

CHAPTER 10

TANK WAGON

Tank wagons form a special class of non-pooled rolling stock. They are classified according to the product carried by the tank and its design. Tank wagons fall in the following categories:

- Tanks as pressure vessels.
- Tanks for corrosive liquids.
- Tanks for petrol and other highly inflammable products.
- Tanks for middle distillates of petroleum and others products.

For information about these wagons in respect of their mechanical code and the products carried, refer to Appendix “B” of IRCA Part III (2000).

1001. CONSTRUCTIONAL DETAILS

A. Underframe

The design of the underframe of four wheeled and eight wheeled wagon is generally similar to that of other IRS wagons except that a pair of saddles is provided on the underframe at each end for mounting the barrel. Refer to Chapter 5 for repair and maintenance of underframe.

B. Barrel and saddles

The barrel is cylindrical vessel generally fabricated out of low carbon structure steel to IS:2062 Fe 410CuW. Material specification for various types of tanks are given in Table-10.1. The barrel is placed longitudinally on the underframe and secured by means of rivets to the saddle. The saddle is welded on underframe at each end.

TABLE 10.1
MATERIAL SPECIFICATION

Sr. No.	Type of wagon	Cylindrical portion	Dished ends
1	Ammonia tank wagon type TAL BTAL BTALN	Steel.toBS:1501- 224Gr.32AT 50ASTM-516Gr-70	Steel to BS:1501-224- Gr.32 A LT 50 ASTM- 516 Gr.-70
2	Chlorine tank wagon type LCT	Steel To BS: 1501-157 Gr C Colvilles Coltuff 28	Steel To BS:1501-157 Gr C Colovilles Clotuff 28
3	Liquified petroleum gas tank wagon type TLGL,BTPGL,BTPGLN	Steel to BS: 1501-224- Gr32 A LT 30 ASTM-516 Gr. 70	Steel to BS: 1501-224- Gr32 A LT 30 ASTM-516 Gr. 70
4	Sulphuric acid tank TSA & MBTSA	Steel to IS 2062 St. 42 WC	Steel to IRS:M 30/IS:3747
5	Petrol tank wagons type TPR TPR/A,MBTPX &MBTPZ	---do---	---do---
6	Oil tank wagon type TORX	---do---	---do---
7	Heavy oil tank wagon TORX	---do---	---do---
8	Bitumen tank wagon type TBT	---do---	---do---
9	Coaltar tank wagon type TR	---do---	---do---
10	Petrol tank wagon type TR& MBTP	Steel to IS:2062 St. 42 WC	---do---
11	Oil tank Wagon type TO	---do---	---do---
12	Oil tank wagon type MBTOX	---do---	---do---
13	Caustic soda tank wagon type TCS,BTCS	Steel. to IS: 2062 St. 42 WC	Steel to IS 2062 St.42 WC
14	Hydrochloric acid tank wagon type THA	---do---	---do---
15	Molasses tank wagon type TM & MBTM	---do---	---do---
16	Tank wagon for phosphoric acid	ASTM A 240 55 316 L	ASTM A 240 55 316 L

C. Barrel mountings and safety Fittings

Various types of barrel mountings are necessary for filling, measuring and decanting depending upon the product handled. Safety fittings are generally provided inside the dome on a diaphragm plate so as to protect them from accidental injury. These fittings as used on various types of wagons are given in Table 10.2.

TABLE 10.2

DETAILS OF SAFETY FITTINGS

Sr No	Description of fittings	Particulars and Mech. Code	Anhydrous liquid Ammonia BGTALB T AL BTALN	Liquified petroleum gas BG TPGI BTPGLN	Liquid chlorine BGTCL	Sulphuric acid tanks BGTSA MG MBSTA	Caustic soda TCS BTCS	Hydrochloric acid THA	BG,TP,TPR, TPRABTPN MG MBTP MBTPZ MPTPX	BG,TO, TPRX, MG MB TOX	TOH	TBT	Coaltar	Molasses
1	Safety valves	No.off	Two	one	One		One		One	No	No	One	No	No
		Drg. NO	IRS 2137\56	IRS 2138\55	Midland A-255B		IRS 2136\57/M		URS WA FT 87		IRS 2139/77			
		Location	Inside dome	Inside dome	Inside dome		Outside on barrel		Outside on barrel			Outside on barrel		
		Vapour tight at pressure Kg/sq.cm	(80% of (33.47)	247	127				112					
		Start of discharge pressure	Above 33.47	28	1585+5		21		1406			2.11		
2	Pr. release valve	No.off				One		One	NO		NO	NO	NO	NO
		Drg.NO				IRS WA/T F7083		IRS 8133/54						

Sr No	Description of fittings	Particulars and Mech. Code	Anhydrous liquid Ammonia BGTALB TAL BTALN	Liquefied petroleum gas BG TPGI BTPGL N	Liquid chlorine BGTCCL	Sulphuric acid tanks BGTSA MG MBSTA	Caustic soda TCS BTCS	Hydrochloric acid THA	BG,TP,TPR, TPRABTPN MG MBTP MBTPZ MPTPX	BG,To,T PRX, MG MB TOX	TOH	TBT	Coaltar	Molasses
		Location				Outside on barrel		Outside on barrel						
		Set to operate at pressure (kg/sq.cm)				21		21						
3	Safety vent with frangible disc	NO off				One	One	One	NO	NO	NO	NO	NO	NO
		Drg.NO.				IRS2132/57	IRS2135/57	IRS2133/54						
		Location				Outside on dome	Outside barrel	Outside barrel						
		Disc not to rupture pressure (kg/sq.cm)				211	211	211						
		Rupture pressure for disc (kg/sq.cm)				32	32	32						

D. Safety valve

The safety valve is provided to prevent building up of excess pressure inside the barrel. Its fitting on the barrel is either on the diaphragm plate inside the dome or on a separate opening on the barrel. Table 10.2 shows the location, number of safety valves used and their working pressure, etc. for various types of wagons.

E. Relief valve

It is a spring loaded valve fitted on the barrel of tanks for corrosive liquids. Its main function is to release built up pressure, if it exceed the working pressure limit. Table 10.2 shows the type of wagons on which these are fitted and their working pressure limit.

F. Safety vent

This consists of a frangible disc (lead or any approved material not affected by lading) which ruptures at specified pressure. It is an additional safety fitting to safeguard against the failure of the relief valve. When the built up pressure exceeds the working pressure of the relief valve and the latter fails to function for any reason the frangible disc of this safety vent ruptures to release the pressure.

G. Compressed air valve

It is provided on tank wagons from which the contents are unloaded by compressed air. Its main function is to control the rate of discharge by controlling the rate of air admission.

H. Vapour extractor cock

Its function is to extract vapour from the tank while filling (Drg.No.2131/58/M & WD-86081-S/65).

I. Master valve assembly

It is a gravity discharge valve fitted with a hand wheel in the dome for manual operation.

- J. BG 4-wheeler tank wagon bottom discharge valve (Drg. No. WA/TF-88 & WD-93066-S/01) are provided with a single bottom discharge valve situated underneath the master valve while on BG/MG eight wheeler stock two bottom discharge valves are fitted, one on either side and connected with the master valve through a tee pipe. The main function of the valve is to control the flow of the contents and also to serve as an additional safety stop in case the master valve fails or breaks. The bottom discharge valve openings are also provided with blank flanges to be used with 2mm compressed asbestos fibre jointing material to IS:2712-65 to serve as a further check on accidental leakage of contents.

