Govt. of India
Ministry of Railways
Research Designs & Standards Organization
Manak Nagar,Lucknow-226011

QM-C-8.1/AB/0001/M

Inspection Plan (Check Sheet for New Wagons)

Item :Pipes for Air Brake System for Freight & Coaching Stock.

Specification : 04- ABR-2019, Revision 02 of June- 2019

Drg. No. with Alt.No.: WD-83062-S-06,Alt.4or latest,WD-83062-S-07 Alt6 or latest,WD-94056-S-1,Alt.1or latest

Passenger/Freight Stock (including BMBS Stock):Stainless steel to ASTM-A312 schedule 40SGr.TP 304(seamless)for Brake pipe/Feed pipe & Branch pipe**.**

For flange sand fittings -Stainless steel toIS: 6911-1992 X 04 Cr19 Ni 9304 Si, OR

ASTM A351/A351M-03 Gr.-CF8 J92600, OR

ASTM A182/A182M-12A Gr.-F304

1	Name of Manufacturer	
2	Date of offer	
3	Date (Period) of Inspection	
4	RDSO File No.	
5	Drawing & Alt. No.	
6	P. O. No.	
7	Total Quantity ordered	
8	Quantity earlier passed	
9	Quantity now offered	
10	Consignee	
11	D.P.	

SIGNATURE OF FIRM REPRESENTATIVE

SIGNATURE OF RDSO INSPECTOR

A)<u>Vendor should produce Mill test certificate of pipe at the time of inspection, shall be consisting of following tests as per ASTM -A312-/A312M-01a</u>

<table>
<tr><th>S. No</th><th>Spec. Clause no of ASTM - A312/A312M-01a</th><th>Test Details</th><th>Specified Parameters</th><th>Value of MTC</th><th>Remark</th></tr>
<tr><td>1.0</td><td>6.3</td><td>Grain Size</td><td>No. 7 or coarser for TP-304</td><td></td><td></td></tr>
<tr><td rowspan="2">2.0</td><td>7.0</td><td>Chemical composition</td><td>
<table>
<tr><th>Grade</th><th colspan="2">Composition %</th></tr>
<tr><td rowspan="7">TP304</td><td>Carbon (Max)</td><td>0.08</td></tr>
<tr><td>Manganese (Max)</td><td>2.00</td></tr>
<tr><td>Phosphorus (Max)</td><td>0.045</td></tr>
<tr><td>Sulphur (Max)</td><td>0.030</td></tr>
<tr><td>Silicon (Max)</td><td>1.00</td></tr>
<tr><td>Chromium</td><td>18.0-20.0</td></tr>
<tr><td>Nickel</td><td>8.0- 11.0</td></tr>
</table>
</td><td></td><td>OK/Not Ok</td></tr>
<tr><td>11.1</td><td>Tensile Requirement (Transverse)</td><td>
<table>
<tr><td>Grade</td><td>Tensile Strength Minimum</td><td>Yield Strength Minimum</td></tr>
<tr><td></td><td>MPa</td><td>MPa</td></tr>
<tr><td>TP304</td><td>515</td><td>205</td></tr>
</table>
</td><td></td><td>OK/Not Ok</td></tr>
<tr><td>3.0</td><td>11.2</td><td>Flattering Test</td><td>As per ASTM -A312/A312M-01a</td><td></td><td>OK/Not Ok</td></tr>
<tr><td>4.0</td><td>12.0</td><td>Hydro static or Non Destructive Test electric test</td><td>As per ASTM -A312/A312M-01a</td><td></td><td>OK/Not Ok</td></tr>
<tr><td rowspan="5">5.0</td><td>17.0</td><td>Marking Details</td><td></td><td></td><td></td></tr>
<tr><td rowspan="4"></td><td>a) Manufacturer trade mark</td><td>Marking should be legible</td><td></td><td>OK/Not Ok</td></tr>
<tr><td>b) Nominal pipe size or OD</td><td>Marking should be legible</td><td></td><td>OK/Not Ok</td></tr>
<tr><td>c) Heat No, NH (if hydrostatic test not performed)</td><td>Marking should be legible</td><td></td><td>OK/Not Ok</td></tr>
<tr><td>d) ET(Eddy current test)/UT</td><td>Marking should be legible</td><td></td><td>OK/Not Ok</td></tr>
<tr><td>6.0</td><td colspan="5">Supplementary Requirements of Clause of Specification</td></tr>
<tr><td>6.1</td><td>S4</td><td>Etching test</td><td>As per ASTM -A312/A312M-01a</td><td></td><td>OK/Not Ok</td></tr>
<tr><td>6.2</td><td>S7</td><td>Intergranular corrosion test</td><td>As per ASTM -A312/A312M-01a</td><td></td><td>OK/Not Ok</td></tr>
</table>

