Should have residual spring condition so that temperature cycling will not cause any leakage.
  - i) Should not significantly reduce flow area.
  - j) Should have enough tube support ahead of the seal to resist any vibration.
  - k) Can contain any pressure up to the burst point of the tubing without leakage.
  - l) Seal repeatedly under make-and-break conditions.
  - m) One (1) micron finish on sealing surface and three (3) micron finish overall without any annular tool marking.
  - n) The design of the fittings should be such that they need not require disassembly before assembly with tubing and should not require any special tools.

**NB:-** Bidder shall indicate any deviations from design principle /manufacturing or any kind of technical deviation including scope of supply as indicated in the specification.

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