1002. PERIODICITY OF OVERHAULING OF TANK WAGON

The periodical overhauling of IRS tank wagons should be carried out in fully equipped mechanical workshops. The periodicity of POH (refer IRCA Part III Rule 2.4.3) is given below in Table 10.3.

TABLE 10.3
PERIODICITY OF OVERHAULING

Sr. No	Type of wagon	For 1 st POH	For subsequent POH
1.	4 wheeler tank wagons except those listed below.	4 years	3-1/2 years.
2.	Tanks for liquid chlorine and hydrochloric acid, type TCL/THA	2 years	2 years
3.	Tanks for liquids ammonia type TAL,TPGLR	2 1/6 years	2 1/6 years
4.	Tanks for petroleum gas BTAL, BTALN,BTPGL,BTPGLN	4 years	4 years
5.	BTPN	6 years	6 years

A. INTERIOR EXAMINATION OF TANK BARREL

No person should be allowed to enter the tank barrel for internal examination/repair unless the barrel is free from noxious or inflammable fumes. Therefore, before internal inspection of barrel is allowed, it must be steam cleaned/washed with solution of sodium phosphate commercial or soda ash, washed with water or other suitable cleaning agent as prescribed in case of various types of tank barrels.

B. STEAM CLEANING OF TANK BARRELS

The tank(s) requiring steam cleaning should be placed as near the steam supply line as possible and protected against any movement. The berthing siding should be completely isolated from all other traffic.

Tanks as pressure vessels, tanks for petroleum, other highly inflammable products, vegetable oils, bitumen, coal tar and molasses are cleaned by steam. In case of pressure vessels, it should be ensured that all the gas has been discharged to the atmosphere. After ensuring that the tank barrel is no longer under pressure, the following sequence should be followed:

- i. Remove the manhole cover together with manhole housing, valves etc. and leave the tank exposed to atmosphere for 24 hours.
- ii. Entry of staff in the tank barrel should be strictly prohibited and signs with suitable legends displayed at a reasonable distances away from the tank(s) to be steam cleaned.
- iii. Insert pipe through man hole and steam interior of barrel for 12 hours. In order that the tank barrel is thoroughly steamed from inside, the stem pipe should be provided with a “T” connection at its lower end and so directed as to blow steam towards both ends.

- iv. Remove condensed steam collected in the tank barrel and keep the barrel exposed to atmosphere for another 24 hours.
- v. Ascertain if the tank barrel is free from gas fumes. This may be done as follows:

(a) AMMONIA TANK BARREL

Fill the tank barrel with water and take a specimen of the same in a clean glass bottle since ammonia is readily soluble in water. The specimen of water should be tested for any traces of ammonia with red litmus paper. Any trace of ammonia in water would turn red litmus blue. Another very sensitive method known as Nessler's test may be applied to find out if the specimen of water contains any traces of ammonia. In this test, the reagent used is a solution of potassium mercuric iodide with potassium hydroxide. This reagent gives a brown colour when mixed with the specimen of water containing even a minute trace of ammonia.

If ammonia is detected, empty out the tank barrel and refill with fresh water. This process may be repeated till the tank barrel is free from ammonia traces completely.

(b) CHLORINE TANK WAGONS

Fill the tank barrel with water and take a specimen of the same in a clean glass bottle. Since chlorine is readily soluble in water, specimen of water taken out should be tested for any traces of chlorine. Any trace of chlorine in water would have a bleaching effect on coloured litmus paper. If chlorine is present, the tank should be repeatedly emptied and refilled with fresh water till free from chlorine traces completely.

(c) LPG TANK WAGONS

A clean bottle filled with fresh water is lowered through the manhole. A string is attached to the bottom of the bottle before lowering. Tilt the bottle at the bottom of the tank to allow its water to flow out and the gas in the tank to take its place. The bottle should be left in this position for about 5 minutes and then withdrawn away from the tank. A lighted match stick should then be brought near the mouth of the bottle or applied to the air or gas inside and bottle. If there is no flame the tank is free from injurious gas. But, in case it gives out a flame, the tank should again be steam cleaned.

After ascertaining that there is no trace of gas in the barrel the tank should be dried out by blowing in hot compressed air before proceeding with inspection and repairs.

1003. STEAM CLEANING OF BITUMEN AND MOLASSES TANK WAGON

The procedure for steam cleaning of these barrels is as under:

- A) Close the manhole cover and open bottom discharge valve.
- B) Pass steam through the air inlet valve for sufficient time till the bitumen melts and drains away through the water discharge valve. The bitumen should be collected in containers and not drained out on the floor.
- C) Open the manhole cover to see whether the tank is completely clean from inside. In case any residue is left behind the above procedure should be repeated.
- D) Remove heating arrangement i.e., heating pipe, internal pipe, etc. from the tank. Clean inside surface of the heating pipe by scrapping the carbon layer with wire brush or other suitable process. Blow in air under pressure from one end.
- E) The outer surface of the heating pipe should be cleaned with kerosene oil.

1004. CLEANING OF TANKS FOR CORROSIVE LIQUIDS

A. Hydrochloric acid tanks: Open the manhole and the washout covers and start cleaning the barrel with water. Initially the water coming out of the washout opening will show excessive acidity which will turn blue litmus paper red. The washing should be continued till blue litmus paper shows no change. The washout cover should be refitted and the tank wagon filled with water. A sample of the water in the tank barrel should be taken out in a bottle and its reaction on litmus paper tested. The water should then be drained out. The tank wagon is now ready for internal inspection and repairs.

B. Sulphuric acid tank barrels : Sulphuric acid tank barrels should be washed with 1/2 to 1% solution of sodium phosphate commercial or half percent solution of soda ash so as to neutralize the sulphuric acid. This washing may be done as soon as possible after receiving the wagon in workshops. Since concentrated sulphuric acid absorb moisture when left open to moist air, the acid will in drop in concentration with time. It is to be remembered that dilute sulphuric acid is highly corrosive and thus, as the acid absorbs moisture, it will attack the tank barrel more vigorously. Freedom from presence of sulphuric acid can be ascertained with the help of litmus paper (if blue litmus paper turns red, the liquid contains acid). Now, rinse the tank with water, clean and dry.

Caution: As addition of water to sulphuric acid will produce intense heat, resulting in splashing due to generation of steam, the solution of commercial sodium phosphate should be added or spread gradually and with care.

C. Caustic soda tanks: These barrels should be washed free of alkalinity with hot water. Freedom from alkalinity can be easily ascertained by litmus test (if red litmus changes to blue, there are still traces of alkalinity). After it is free from alkalinity, water should be drained and barrel dried out before inspection and repairs.

1005. INSPECTION OF TANK BARRELS

A. Generally tank barrel defects will be indicated by hydraulic test but it is necessary to inspect the barrel before hydraulic test so as to avoid accidental rupture of corroded barrel plates at the time of hydraulic test. The barrel should be examined by a competent inspector nominated by the CME, who must examine the interior of the barrel and the internal fittings for their general condition and freedom from wasting, wear, tear and damage. Measure barrel thickness by D-meter to ensure extent of corrosion. If the examination indicates that the corrosion/erosion has taken place to such an extent that the barrel is likely to rupture during hydraulic test, first carry out the repairs and then give a hydraulic test.

