

**TECHNICAL PAMPHLET No. G-108**

**GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS  
(RAILWAY BOARD)**

**INSTRUCTIONS FOR MAINTENANCE AND OPERATION  
OF BOGIE PETROL TANK WAGON TYPE 'BTFLN'**

(Amendment No. 1 of Dec. 2015)  
(Amendment No. 2 of Oct. 2016)

**ISSUED BY  
RESEARCH DESIGNS & STANDARDS ORGANISATION  
MINISTRY OF RAILWAYS  
LUCKNOW-226011**

**October, 2015**

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**Amendment No. 2 of October, 2016 applicable to RDSO technical Pamphlet No. G-108 of October, 2015 (Instruction for Maintenance and Operation of Bogie Petrol Tank Wagon Type BTFLN).**

1. Clause No 3.8 modified and shall be read as under-

“The leaky/unloadable wagons noticed by oil companies/refineries, during unloading/decanting at unloading points, shall be marked on to the wagon by paint by oil companies and also communicated to Railway Train examination staff at the nearest yard. The train examination staff of nearest yard will book the wagon at nominated workshop for proper repair of the wagon.”



**Amendment No. 1 of December, 2015 applicable to RDSO technical Pamphlet No. G-108 of October, 2015 (Instruction for Maintenance and Operation of Bogie Petrol Tank Wagon Type BTFLN).**

1. Clause No 3.8 added and shall be read as-

“The leaky/unloadable wagons noticed by oil companies/refineries, during unloading/decanting at unloading points, shall be marked on to the wagon by paint by oil companies and also communicated to Railway Train examination staff at the nearest yard and the train examination staff will remove the stencil after proper repair of the wagon.”

## PREFACE

This manual contains instructions for operation and maintenance of Bogie Petrol Tank Wagon type "BTFLN". The design of this wagon has been developed by M/s RITES & RDSO. This manual has been prepared based on the design considerations and other information available with this office. The manual is therefore, likely to be revised on the basis of the experience gained and data collected after the wagons have been in service.

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## **GENERAL (SECTION-I)**

### **1. SCOPE**

These instructions for operation and maintenance apply only to Bogie Frameless Tank Wagon Type BTFLN to M/s RITES Drawing No RSD-6315-051 (Fig-1 of Annexure)

### **2. LEADING PARTICULARS**

#### **2.1 General:**

• Length over coupler	: 12420 mm
• Maximum Width	: 3191 mm
• Overall height	: 4358 mm
• Tare Weight	: 23.33 t
• Carrying capacity	: 57.95 t
• Gross Load	: 81.28 t
• Axle Load	: 20.32 t
• Gauge	: 1676 mm

#### **2.2 Underframe:**

The under frame consists of a pair of stub center sill, side sills, bolsters, head stocks, and cradles. The center sill and side sills run from the headstock upto bolster at either end. Between bolsters there is no under frame member except a pair of middle stringers (inverted T-section) welded to the underside of the barrel. The wagon is fitted with Bogie mounted brake system in which each bogie carries a brake cylinder which applies tread brake in the bogie through brake beams and push rods. The brake equipment like auxiliary reservoir, distributor valve and other valves and cocks are mounted beneath the tank barrel. The underframe is manufactured from Structural Steel to SALIMA 350.

• Length over head stock	: 11491 mm
• Bogie Centers	: 8391 mm
• Coupling Arrangement	: Standard Non transition CBC
• Method of anchoring barrel with underframe	: Welding

#### **2.3 Tank Barrel:**

The tank barrel is inclined at 1 degree towards the discharge points located at the bottom of the barrel to facilitate easy flow of POL products. Tank barrel is seven-course construction with the material of cylindrical portion of tank barrel to Steel of IS: 2062 E 450 (earlier IS: 8500 Fe 570B) and Dished end of barrel to steel of IS: 2062 E 450 (earlier IS: 8500 Fe 570B). The dished end joined to cylindrical portion by welding. All welding of the vessel are completely radiographed but the vessel is not stress relieved. The barrel can carry the following different products with minimum air space required during loading.