SIGNATURE OF FIRM REPRESENTATIVE

SIGNATURE OF RDSO INSPECTOR

B) RAW Material Verification Details

S.No	Descriptions	Observations/ Comments
1.	Verification of incoming raw materials procured for manufacturing of tube	
2.	Thickness / diameter of raw materials for manufacturing of seamless tube	
3.	Verification of ledger of raw material for incoming pipes, Dispatched quantity & balance (both in weight & Quantity)	

SIGNATURE OF FIRM REPRESENTATIVE

SIGNATURE OF RDSO INSPECTOR

C. Lot Size: 100 sets or part there of

- **Visual Check:**

Specified

sample size -

S.No	Specified	Observation
1.0	Pipe should be smooth, inside and outside must be free from defects and must be provided with parallel threads to IS: 554 wherever called for.	OK/Not OK
2.0	Pipe should be cleaned, free from dust/rust & moisture.	OK/Not OK
3.0	Painting (if included in Purchase Order):Exterior of Flange, Socket and Cut-off Angle Cock tobe Painted.	OK/Not OK
4.0	a.) Welding Joints to pipe shall be in accordance with Procedure given in annexure-A.	OK/Not OK
	b.) Verification of DP testing register of welding joint	Verified/Not Verified
5.0	Marking. 1. Stencil of mfg. initial, month and year to be stamped on pipe. 2. Punch in 6mm size mfg. initial, month and year on flange.	OK/Not OK

SIGNATURE OF FIRM REPRESENTATIVE

SIGNATURE OF RDSO INSPECTOR

D) Item: Flange & Socket

- Specified sample size -10%
- Actual sample size–

S. No	Item Details	Specified parameter in mm	Observed Value
1.0	Flange for 32mm NB Pipe (Fixed)	CRS 95±0.4, T-20, Hole Size- 17.5 W-70	
2.0	Flange for 32mm NB Pipe (Swivel)	• CRS 95±0.4, T-16, Hole Size- 17.5 W-70 • Bore- 43.0 – 43.25 & 32.5	
3.0	Flange for 25 mm NB Pipe (Fixed)	• CRS 95±0.4, T-20, Hole Size- 17.5 W-57 • Bore-51.77- 52.02 & 34.50 – 34.75	
4.0	Flange for 25 mm NB Pipe (Swivel)	• CRS 76±0.4, T-14.5, Hole Size- 13.5 W-57 • Bore- 51.77 -52.02 & 44.45 -44.70	
5.0	Flange for 20 mm NB Pipe (Fixed)	• CRS 70±0.4, T-16, Hole Size- 13.5, W-53 • Bore-27.5- 27.75 & 20.0	
6.0	Flange for 20 mm NB Pipe (Swivel)	• CRS 70±0.4, T-14.5, Hole Size- 13.5 W-53 • Bore- 43.71-43.97 & 35.71- 35.97	
7.0	Flange for 15 mm NB Pipe (Swivel)	• CRS 70±0.4, T-14.5, Hole Size- 13.5 W-53 • Bore- 43.71-43.97 & 35.71- 35.97	
8.0	Socket for32mm NB Pipe	D- 51.33- 51.46 & L- 31.5	
9.0	Socket for25mm NB Pipe	D- 44.20 – 44.32 & L- 30.0	
10.0	Socket for20 mm NB Pipe	D- 35.46- 35.59 & L- 28.5	
11.0	Socket for15 mm NB Pipe	D- 35.46- 35.59 & L- 28.5	
12.0	Tee flange for 32x32x25 mm NB Pipe	Dimensions check for Tee flange as per RDSO DRG WD-94056-S-01 Alt-1 or latest.	
13.0	Tee flange for 20x20x15 mm NB pipe		
14.0	Tee flange for 32x32x20 mm NB pipe		

SIGNATURE OF FIRM REPRESENTATIVE

SIGNATURE OF RDSO INSPECTOR

E) Dimensional Check :

- Specified sample size -10%
- Actual sample size–

1.0 Check the pipes with piping lay out as per RDSO Drawing relevant type of wagons/Coach				OK/Not OK			
2.0 Measure pipe OD & wall thickness for seamless stainless steel pipe as per ASTM A 312 40S Gr. TP-304(Seamless)				------			
Nominal Bore	**Outer diameter**		**Wall thickness (Variation +12.5%/-0 of Std.)**	**Observed Dimensions**			
				Outer diameter		**Wall thickness**	
	Max mm	**Min mm**		**Observed Value**	**Remark**	**Observed Value**	**Remark**
32 mm	42.16	42.0	3.56 to 4.0		OK/Not OK		OK/Not OK
25 mm	33.4	33.3	3.38 to 3.8		OK/Not OK		OK/Not OK
20 mm	26.67	26.5	2.87to 3.22		OK/Not OK		OK/Not OK
15 mm	21.8	21.0	2.77 to 3.11		OK/Not OK		OK/Not OK
10 mm	17.15	16.7	2.31to 2.59		OK/Not OK		OK/Not OK