B. Inspection of rubber lining

Hydrochloric acid tank wagons are fitted with rubber lining inside the barrel. The procedure for inspecting this rubber lining is as follows:

- i. The barrel and its fittings are rubber lined, in accordance with code of practice for rubber lining of hydrochloric acid tank barrel.. This lining should be subjected to an examination every six months.
- ii. While inspecting the barrel, lining defects such as dents on the surface, cracks, damages as well as embedding of foreign bodies should be particularly noted.
- iii. It should be ensured that there are no pin holes in the rubber lining by examining the entire surface with suitable high frequency test electrodes.
- iv. It should also be ensured that there are no crevices and peeling at the joints of the rubber sheets.
- v. In cases where the condition of the lining causes doubts in respect of soundness, the firms specializing in rubber lining should be contacted for examination and necessary repairs/rectification.
- vi. The rubber lining can perish if heat is applied externally to any part of the barrel. This should be borne in mind in the context of repairs by welding.

1006. TESTING OF BARREL

- A. Ensure that all filling lines with low pressure and other appurtenances, which should not be subjected to the test pressure, are disconnected.
- B. The tank barrel and manhole orifice should then be completely filled with water at a temperature which must not exceed 38 Deg.C (100 Deg.F) during test. The barrel should be vented to prevent formation of air pockets while it is being filled. Before applying pressure, the equipment should be inspected to see that it is tight. The tank barrel should be tested by using a power driven hydraulic pump which should enable a steady increase of pressure in the tank barrel. Test pressure should be maintained for a sufficient length of time to permit a thorough examination of the barrel for any leaks.

For the purpose of this test, connection is to be made through a dummy flange with pressure gauge attached, fitted on the safety valve seating. The filling, discharge and gas valve should be tested in position on the tank in following two ways:

- a) With valves closed and outlet cap off, and
 - b) With valves open and outlet cap in position.
- C. In case of any sign of leakage that may be evident from the drop in pressure under hydraulic test, the pressure should be reduced by 20%. The lagging and insulation is removed for locating leaks. The welded seams of the tank barrel should be given a thorough hammer test by striking the plates on both sides adjacent to the weld. The plate should be struck at intervals of about 6" for the whole length of all main welded seams.
 - D. The hammer used for the above test should be of a material softer than the barrel plate and its edges so rounded as to prevent denting of the barrel plates. The weight of the hammer should not exceed 5 Kg.
 - E. The pressure should then be raised to the full test pressure and maintained for a sufficient length of time, but not less than 30 minutes. Inspect all seams and connection.
 - F. The tank barrel should remain secured to the underframe during this test.

1007. BARREL TEST PRESSURE

The testing pressures for different types of wagons are given in the following table:

Description	Mech.Code	Hydraulic test pressure
Chlorine tanks	TCL	43.7 Kg/cm ² (623 lbs/sq.in)
Ammonia tank	TAL,BTAL, BTALN	56.23Kg/ cm ² (800 lbs/sq.in)
LPG tank	TPGL/TPGLR, BTPGL,BTPGLN	23.7 Kg/ cm ² (337 lbs/sq.in)

1008. TESTING OF TANKS USED FOR CORROSIVE LIQUIDS

- A) The procedure for testing sulphuric acid tanks (TSA and MBTSA) and caustic soda tanks (TCS,BTCS) is the same as that given for tanks as pressure vessels above except that their testing pressure would be 4.22 Kg/cm² (60 lbs/in²)
- B) No hydraulic test should be done on a tank wagon, which is rubber lined. Such tanks should only be subjected to pneumatic test at a pressure of 2.1 Kg/ cm². The pressure should be watched for a minimum period of 10 minutes. Drop in pressure will indicate leakage through rubber lining and barrel.

1009. TESTING OF TANK WAGONS USED FOR PETROL AND MIDDLE DISTILLATES OF PETROLEUM AND VEGETABLE OIL

The following procedure should be followed for hydraulic test of petrol tanks:

- A) Remove the safety valve from its seating and fill the tank completely with water. Provide connections with the hydraulic pump through the safety valve opening. Close the manhole cover and fully tighten it. It should be ensured that the bottom discharge valve is properly closed before filling the barrel with water. The pressure should be increased gradually by means of a hydraulic pump provided with a pressure gauge. Close the control cock as soon as the pressure reaches 2.1 Kg/ cm² (40 PSI). Watch the pressure for a minimum period of 5 minutes.
- B) In case of leakage (which will be evident from the drop in pressure under hydraulic test), the joints should be checked first and made tight. Thereafter, the well seems of the tank barrel should be examined thoroughly by applying soap solution, which will show up the crack or other source of leakage.
- C) A similar procedure should be adopted for hydraulic testing of bitumen tank wagons except that in this case the top outlet pipe should be suitably dummied before applying any pressure. If leakage is noticed even after the joints are found satisfactory, an examination of the barrel after removal of the lagging will be necessary. Insulation should be opened only after making sure that leakage is through the tank barrel.

1010. REPAIRS TO TANK BARRELS BY WELDING

A. Pressure vessels

Pressure vessels requiring repairs should be inspected by a competent authority approved by Chief Consultative Explosives. A workshop undertaking such repairs must be properly equipped for the same and facilities for radiographic examination of the repaired joints must be available. The detailed procedure for repairs of pressure vessels is given in Appendix – IV.

B. Tanks for transport of corrosive liquids

- i. Tanks used for transport of corrosive liquids suffer most, commonly from pitting and also have a tendency to develop cracks. Pits when not deep enough to affect the strength of the parent plate may be chipped to sound metal welded and then ground flush to the original thickness of the plate. When pits are in a close group or in one straight line and are deep enough to affect the strength of the plate, the affected area should be cut out and replaced with a let in patch.
- ii. Cracks should be fully explored to ascertain their extent. The crack may be on surface or in full depth of the thickness. If possible, a portable magnetic crack detector should be used. Such detector are manufactured in the country and are a very useful piece of equipment for every railway

workshop. In absence of crack detector, dye penetration test shall be performed to ascertain extent of crack. A 12mm dia hole should be drilled at the ends of the crack and the full length of the crack should then be carefully chipped and C grooved for welding. Removal of all paint, grease, oil, dirt etc. by frame heating and brushing is essential both for the purpose of proper inspection and to prevent contamination of the welded joint. Perform DP test and then do welding..

- iii. After completion of welding from one side, the other side of the crack should be grooved, cleaned and welded. It is preferable if the welding is done from the inside of the barrel and is in the down hand/horizontal position. Flush ground the welded position and perform DP test along the weld.
- iv. If a crack occurs in an area where the plate is wasted and of inadequate strength, the defective portion should be cut out and replaced with a let in patch. It must be ensured that the let in patch is of the same material and thickness as the parent metal. Corners of patches should be rounded to a minimum radius of 25mm and edges must be carefully prepared to obtain a V butt weld. Weld deposits should be smoothed flush with the parent metal. Perform DP test and radiography of barrel plate.
- v. Rubber lined barrels should be repaired in the same manner as described above and then relined with rubber.

C. Tanks for petrol, middle distillates of petroleum, vegetable oil etc.

The repair procedure will generally be same as described above.

D. Welding procedure and technique

- i. Only approved brands and grades of electrodes should be used. Lists of such approved brands and grades are published by RDSO every year and these should be available in all workshops and repair depots for reference and guidance.
- ii. Welding should be as possible done in the down hand position. Welding current (also polarity if direct current is used) should be set as recommended by the electrode manufacturer.
- iii. Transverse speed of the electrodes should be controlled to obtain proper fusion of the parent metal.
- iv. After every interruption of the arc, welding should be restarted ahead of the previous deposit and then moved back to fill the crater before proceeding forward again.
- v. Care should be taken to remove slag before depositing successive beads.