S. No.	Name of Commodity	Minimum air space required as a % of total volume
1	Motor spirit (Petrol)	4%
2	Naphtha	4%
3	Superior kerosene	2 ½%
4	ATF	2 ½%
5	High Speed Diesel (HSD)	2 ½%
6	Light Diesel Oil (LDO)	2 ½%
7	Furnace Oil (FO)	2 ½%

Dimensional details of the tank barrel are as under

- Length of barrel (inside) : 11522 mm
- Length of barrel (outside) : 11538 mm
- Diameter of barrel (inside) : 2950 mm
- Thickness of barrel plate : 7 mm
- Thickness of dished end plate : 8 mm
- Volumetric Capacity of barrel : 76.00 m<sup>3</sup>
- Loadable volume (Leaving 4% air space) : 72.96 m<sup>3</sup>
- Working pressure : 1.4 kg/cm<sup>2</sup>
- Test pressure : 2.8 kg/cm<sup>2</sup>
- Material for construction
  - Cylindrical shell : Steel to IS: 2062 E 450
  - Dished End : Steel to IS: 2062 E 450

## 2.4 **Barrel fittings:**

Different types of barrel fittings are necessary for filling, measuring and decanting various products. Safety fittings are also necessary to release any undue pressure that may be developed during transportation. Following fittings are provided on the barrel-

- i. Safety valve to Drg. No. WA/TF-87 (1.4 kg/cm<sup>2</sup>).
- ii. Two domes each accommodating-
  - a. One 100 mm dia filling pipe.
  - b. One 25 mm dia dip stick guide.
  - c. One vapour extractor cock with cap to IRS Part Drg. No. WA/TF-2116
  - d. One hand wheel for operating master valve
- iii. Master valve.
- iv. Bottom discharge valve (100 mm lubricated taper plug valve) to Drg No. WD- 93066-S-01.

### 2.4.1 **Safety Valve-**

It is a spring loaded valve which gets lifted when the pressure inside the barrel exceeds certain predetermined value. The valve is set at a release pressure of 1.4 kg/Sq.Cm. One safety valve has been provided on the barrel at top near the centre.



#### **2.4.2 Filling Pipe-**

100 NB filling pipe has been provided in each dome for connecting the inlet hose required during gravity filling of product at loading point. The pipe is provided with flap for closing the pipe after loading. The filling pipe is extended to the bottom of the barrel to avoid any flashing. Perforations are provided in the pipe to enable the entrapped air, escape from the pipe. Two numbers of filling pipes one inside each dome has been provided on the wagon.

#### **2.4.3 Vapour Extractor Cock-**

Function of this cock is to extract vapour from the tank during filling. One such cock inside each dome has been provided. Suitable cap has been provided to close the cock after loading.

#### **2.4.4 Master Valve-**

The master valve, 100 mm size, is fitted inside the barrel at the bottom and is operated by a hand wheel provided inside the dome. A long vertical spindle connects valve with hand wheel. The spindle is guided at three locations i. e. at bottom by bronze nut, at middle by a bracket and at the top by a gland at the diaphragm plate. The hand wheel is operated to discharge the contents of the barrel by gravity. Two Master Valves hand wheel, one inside each dome have been provided. The lift of the valve is 35mm.

#### **2.4.5 Dip Rod pipe With Plug-**

Dip rod pipe with a plug has been provided to gauge, by the Dip rod, height of the commodity during filling.

#### **2.4.6 Bottom Discharge Valve-**

This valve is fitted below the barrel under each Master Valve. This is a tapered lubricated plug valve. The main function of the valve is to control the flow of the content during unloading and also to serve as an additional safety stop in case the Master valve fails or leaks.

#### **2.5 Coupler:**

The wagon is provided with standard automatic center buffer coupler with knuckle type (Non transition).

#### **2.6 Brake:**

The wagon is fitted with single pipe graduated release Bogie mounted air brake system along with automatic pressure modification device.

#### **2.7 Bogie:**

The wagon is provided with CASNUB 22 HS Bogie to RDSO Specification No WD-17-CASNUB-22HS-BOGIE-92.

## **OPERATION (SECTION-II)**

### **3. PROCEDURE FOR LOADING AND UNLOADING**

- 3.1 Before starting loading/unloading operation, it should be ensured that all necessary safety precautions including those given in para 4 and 5 of this manual are clearly understood & followed.
- 3.2 Before loading, the wagon must be certified fit for loading by the TXR. Instructions issued by the Railway Board/Railways from time to time in this regard should be religiously followed.
- 3.3 The wagons to be loaded/ unloaded are placed in position preferably under shed and hand brakes are applied to prevent any movement.
- 3.4 It should be ensured that points leading to loading/unloading line on which the wagons are to be loaded/ unloaded are set and pad locked so as to isolate the line on which the loading/ unloading are to be done.
- 3.5 Shunting of wagons is not permitted on the same line when loading/ unloading is done.
- 3.6 Throughout the entire period of transfer operation, the wagon must be, continuously attended to by the operator.
- 3.7 Spillage of contents inside the dome should be avoided.

