TANK WAGON

STC/SPJ

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.

Classification of Tank Wagon for Consignment

S.N.	Consignment	Code
01.	*Highly inflammable products*	*TP, TK, BTPN, BTPNHS, BTFLN*
02.	*Raw petroleum products (Black Oil)*	TL
03.	*Vegetable oils*	TV
04.	*Bitumen*	TB
05.	*Molasses*	TM
06.	*Petroleum gases (LPG)*	TPGL, BTPGLN
07.	Amonia and others	BTALN, BTAP
08.	Caustic Soda	BTCS
09.	Phosphate	BTPH
10.	Liquid chlorine	BGTCL
11.	Sulphuric acid	BGTSA

CONSTRUCTIONAL DETAILS

A. Under frame

The design of the under frame 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 under frame at each end for mounting the barrel.

B. Barrel and saddles

The barrel is cylindrical vessel generally fabricated out of low carbon structural steel to IS:2062 Fe 410CuW. Material specifications for various types of tanks are given below. The barrel is placed longitudinally on the under frame and secured by means of rivets to the saddle. The saddle is welded on under frame at each end.

MATERIAL SPECIFICATION

Sr. No.	Type of wagon	Cylindrical portion	Dished ends
1	Ammonia tank wagon type BTALN	Steel.toBS:1501-224Gr.32ALT 50 or ASTM-516Gr-70	Steel to BS:1501-224-Gr.32 A LT 50 or 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 BTPGLN	Steel to BS: 1501-224-Gr32 A LT 30 or ASTM-516 Gr. 70	Steel to BS: 1501-224-Gr32 A LT 30 or ASTM-516 Gr. 70
4	Sulphuric acid tank MBTSA	ST.CLII M-5	Steel to IRS:M 30
5	Petrol tank wagons type TPR TPR/A, & MBTPZ	TPR-IS:2062 st42-WC MBTPZ -IS:2062 st42-WC	IS:3747 IS:3747
6	Oil tank wagon type TORX	---do---	---do---
7	Heavy oil tank wagon TORX	---do---	---do---

MATERIAL SPECIFICATION

Sr. No.	Type of wagon	Cylindrical portion	Dished ends
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 BTCS	IS:2062 Fe-410CuWA	IS:5986 Fe-360 Cu
14	Hydrochloric acid tank wagon type THA	IS:2062 st-42 W	IS:3747
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

BARREL MOUNTING

1. **Safety Valve:-** The safety valve is provided to prevent building up of excess pressure inside the barrel. It is fitted on the barrel either on the diaphragm plate inside the dome or on a separate opening on the barrel. This is provided on highly inflammable liquid such as petrol., aviation sprit .etc.
2. **Relief valve:-** It is a spring loaded valve fitted on the barrel on tanks for corrosive liquids. Its main function is to release built up pressure, if it exceeds the working pressure limit.

3. **Safety vent:-** This consists of frangible disc (lead or any approved material not affected by loading), 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 exceed 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.
4. **Compressed air valve:-** It is provided on tank 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.
5. **Vapour Extractor cock:-** Its function is to extract vapour from the tank while filling.

6. **Master valve:-** It is a gravity discharge valve fitted with a hand wheel in the dome for manual operation.
7. **Bottom Discharge valve:-** BG-4 wheeler Bottom discharge valve are provided with the single bottom. discharge valve situated underneath the master valve while on BG/MG -8 wheeler stock two bottom discharge valve are fitted one on either side and connected with the master valve through a 'T' pipe. The main function of the valve is to control the flow of the contents and also to serve as an additional safety stock in case the master valve fails or breaks. The bottom discharge valve opening are also provided with blank flanges to be used with 2mm compressed asbestos fiber jointing material to serve as further check on accidental leakage of contents.

PERIODICITY OF OVERHAULING OF TANK WAGON

Sr. No.	Type of wagon	For 1st POH	For subsequent POH
01.	4 wheeler tank wagons except those listed below.	4 years	3-1/2 years.
02.	Tanks for liquid chlorine and hydrochloric acid, type TCL/THA	2 years	2 years
03.	Tanks for liquids ammonia type TAL, TPGLR	2 1/6 years	2 1/6 years
04.	Tanks for petroleum gas BTAL/BTALN, BTPGL, BTPGLN	**4 years**	**4 years**
05.	BTPN	6 years	6 years

Definition of Steam Cleaning:-

- *It is cleaning of tank barrel from inside with the help of high pressure steam.*

Need Of Steam Cleaning:-

- *For safe entry of staff in tank barrel before repairs to be carried out.*
- *Up gradation of tank wagons for loading.*

Procedure of Steam Cleaning for Pressure Vessels, Petroleum & Other highly inflammable Products:-

- The tanks requiring steam cleaning should be placed as near the steam supply line as possible & protected against any movement. Berthing siding should be completely isolated from all other traffic.
- Tanks as pressure vessels, tanks for petroleum, other highly inflammable products, vegetables oils, bitumen, coal tar & molasses are cleaned by steam. In case of pressure vessels, it should be ensured that entire gas has been discharged to the atmosphere. After ensuring that the tank barrel is no longer under pressure. The following sequence should be followed.

Procedure of Steam Cleaning for Pressure Vessels, Petroleum & Other highly inflammable Products:-

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

Procedure of Steam Cleaning for Pressure Vessels, Petroleum & Other highly inflammable Products:-

- Remove condensed steam collected in the tank barrel & keeps the barrel exposed to atmosphere for another 24 hours.
- The tests that should be conducted to ensure the tanks are free from contamination gases of the contents.

Testing Procedure of Tank Wagons-

(i) 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.

(ii) 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 wit h fresh water till free from chlorine traces completely.*

(iii) 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.*

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.

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 : It washed with ½ to 1% solution of sodium phosphate commercial or ½% 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. The 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.

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.

EXAMINATION AND REPAIR OF TANK WAGONS BY C &W SUPERVISOR 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 sick line. The tank wagon discharge valves blank flange and manhole covers should be secured with bolts and nuts whenever the tank wagons are empty or taken out of sick line. 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. 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 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.

iii. Mal functioning of master valve.

Precautions During Loading And Unloading

- *Tank wagon for inflammable liquids shall be in good condition.*
- *In filling tank wagon, an air space of not less than 5% of the capacity of the tank shall be left. (2.5% in case of HSD, Furnace oil, kerosene oil etc)*
- *All inlets and outlets shall be securely closed .*

•Ensure all tank fittings are in good working condition.

• Ensure that bottom discharge valve is fully closed and fitted with a blank flange and gasket.

• Make sure that the dome cover is closed after loading.

• Don’t allow unauthorized persons to operate valves

• Don’t allow tank wagons to move from loading / unloading points unless the tank fittings are properly refitted and dome cover closed.

Precautions During Shunting of loaded & leaky tank wagon

- Shunting speed shall not exceed 8 kmph.
- Tank wagon when left in siding must be placed clear off the fouling marks to avoid side collision and must have hand brakes 'ON'.
- Ensure buffer wagons are placed between engine and cargo.

- *In case of leaky wagon has to be moved in the yard, it must be separated from the shunting engine/pilot by at least ten wagons not containing goods of an inflammable, dangerous or explosive.*
- *Don't allow hump/loose shunting.*
- *Loaded wagon shall be stabled in cool place as far as possible.*

THANKS