E. Welding of stiffening plate.

Weld reinforcement should be made flush with the parent metal of the tank barrel for welding a stiffening plate.

First, tack weld the stiffening plate in the position as below. Stiffening plate to be fitted from out side only. They should be welded with the angle in the case of old design of “TPR” wagons having the bearing plate inside. In case of new designs having both angle and bearing plate outside, weld with the existing bearing plate. The welding should be completed as shown in Fig. 10.1.

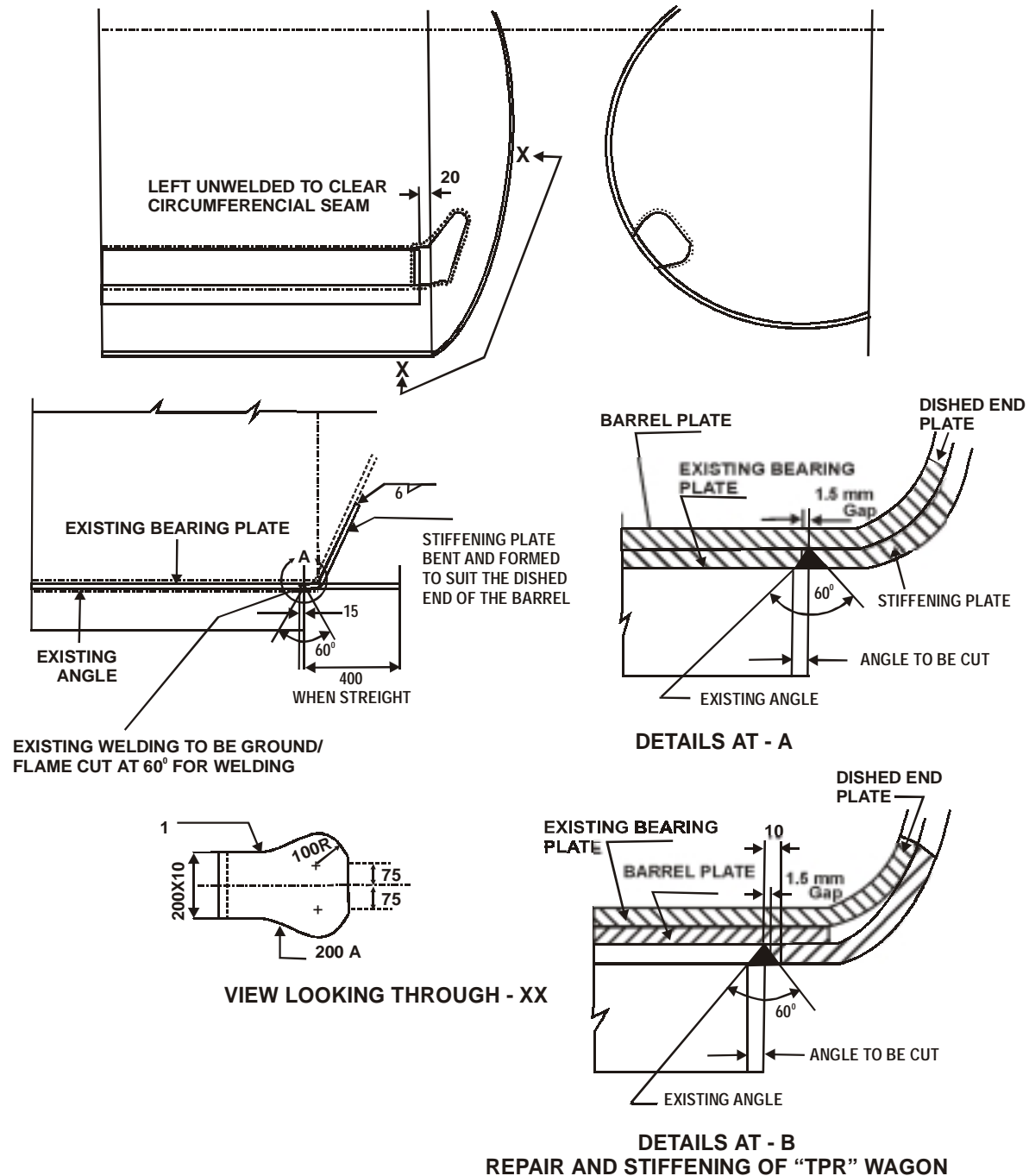


Fig. 10.1 : TANK WAGON WITH BEARING PLATE OUTSIDE

1011. REPAIRS AND TESTING OF TANK BARREL MOUNTING FITTINGS

A. Fittings of pressure vessels

a) Safety valve

The safety valve should be given a pneumatic test. It must be vapour tight against leakage at pressures indicated in Table 10.2.

The safety valve adjustment should not be interfered with unless repairs to the valve become necessary or the valve operates incorrectly. In such cases, it must be repaired, correctly adjusted and re-tested at the pressure specified.

b) Packing and seals must be particularly checked for leaks, and those found defective or damaged, perished, should be changed. The packing should be of correct material and size/shape.

Since deteriorated seals and dirt on the seals are the most frequent cause of leakage, the seals should be given careful attention. Changing of resilient seals of liquified petroleum gas tank wagons type TPGL & BTPGLN, when the vessel is under pressure within 10 pounds of the operating pressure of the valves, should not be attempted.

c) Other fittings of pressure vessels:

- i. Apart from the safety valve, each type of mounted pressure vessel has its own special fittings. The fittings are specific for each type of vessel and details regarding their examination and maintenance are contained in instructions pamphlets published by the RDSO for the respective wagons.
- ii. Items to be particularly checked for defective, damaged or perished packing. “O” ring, “V” ring and lead seals. Asbestos packing or rubber packing is commonly used depending upon the type of vessels and commodity carried. V rings are pressure seals, which expand on application of pressure to remain leak proof.
- iii. The various valves and fittings of these vessels are usually designed to give long periods of trouble free service and should not ordinarily require any maintenance other than cleaning. However, if a fitting become defective, it would be desirable to consult the manufacturer. Most of these valves and fittings are specialized pieces of equipment, made of special materials. Substitution by components made of incorrect materials or to wrong tolerances could have undesirable repercussions.
- iv. The main fittings are two liquid education valves, a vapour education valve, a safety valve, a slip tube for determining liquid level, a pressure gauge, a thermometer well and excess flow valves which control the rate of flow through the three education valves.

B. PRESSURE GAUGE

In view of the possibility of pilferage/damage, the pressure gauge should be fitted only when required at the time of filling or discharging, or when the pressure is to be checked enroute. It should be removed before releasing the tank wagon. The necessary valve and fittings for attachment of the pressure gauge are provided on the manhole cover plate.

1012. FITTINGS OF TANKS FOR CORROSIVE LIQUIDS

- A) Pressure relief valve/safety valve: These valves should be given a pneumatic test at the pressures indicated in the table 10.2.
- B) Safety vent with frangible disc: The safety vent should be provided with rubber lining of 5mm (3/16") and closed with a frangible disc which should rupture at a pressure not exceeding 3.2 Kg/cm² (45 lbs/sq.in) for a working pressure of 3.1 Kg/cm² (30 lbs/sq.in). The ruptured frangible disc indicates that excessive pressures have been built up in the tank wagon and may be the first sign of malfunctioning of the safety valve. The cause needs to be investigated and removed. A ruptured frangible disc should be replaced by a new frangible disc, conforming to the required specification.
- C) Globe valves/compressed air valves/washout valves: All these valves should be tested on a bench by applying hydraulic pressure by means of a pump and it should be ensured that they are leak proof at the pressures of individual wagons mentioned under "Testing of the Barrel" in para 1008 above. Leaky valves should be attended for defects before fitting body on the tank.