3.Ball Test: Pipes must be tested after bending for free passage with a ball of following dia :			**Observations**
3.1	32 mm nominal dia pipe	28 mm ball	OK/Not OK
3.2	25mm nominal dia pipe	22mm ball	OK/Not OK
3.3	20mm nominal dia pipe	16mm ball	OK/Not OK
3.4	15mm nominal dia pipe	11mm ball	OK/Not OK
3.5	10mm nominal dia pipe	8.5mm ball	OK/Not OK
4.0 Threads checking with Gauge.(GO & No Go)			OK/Not OK
5.0 Measurement of minimum thickness at thread portion of 32mm NB pipe ASTM A312 Schedule 40S Gr. TP 304 (Seamless).			OK/Not OK

SIGNATURE OF FIRM REPRESENTATIVE

SIGNATURE OF RDSO INSPECTOR

F). Chemical, Tensile& bend test as per related specification: (One per lot per raw material to be tested from NABL).

Specified sample size:

a. Chemical Test (includingPipe, Socket and Flange)-1 No eachb.

Tensile and Bend Test (Pipe only)-1 No each.

1.0	**Chemical Test**:		
1.1	**Passenger /Freight stock (including BMBS stock)**		
1.1.1	Brake Pipe/ Feed Pipe & Branch Pipe	Stainless steel to ASTM- A 312 schedule 40SGr. TP 304 (seamless)	OK/Not OK
1.1.2	Flange/fittings for branch Pipes	Stainless steel to IS: 6911-1992 X 04 Cr 19 Ni 9 304 Si.**OR**ASTM A351/A351M-03 Gr.-CF8 J92600, **OR** ASTM A182/A182M-12A Gr.-F304	OK/Not OK
1.1.3	**Microstructure**		
1.1.3.1	Flange/fittings for branch Pipes	Stainless steel to IS: 6911-1992 X 04 Cr 19 Ni 9 304 Si **OR**ASTM A351/A351M-03 Gr.-CF8 J92600, **OR** ASTM A182/A182M-12A Gr.-F304	OK/Not OK
1.1.3.2	Brake Pipe/ Feed Pipe & Branch Pipe	Stainless steel to ASTM- A 312 schedule 40SGr. TP 304 (seamless)	OK/Not OK

2.0	**Items Details**	**Specified parameters**		**Observed Values**	**Remark**
2.1	Tensile & Bend Test Brake pipe/ Feed pipe& Branch Pipe	Stainless steel to ASTM- A 312 schedule 40SGr. TP304 (seamless)		**----**	**----**
	i. Tensile Strength (Minimum)	515 MPa			OK/Not OK
	ii. Yield Strength (Minimum)	205 MPa			OK/Not OK
	iii. %EL (Minimum)	Longitudinal- 35%	Transverse= 25%		OK/Not OK
G.	**Metal structure & Macro Etching test (for Seamless pipe)**	Pipe should sound and reasonably uniform material free from injurious laminations, cracks, seams, scabs, tears etc.			**Ok/Not OK**

SIGNATURE OF FIRM REPRESENTATIVE

SIGNATURE OF RDSO INSPECTOR

H.	**LeakageTest:** • Specified sample size -5% of offered lot- • In case of failure- 20% of re offered lot- • Actual sample Size-		
	• Leak Test at 10 kg/cm^{2}compressed dry air pressure, Dipping in water tank.		OK/Not OK
I.	**Packing:**		
	i.	Outer ports & exposed threaded portion of pipes and joints are suitably covered with airtight Protection caps.	**Available/Not Available**
	ii	Pipe sand Joints should be adequately packed to prevent Damage in handling and storage.	**Adequate / Inadequate**
J.	**CalibrationStatus Checked.**		**OK/Not OK**

K. Rubber Gasket (Sample size 10%)

S. No	Details	Specified -Parameter			Observed value	Remark
		Outer Diameter	Inner Diameter	Thickness		
1.0	32 mm NB	$57.15\pm^{0.25/0}$	$47.5\pm^{0.13}$	$6.4\pm^{0.25/0}$		OK/Not OK
2.0	25 mm NB	$50.3\pm^{0.25/0}$	$40.0\pm^{0.13}$	$6.4\pm^{0.25/0}$		OK/Not OK
3.0	20 mm NB	$41.25\pm^{0.25/0}$	$31.8\pm^{0.13}$	$6.4\pm^{0.25/0}$		OK/Not OK
4.0	15 mm NB	$41.25\pm^{0.25/0}$	$31.8\pm^{0.13}$	$6.4\pm^{0.25/0}$		OK/Not OK

L. Testing of Rubber Gasket

S. No	Detail	Observed value	Remark
1.0	03 pieces Gasket of each size from the lot of 100 sets of pipe to be tested at NABL accredited Lab as per IRS R 48 – 88 Grade E.		OK/Not OK

SIGNATURE OF FIRM REPRESENTATIVE

SIGNATURE OF RDSO INSPECTOR