### **4. PRECAUTIONS TO BE TAKEN AT LOADING POINTS**

- 4.1 Ensure that all tank fittings are in good working condition.
- 4.2 Ensure that the safety valve is intact and properly sealed.
- 4.3 Ensure that the Master valve is fluid tight.
- 4.4 Ensure that the bottom discharge valve is fully closed and the outlet pipes at both sides of the wagons are closed with gasket and dummy flanges at four locations before commencement of loading.
- 4.5 Ensure that the vapour extractor cock is open before commencement of loading.
- 4.6 Ensure that loading is done through filling pipe only.
- 4.7 Ensure that recommended "air space" as specified for particular petroleum product is provided and that payload does not exceeds the permissible limit.
- 4.8 Remember to close the vapour extractor cock and fit the cap on it after loading.
- 4.9 Ensure closure of dip rod pipe plug after taking necessary measurements.
- 4.10 Ensure to close and tighten the flap covers of filling pipe after loading.
- 4.11 Ensure that dome cover is closed and provide proper sealing when dome cover eye bolt nuts are tightened.
- 4.11.1 Oil companies/ loading parties will use nonmetallic sealing wires only for sealing dome cover.

### **5. PRECAUTIONS TO BE TAKEN AT UNLOADING POINTS**

- 5.1 Open the dummy flange and connect the unloading hose to the dummy flange. Ensure that other end of the hose is inside the storage tank. Open slowly the bottom discharge valve. Open the dome at the top. Open the cap of the vapour extractor cock and open the vapour extractor cock and then rotate the hand wheel slowly to lift the Master valve for discharge.
- 5.2 Ensure that master valve is not opened beyond its lift of 35mm to avoid uncoupling of master valve.
- 5.3 Ensure closing of the Master valve after unloading.

- 5.4 Close the bottom discharge valve after unloading.
- 5.5 Fit the dummy flange with gasket with all its bolts back in position after unloading.
- 5.6 Do not allow unauthorized persons to operate the valves.
- 5.7 Close the dome cover after unloading and tighten the eye bolt nuts of dome cover.
- 5.8 Ensure that used sealing wires are completely removed from the dome/ dome cover.
- 5.9 Do not allow any person to enter the tank barrel for internal examination/ repairs unless the barrel has been made free of gasses/ inflammables by dry air circulation or steam cleaning.
- 5.10 Do not undertake repairs of tank barrel by welding unless it is free from all inflammables.
- 5.11 Do not start welding repairs on the wagon unless the barrel is properly earthed and roller bearings are short circuited.
- 5.12 Do not allow the wagons to move from loading/ unloading points unless the tank fittings are properly refitted and dome cover closed.

## **6. PRECAUTIONS TO BE OBSERVED DURING SHUNTING AND MARSHALING**

### **6.1 Shunting:**

- 6.1.1 Shunting of wagons containing petroleum and inflammable liquids shall not be carried out except under the superintendence of a duly authorized officer who shall ensure that during shunting operations-
  - a) Wagons containing petroleum and other inflammable liquids are separated from the locomotive by not less than three carriages not containing explosives or other dangerous goods or articles of inflammable nature provided that when an electric or diesel electric is used, only one such carriage need intervene between the wagons containing petroleum and other inflammable liquids and the locomotive.
- 6.1.2 The speed of all movements does not exceed 8 kmph.
- 6.1.3 No rough, hump, fly or loose shunting takes place.

### **6.2 Marshaling:**

- 6.2.1 There is no restriction on the number of wagons containing petroleum and other inflammable liquids which may at any one time be attached to or be transported by any one train.
- 6.2.2 Wagons containing petroleum and other inflammable liquids, which may be grouped together, should be placed as far away as practicable from the train locomotive.
- 6.2.3 Wagons containing petroleum and other inflammable liquids, shall be separated by not less than three carriages not containing explosives or other dangerous goods or articles of inflammable nature from-
  - a) The train locomotive, provided that when an electric (traction) or diesel (electric) locomotive is used, one such carriage need intervene between the wagons containing petroleum and other inflammable liquids and the locomotive.
  - b) The passenger carriages or the brake-van, provided that when an electric (traction) or diesel (electric) locomotive is used, instead of three such carriages, only one carriage not containing explosives or other

dangerous goods or article of inflammable nature may be attached between the brake-van and the last tank wagon, containing petroleum or other inflammable liquids.

- c) Any other carriage containing explosives or other dangerous goods or articles of inflammable nature.

**6.2.4** Wagons containing petroleum and other inflammable liquids shall be closed coupled to the adjoining carriages and to each other.

Note: The provisions related to precautions to be observed during marshaling shall also be apply to empty tank wagons.

## **MAINTENANCE (SECTION-III)**

### **7. MAINTENANCE SCHEDULE**

In order to keep the wagon in good fettle, the following schedules of maintenance are recommended.