1013. FITTINGS ON TANK WAGONS OF PETROL, OTHER INFLAMMABLE PRODUCTS, VEGETABLE OIL ETC.

- A) **Safety valve** : These valves are provided on petrol tank wagons and bitumen tank wagons. The safety valves should be subjected to pneumatic test after repairs/POH at the pressure given.
- B) **Master valve**: Wherever repairs to the master valve and its seating are undertaken, after filling the valve should be tested in position under air pressure of 0.35 to 0.56 Kg/ cm² (5 to 8 psi), the tank barrel being filled with water to a minimum height of 150 cms. The hydraulic test should be carried out keeping the bottom discharge valve and blank flange open.
- C) **Bottom discharge valve** : The bottom charge valve should also be tested in position under air pressure of 0.35 to 0.56 Kg/ cm² (5 to 8 psi) after filling the tank barrel with water to a minimum height of 150 cm. Master valve should remain open during this test. This test to be done after satisfactory testing of the master valve.
- D) **Blank flange** : The blank flange should be tested in the same manner as the master valve and bottom discharge valve after ensuring that a gasket of specified material has been fitted underneath.

1014. HEATING ARRANGEMENT OF TOH TANK WAGONS

The heating arrangement of tank wagons meant for carrying heavy oils, namely residual fuel oil, LSHS oil, pitch, etc., should be subjected to a hydraulic test at a pressure of 14 Kg/ cm² maintained for about 15 minutes. In case of any leakage (which will be evident from drop in pressure under this test), the joints of the pipe system should be checked. The defect should be located and rectified.

1015. TEST REPORTS AND RECORDS OF INSPECTION

Re-tests of all tanks, safety valves and rubber lining must be certified by the official making the tests and records maintained in the office of the CME. Certification must show railway initial, number of tank wagon, pressure to which tested, date and place of test, etc. A copy of the certificate may be submitted to the party owning the tank wagon in the case of private or dual owned tank wagons.

The testing authority must maintain detailed records of the tests carried out on each individual tank wagon.

A special report must be submitted to the CME concerned in every case where the maximum permissible working pressure is reduced or the examination shows that the tank can not continue to be used with safety unless certain repairs are carried out immediately or within a specified time. Such a tank wagon must not be commissioned in service till it is certified fit for use after repairs and re-testing under specified pressure by the testing authority.

The testing authority competent to test the barrel, safety valve and rubber lining under the above clause is to be nominated by the CME.

1016. IMPORTANT MODIFICATIONS

The important modifications to be carried out in workshops and depots are given in Table 10.4.

1017. PAINTING AND LETTERING

Full schedule of painting and lettering following as per standard practice as given in Corrigenda No. 5 & 6 to IRS specification No R.6-59 as supplemented by the diagrams issued by RDSO for each such type of wagon. The test particulars must be marked at the prescribed places on the tank wagon. In case of tanks used for acids the external surface of the tank barrels should be printed with an acid-resistant paint to prevent external corrosion.

TABLE 10.4
LIST OF IMPORTANT MODIFICATIONS TO BE CARRIED OUT

Sr. No	ITEM DESCRIPTION	RDSO REF.	TO BE DONE IN			
			SICK LINE	ROH	POH	NEW BUILT
1.	Conversion of Centre Pivot top arrangement from bolted to riveted design on a) BCNA/BRN wagons b) BTPN wagons c) BOXN/BCN wagons	MW/PLNG/CSNB Dt. 3.5.94 & MW/BTPN Dt. 18.7.94 & MW/ BOXN/MAINT Dt. 28.6.93.	No	Yes	Yes	Yes
2.	Modification to blank flange arrangement on BTPN	MW/WT Dt. 23.12.93.	No	No	Yes	Yes
3.	Modification to brake gear in BTPN wagon to prevent breakage/bending of pull rod.	MW/BTPN Dt. 3.1.94.	No	No	Yes	Yes
4.	Modification to BTPN empty/load spindle bracket.	MW/BTPN Dt. 1.11.94.	No	No	Yes	Yes
5.	Modification of main pull rod to prevent hitting with T pipe on BTPN wagons	MW/BTPN Dt. 9/10.5.96.	No	Yes	Yes	Yes
6.	Modification to securing of dome arrangement of BTPN wagon.	MW/BTPN Dt. 6.6.97.	No	No	Yes	Yes
7.	Modification to anchoring tee joint on BTPN wagons.	MW/BTPN Dt. 24/26.8.98.	No	Yes	Yes	Not applicable

Specification of the paint should be generally as follows Ready mixed paint brushing bituminous black lead free acid alkali water and heat resisting for general purpose to specification IS 158-1960 while using these paints care should be taken to prepare the surface properly so that all rust loosely adherent scale and dirt are removed by means of metal scraper suitable hammer and wire –brush . Grease oil etc if present should also be removed with white spirit or other suitable solvent. In case of tanks already used for carrying acid care should be taken to wash down the surface with water to remove all traces of acid and to ensure that the surface is dry before application of paint.

1018. EXAMINATION AND REPAIR OF TANK WAGONS BY JUNIOR ENGINEER (C &W) AT SICK LINE & BASE DEPOT

- A) Any repairs to tank barrels should be done only at nominated sick lines where facilities for steam cleaning are available. After repairs, the barrels and valves must be tested to ensure that there is no leak. Safety valves must not be permitted with any nut or bolt deficient from sickline. The tank wagon discharge valves blank flange and manhole covers should be secured with full complement of bolts and nuts whenever the tank wagons are empty or taken out of sickline. Whenever tank wagons containing petrol or other inflammable fluids are examined, only specified safety torches (battery torches) should be used for this purpose.

- B) Before any repairs are commenced on such stock, due precautions must be taken to remove all such petroleum and other inflammable fluids as required under IRCA red tariff and special instructions issued by the railway/railway board from time to time. These precautions must be observed on empty tank wagons also and no staff should be allowed to enter the tank or to bring naked light or matches near it till the tank has been steam cleaned and tested free of vapour.

The following simple checks should be carried out by train examining staff before a tank wagon is certified fit for loading:

- a. **Master valve** : Leakage of master valve should be checked while keeping the bottom discharged valve open.
- b. **Bottom discharge valve** : Proper functioning and fluid tightness of the bottom discharge valve should be ensured.
- c. **Blank flange** : The blank flange of the correct thickness made out of steel plate and with a gasket of proper material between the blank flange and bottom discharge valve flange should be tightened by six bolts and nuts.
- d. **Tank barrel** : Tanks with cracks on barrels should be marked sick.
- e. **Leaky tank barrels** : The leakage of tank barrels may be caused due to one or more of the following reasons:
 - i. Mechanical injury to the valve face and/or valve seat as a result of foreign material, particularly nuts and bolts finding their way inside the tank wagon.
 - ii. Valve seats not properly secured to the stool by proper interference fits.
 - iii. Mal functioning of master valve.

1019. PRECAUTION WITH LEAKY TANK WAGONS

A. **TCL,TAL,BTAL, BTALN tank wagons**

Chlorine and ammonia gases are poisonous gases and have a characteristic pungent odour, which gives warning of their presence in the atmosphere before dangerous concentrations are attained. In the case of chlorine gas, the greenish yellow colour of the gas makes it visible when high concentrations are present. In the case of ammonia, if sufficient concentration of the gas is present in the atmosphere, it will irritate the eyes and the respiratory system. As such, in the event of leakage, all present in the vicinity should be warned to keep on the wind ward side of the leak.

B. **TPGL, TPGLOR, BTPGL & BTPGLN tank wagon**

Action in any particular case will depend upon existing conditions, and good judgement will be necessary to avoid disastrous fires on one hand and useless sacrifice of valuable property on the other hand:

- a. When a tank wagon is leaking, all flames or fires near it should be extinguished or removed. No smoking should be allowed. Spectators should be kept away. Only battery operated torches or incandescent electric lights with gas proof sockets should be used.

- b. Oil lanterns or signal lamps necessarily used for signaling must be kept far away and at as high an elevation as can be obtained from the tank and on the side from which wind is blowing. The vapour will go with the wind, not against it. The ash pan and fire boxes of steam locomotive are sources of danger especially when wind is blowing across the leaking tank towards them. The locomotives be moved away from the site and ash pit fires be extinguished with water.
- c. The leaky tank wagon should be removed as quickly as possible to an open area where the escaping gas will be less hazardous.
- d. Earth should be spread over any surface on which the LPG has leaked out in liquid form.
- e. A leaky tank, which has been emptied, should under no circumstances be sent to the loading point and should be suitably stenciled as such. A leaky tank wagon must only be dealt with in a fully equipped mechanical workshop.
- f. Recommended procedures to stop leaks in dome fittings:
 - i. The liquid outlet valves face each end of the tank wagon, while the vapour outlet valves face the sides of the wagon. If there is leakage around the valve hold down bolts, tighten the bolts until the leakage stops. If leakage persists, isolate the tank wagon and notify the oil company concerned.
 - ii. If there is any indication of leakage around safety valve, which is in the centre of the dome, it should first be checked whether the valve is merely performing its function, i.e., relieving excess pressure. However, if considerable flow of gas is evident, isolate the tank wagon and notify the oil company concerned.
 - iii. If there is leakage from the outlet of the valve, turn the valve handle by hand, if it does not stop leaking, the seat is defective. Do not try to use a wrench but insert and tighten the plug attached by a chain to the valve.
 - iv. If there is any leakage out of the thermometer well, the only thing that can be done is to tighten the plug. If the leak cannot be stopped, by tightening, isolate the wagon and notify the oil company. **DO NOT TAKE THE PLUG OUT FOR LAPPING OF THE THREAD.** The thermometer well is, in fact, a part of the shell of the tank, and if there is any evidence of leakage from the thermometer well, a bad situation is indicated. If the plug is removed when leakage is present, liquid will probably be discharged with a consequent extreme hazard.
 - v. A high percentage of any leaks that might occur will be in the gauging and sampling devices. The sampling valve is a part of a fixed line to the bottom of the tank. The valve on the gauging device (slip tube) must be used in gauging the volume of the liquid in the tank wagon. It is open while moving the gauge down to find the liquid level. Once the liquid level is found, the valve should be closed. In both cases, a turn of the shut off valve handle will probably stop any leakage that might be occurring through the valve. However, on the slip tube, which is moved up and down to determine the liquid level, there is a packing gland, which is subject to wear. If the leak is occurring through this packing gland, tighten the packing nut until the leak stops.

- vi. The Junior Engineer (C&W) staff must be most careful that liquefied petroleum gas does not get on their skin. The effect is substantially the same as when dry ice comes in contact with the skin viz. freezing. The white fog of its discharge can distinguish liquefied petroleum gas while liquid can only be distinguished by careful viewing. In many cases, soapy water must be used to locate liquid leaks because they are not readily visible.

C. All other types of tanks

No leaky tank wagon should be allowed in service and such tank wagons should be attended in properly equipped sick line and/or shops.

1020. PRECAUTIONS TO BE TAKEN AT LOADING AND UNLOADING POINTS (TANKS AS PRESSURE VESSELS)

- i. Ensure that the tank is loaded/unloaded under supervision of a responsible and competent person and all precautions taken by him to see that the persons engaged in the filling/discharging operations are properly protected against the poisonous gas contaminated atmosphere. A list of precautionary measures to be taken by the staff must be exhibited at a conspicuous place near the installation. The loading/unloading connections must be securely attached to the pipe line before valves are opened.
- ii. Ensure that the tank to be loaded/unloaded is placed in position, preferably under shade, and secured properly against any movement. The handbrakes must be put on and hand brake lever secured in that position.
- iii. Shunting of any kind of the tank under loading/unloading must be strictly prohibited.
- iv. Ensure that points leading to loading/unloading line on which the tank is to be loaded/unloaded are set and pad locked so as to isolate the line on which loading/unloading is to be done. If loading/unloading is to be done at one end of a long siding, it must be protected properly by a scotch block or other authorized device so as to prevent any wagon dashing against the tank wagon. It must also be ensured that shunting is not permitted on the same line when loading/unloading is being done.
- v. Ensure that signs are exhibited at a suitable distance away from the tanks on the approach end or both ends as applicable.
- vi. Ensure that the tank is filled by connections to the liquid valves, which have dip pipes to the bottom of the tank. The other gas valve is connected to the absorption system of the chlorine plant or Ammonia plant. In the case of TPGL tanks, two liquid valves are provided for loading/unloading of the tank. The rate of flow of LPG liquid becomes too great in case only one liquid line is provided and this may result in the excess flow valve (provided inside the pipes below the diaphragm plate) closing off. Use of only one valve may result in closing down of excess flow valve repeatedly.
- vii. The tank should not be loaded beyond its marked capacity under any circumstances.

- viii. Tank wagon(s) must not be allowed to stand with loading/unloading connections attached after loading/unloading is completed.
- ix. Throughout the entire period of transfer operations or while the tanks connected to loading/unloading devices, the tank(s) must be continuously attended to by the operator.
- x. If it is necessary to discontinue transfer operations for any reasons, all loading/unloading connections must be tightly closed and closure of all other concerned components strictly ensured.
- xi. On completion of filling operation, the valves should be properly closed and dome cover sealed. The caution signs should then be removed and padlocks on the points opened to enable the tank(s) to be taken out for attaching to trains.
- xii. The loading of pressure gas tank wagons must be carried out by using a gas compressor i.e. the compressor will be connected to the gas valve on the tank. The liquid valve on the tank will be connected to the storage tank. By ensuring that the pressure in the tank barrel is about 10 lbs/sq.in (gauge) above the pressure in the storage tank, the liquid gas will discharge itself. To avoid reverse siphoning of the liquid gas into the tank barrel, the above pressure must be maintained inside the barrel till such time the whole contents are discharged.
- xiii. While discharging, the pressure inside the tank barrel should be maintained steady so as to avoid any chance of sudden evaporation and consequent chilling of the barrel plates.
- xiv. When all the liquid gas has been transferred, which will be indicated by the level ceasing to rise in the storage tank, the liquid valve on the tank must be closed.
- xv. All tools and implements used in connection with transfer operations must be kept free from oil, grease, dirt and grit.
- xvi. Seals and other substances must not be thrown into the tank. Care must also be taken to avoid spilling of the contents over the tank.

1021. LOADING AND UNLOADING CORROSIVE LIQUIDS (TSA, BTCS & TCS TANK WAGONS)

- i. Only concentrated sulphuric acid of concentrations 80% or 85% and above is to be loaded in a TSA wagon. Dilute sulphuric acid of lower concentrations if loaded will corrode the tank since the latter is unprotected/unlined from inside. No chemical other than concentrated sulphuric acid should be loaded in a TSA wagon. Caustic soda lye (liquor) having specific gravity of 1.51 at 15⁰C or a concentration of not less than 48% and containing not more than 3% of any chloride and no free chlorine, is loaded in the caustic soda tanks type BTCS & TCS.
- ii. Before loading it should be ensured that the tank barrel and washout valve is free from any leaks and the dome cover fits airtight. A leaky tank wagon should not be allowed to run on line and it should be suitably marked for repairs after unloading. Dome fittings should be inspected for leaks and other defects before unloading to avoid acid spillage or spraying.

- iii. An air space of not less than 5% of the capacity of the tank should be left. When higher concentrations are filled, it should be ensured that tank wagon is not overloaded beyond its carrying capacity in tonnes.
- iv. All empty tank wagons should be securely closed airtight as sulphuric acid is self-diluting and absorb moisture from atmosphere. Dilute sulphuric acid is highly corrosive to mild steel.
- v. During the loading and unloading operations, caution signs must be exhibited at a suitable distance away from the tank on the approaches at both ends.
- vi. Smoking or bringing a naked flame or lamp near TSA wagons is strictly prohibited. An incandescent electric light with gas proof socket should be used.
- vii. At the time of loading/unloading, the tank wagons should be protected by means of scotch blocks or other suitable devices to prevent any risk of damage due to inadvertent shunting.
- viii. Steel spanners/tools should not be used as they may cause sparks on striking, Brass tools may be used.
- ix. All spillage of acid should first be neutralized by means of hydrated lime and washed down the drain with an adequate supply of water.
- x. The tank wagon has a top discharge arrangement. For loading the tank it should be connected to an air compressor through the globe valve and it must be ensured that the pressure in the tank does not rise above 30 psi. The discharge pipe should be connected to the designated line after removal of the blank by means of a suitable flange after inserting a rubber gasket/lead lining. The gasket/lead lining prevents spillage of acid on the tank barrel.
- xi. The filling in of the tank wagon is also effected through the discharge pipe by connecting it to the consignee's acid supply pipeline by means of a suitable flange after inserting a rubber gasket/lead lining. During the filling in operation, the globe valve/air compression valve should be in open position to permit exit of air from the tank.

1022. LOADING AND UNLOADING OF TANK WAGONS

- i. Hydrochloric acid has a characteristic pungent odour, which gives warning of its presence. All unprotected contact with the hydrochloric acid fumes should be avoided.
- ii. No chemicals other than hydrochloric acid should be loaded in THA type tank wagons.
- iii. Adequate supervision of filling and emptying of wagons is necessary to ensure that this is done in an authorized manner only.
- iv. The filling should be done from the filling and discharge pipe. This pipe is provided with a rubber lined flange. A corresponding flange should make the connection to the acid supply line after inserting a rubber gasket between the filling flange and the supply flange. The gasket prevents spillage of acid on the tank barrel and would also prevent damage to the rubber lining on the filling/delivery flange.
- v. In order to give vent to the air inside the tank barrel, the air flange should be removed for the filling operation.

- vi. The decanting should be done after connecting the delivery pipe to the discharge flange. Connecting with the help of a suitable flange using a rubber gasket should do this.
- vii. The air pipe flange should be removed and a pneumatic line should be connected to the air pipe, by means of a suitable flange after inserting a rubber gasket.
- viii. The pneumatic pipeline should be connected to a pneumatic system wherein the pressure in the line cannot exceed 1.75 Kg/cm² (25 psi). This is done to prevent damage to the tank barrel.
- ix. After the tanks have been unloaded, they should be filled with clean water at a temperature not exceeding 38⁰ C (100⁰ F). This is done to prevent deterioration of the rubber lining as the rubber decomposes in presence of air.
- x. All spillage of acid should be washed down the drain with an adequate supply of water. If the spillage is excessive, the acid should first be neutralized by means of hydrated lime.

1023. PRECAUTIONS FOR TANKS FOR PETROLEUM AND OTHER INFLAMMABLE PRODUCTS

A. At loading points

- i. Ensure that all tank fittings are in good working condition.
- ii. Ensure that tank fittings are provided with requisite anti-pilferage devices.
- iii. Ensure that the safety valve is intact and properly sealed.
- iv. Ensure that the master valve is fluid tight.
- v. Ensure that the bottom discharge valve is fully closed and fitted with a blank flange and gasket before commencement.
- vi. Ensure that the vapour extractor cock and vent plug are open before commencement of loading.
- vii. Ensure that loading is done through the filling pipe only.
- viii. Ensure that recommended air space as specified for the particular petroleum product is provided and that payload does not exceed the permissible limit.
- ix. Remember to close the vapour extractor cock after loading.
- x. Remember to fit the cap on the vapour extractor cock after loading.
- xi. Remember to fit the cap on the filling pipe after loading.
- xii. Ensure closure of the vent plug cock after loading.
- xiii. Provide proper sealing when dome cover eye bolt nuts are tightened.
- xiv. Make sure that the dome cover is closed after loading.

B. At unloading points

- i. Close the master valve after unloading.
- ii. Close the bottom discharge valve after unloading.
- iii. Fit the dummy flange with gasket and all its bolts back in position after unloading.
- iv. Close the dome cover after unloading.

- v. Tighten eye bolt nuts of dome cover after unloading.
- vi. Do not allow rough, hump or loose shunting.
- vii. Do not allow unauthorized persons to operate valves.
- viii. Do not allow any person to enter the tank barrel for internal examination/repairs unless the barrel has been steam cleaned.
- ix. Do not undertake repair of the tank barrel by welding unless it is properly steam cleaned.
- x. Do not start welding repairs on a tank wagon fitted with roller bearings unless the barrel is properly earth and roller bearings are short circuited.
- xi. Do not allow tank wagon to move from loading/unloading points unless the tank fittings are properly refitted and dome cover closed.

1024. PRECAUTIONS FOR BITUMEN TANKS

A. Loading

- i. The tank wagon offered for loading must be examined for any signs of leakage through the gaskets or flange stud holes. Tank wagons having any signs of leakage should be rectified before being offered for loading bitumen.
- ii. Place the wagon at the proper loading point and ensure that the bottom discharge valve is properly closed. Load the bitumen through the manhole cover. Fill the tank to about 1/3rd of its capacity and then stop loading for about half-an-hour. Check for leakage through the studs or gaskets provided at the end of the barrel, if any. Tighten the nuts all this stage if leakage is noticed through the gaskets/stud holes.
- iii. Start loading again upto marked capacity. Close the manhole cover tightly.

B. Unloading

The wagon to be unloaded should be placed as near as possible to the storage tank in which it has to be unloaded. Open the mouth of the internal pipe and fix the burner centrally on the flanges. Ignite the burner and adjust the flame suitably for correct combustion to get a long blue flame. After heating for half-an-hour, check if any leakage is noticed through the studs and gasket provided at the end of the barrel. Tighten the nuts to stop the leakage. Check leakage from the bottom discharge valve. If leakage is found, close the valve tightly. Heating should be continued till such time the temperature rises to 150-160^o C. Stop the burners and connect the air inlet valve of the wagon to the compressor. The top discharge valve should be connected with the storage tank with proper sealing and tightening of the nuts to ensure against leakage through these connections. The man hole cover along with its sealing ring must be secured tightly to avoid leakage. Unloading of the Bitumen from the tank should be completed in one stretch. During unloading, compressed air pressure should be maintained between 12 to 15 lbs/sq.in. It should be ensured that the tank is completely drained of its contents before releasing it. After unloading, the cover plate on the mouth of the internal pipe should be refitted.

1025. MAINTENANCE AND REPAIR IN SICK LINE

- A) No person should be allowed to enter the tank barrel for internal examination/repair unless the barrel is free from noxious or inflammable fumes. Therefore, before internal inspection of barrel is allowed, it must be steam cleaned/washed with solution of sodium phosphate commercial or soda ash and washed with water or other suitable cleaning agent as prescribed in case of various types of tank barrels.
- B) Before any repairs are commenced on such stock, due precautions must be taken to remove all such petroleum and other inflammable fluids as required under IRCA red tariff and special instructions issued by the Railway/Railway Board from time to time. These precautions must be observed on empty tank wagons also and no staff should be allowed to enter the tank or to bring naked light or matches near it till the tank has been steam cleaned and tested free of vapour.
- C) Any repairs to tank barrels should be done only at nominated sick lines where facilities for steam cleaning are available. After repairs, the barrels and valves must be tested for leak. Safety valves must not be permitted with any deficient nut or bolt from sickline.
- D) The tank wagon discharge valves blank flange and manhole covers should be secured with full complement of bolts and nuts when the tank wagons are released from sickline.
- E) Whenever tank wagons containing petrol or other inflammable fluids are examined, only specified safety torches (battery torches) must be used for this purpose.
- F) In addition to routine attention to underframe, suspension, running gear, draw gear, buffing gear and braking gear, the following examinations and repairs to be done in sickline :-
 - i) Examination of tank barrels.
 - ii) Testing of discharge valves and barrels to ensure that there is no leak.
 - iii) Adjustment and examination of security fittings of safety valves
 - iv) Examination of tank barrel insulation where provided.
 - v) Examination of dome equipment
 - vi) Examination of barrel, cradles and fastening arrangements
- G) The checks as mentioned in para 1018 B must be carried out by train examining staff before a tank wagon is certified fit for loading.
- H) Testing of barrel is to be done as given in para 1006.
- I) Procedure for repairs of tank barrel to be followed as given in para 1010.
- J) The important modifications to be carried out in depots are given in Table 10.4.
- K) The painting and lettering to be done as given in para 1017.

1026. MAINTENANCE AND REPAIR IN WORKSHOP DURING POH

The periodical overhauling of IRS tank wagons should be carried out in fully equipped mechanical workshops. The periodicity of POH (refer IRCA Part III Rule 2.4.3) is given in Table 10.3. For various type of tank wagons, detailed maintenance procedure is given in RDSO publications listed in Table 10.5. The detailed procedure for repair of tank wagon pressure vessels is also described in Appendix-IV.

**TABLE 10.5
TANK WAGON**

Particulars	BG wagons	
	BTPN	BTPGLN
Mechanical code		
Description	Bogie Petrol Tank Wagon	Bogie Liquid Petroleum Gas Tank wagon
Length over head stock (mm)	11491	18000
Length over couplers (mm)	12420	18929
Barrel Dia (inside) (mm)	2850	2400
Barrel Length (mm)	11458	17994
Wheel Base(mm)	2000	2000
Bogie Centre(mm)	8391	12970
Journal Size(mm)	RB 144.5 Φ	RB 144.5 Φ
Journal Centre(mm)	2260	2260
Wheel Dia on Tread(mm)	1000	1000
Max.AxleLoad (t)	20.32	20.32
Tare(t)	27.0	41.60
Pay Load (t)	54.28	37.60
Gross Load (Pay+Tare) (t)	81.28	79.20
Ratio Gross Load/Tare	3.01	1.90
Loading Density (t/m)	6.54	4.19
Cubic Capacity (Cu/m)	70.40	79.48
Total Brake power Empty (Kg)	19742	34128
Total Brake power Loaded (Kg)	35035	34128

TABLE 10.6
MODIFICATION ON BTPN TYPE WAGON

Sr. No.	Item	RDSO Ref.
1.	Breakage/bending of pull rods	MW/BTPN dated 3.1.94 and 12-95
2.	Inadequate clearance between discharge pipe flange and pull rod on BTPN wagon	MW/BTPN dated 9/10.3.96
3.	Securing of dome arrangement of BTPN wagon	MW/TPN dated 6.6.97
4.	Anchoring tee and barrel cracks modifications	MW?BTPN dated 12/13.12.97
5.	Broken valve spindle nut Drg. No. WD-86081-S/1 item NO.14 (This is to be modified as per RDSO Drg. No. WD-7-8994-S/1)	MW/CS/BTPN dated 19.12.89
6.	In-sufficient length of spindle screw (item No. 10 of Drg. No. WD-86081-S/61) This is to be modified as per RDSO Drg. No. WD-8994-S/2	--do--
7.	Modification to blank flange arrangement on BTPN wagon	MW/WT dated 23.12.93
8.	Conversion of top centre pivot arrangement from bolted to rivetted design on BTPN wagon	MW/BTPN dated 18.7.94
9.	Modification to BTPN empty/load spindle	MW/BTPN dated 1.11.94
10.	Master Valve a) Provision of stoper (Ref. Drg. No. WD-7-91-38 Item 3) b) Increase in collar dia meter Item 2 of WD-7-91/38 c) Provision of valve operating screw collar item 1 of WD-7-91/38	MW/CS/BTPN dated 31.7.91 -do- -do-

TABLE 10.7
LIST OF RDSO MAINTENANCE PUBLICATIONS FOR TANK WAGONS

Sr. No.	Description	Name of manual/Publication
1.	Four wheeler wagon type "TPR"(petrol)	G-3/Nov.60
2.	Bogie wagon type "MBTPZ"(petrol)	G-5/July 62
3.	Bogie wagon type "MBTPX"(petrol)	G-6/Dec.60
4.	Instruction for operation & maintenance of liquid chlorine tank wagon, type "TCL"	G-38 H
5.	Manual for instructions for anhydrous ammonia tank	G-40H/Oct.76
6.	Instruction for maintenance & operation of Hydrochloric acid tank wagon type "THA" liquid chlorine tank wagon, type "TCL"	G-55 H/Aug.76
7.	Instruction for maintenance & operation of bitumen tank wagon type "TB"(preliminary)	G-60 H/Oct.76
8.	Maintenance manual for 9 wheeled liquified petroleum gas tank type "TPGLR"(preliminary)	G-65/1983
9.	Maintenance manual for TSA	G-66/1983
10.	Maintenance manual for Phosphoric Acid tank wagon	G-71/1996
11.	Instruction for operation and maintenance for BTAL/BTALN	G-79/1988
12.	Instruction for operation and maintenance BG bogie tank wagon for Alumina type "BTAP" for BTAL/BTALN	G-82/1988
13.	Maintenance manual for bogie liquified petroleum gas tank wagon type BTPGL	G-86A/1994 Rev.-1
14.	Safe handling of Hazardous chemicals transported in Rail Tankers	G-87
15.	Maintenance & operating instruction for bogie petrol tank wagon type "BTPN"	G-90 /1993