- i) Trip Examination
- ii) Routine Overhaul (ROH) at intervals of 18 months (three ROH) schedules between successive (POHs).
- iii) Periodic Overhaul (POH) at an interval of 6 years. The Periodicity of the subsequent POH will be decided after gaining experience on the running of BTFLN wagon.

While ROH can be carried out in Maintenance Depots, the POH shall be carried out in a Mechanical Workshop fully equipped for the purpose.

### **8. TRIP EXAMINATION**

The following items shall be especially checked/ attended to during trip examination:

1. Hand Brake to be released.
2. APM device is working properly.
3. Worn out brake blocks to be changed.
4. All brake rigging pins to be intact and in position.
5. Ensure that the hose coupling for brake pipe (B.P) on consecutive wagons are coupled to one another to form a continuous air passage from the locomotive to the rear end of the train. For proper identification, of 'BP' coupling heads are marked with 'BP' and painted in green.
6. All the cut-off angle cocks of brake pipe except those at the rear end of the train shall be open. Handle shall be parallel to the pipe when cock is in open position and will be right angle on closed position.
7. Ensure that a cut -off angle cock of brake pipe at the rear of the train are kept closed.
8. The B.P. hose couplings at the rear end of the train should be placed on their respective hose coupling supports.
9. Ensure that the isolating cocks on the distributor valve of all the wagons are in open position.
10. Ensure that the gauge in Guard's compartment show the prescribed pressures.
11. If the leakage is found to be in excess of prescribed limit, the leakage shall be rectified.
12. If there are visible damages to the hose pipe then change them with new ones.
13. Release the brake and ensure the following:-
  - a. Position of the brake cylinder is in fully retracted position.
  - b. Brakes shoes are away from the wheel.

- c. Driver, Guard & TXR should check the details given in the brake certificate and ensure its compliance.
14. In addition to the above, the following items shall be ensured in the originating station.
- a. Caps/ flaps for filling pipe, vapour extractor cock and dip pipe hole should be tightly closed.
  - b. Dome cover should be tightly closed. The dome cover should be sealed on loaded wagon.
  - c. Bottom discharge valve is properly closed and there is no leakage. It should be sealed in loaded wagon.
  - d. Dummy flange covers over the discharge pipes are tightly closed and there is no leakage.

## **9. ROUTINE OVERHAUL (ROH)**

### **9.1 Barrel Fittings:**

The following work shall be done during ROH.

#### **1. Safety Valve-**

- a. The safety valve shall be subjected to pneumatic test after wagon repairs. The valve adjustment should not be interfered with unless repairs to valve become necessary. In such cases, it must be repaired, correctly adjusted and re tested at pressure 1.12kg.sq. cm for vapour tightness and 1.4 kg/ sq. cm. for test pressure.
- b. All gaskets/ packing's shall be changed.

#### **2. Master Valve-**

- a. The master valve shall be checked for smooth operation and leakage.
- b. All damaged/ worn out parts, particularly valve seat shall be changed.
- c. All packing/gaskets shall be changed.
- d. Whenever repairs to the master valve and its seating are undertaken, the valve should be tested in position under air pressure of 0.35 to 0.56 kg/cm<sup>2</sup> (5 to 8 Psi), the tank barrel being filled with water to a minimum height of 150 cm. The hydraulic test should be carried out keeping the bottom discharge valve and dummy flanges over discharge pipe open.

#### **3. Bottom Discharge Valve-**

Maintenance of this valve should be done as per recommendation of the manufacturer.

#### **4. Blank Flanges-**

- a. The gasket below the cover should be changed.
- b. The blank flange should be tested in the same manner as the Master Valve, ensuring that gasket of specified material has been fitted.

## **5. Locking Device-**

Ensure that all the locking devices like provision of spring washers under the nut, tack welding of nut and welding of split pin has been provided everywhere recommended.

### **9.2 Underframe, Coupler & Bogies:**

For ROH of underframe, couplers and bogies, instructions given in relevant para of the Indian Railway Maintenance Manual for wagons issued by the Railway Board should be followed in so far as they apply to the equipment provided on this wagon.

### **9.3 Brakes:**

The air brake equipment and its components shall be attended as provided in G-97 (latest amendment) except for brake cylinder and automatic pressure modification device (APM). For other details of brake cylinder & APM refer maintenance manual supplied by BMBS manufacturer.

9.4 Any design modification notified for incorporation should be carried out.

## **10. PERIODIC OVERHAUL (POH)**

### **10.1 Barrel:**

The following work shall be done on the barrel during POH as per details given in subsequent paragraphs:-

1. Cleaning of barrel for inspection.
2. Internal and external examination of barrel.
3. Repairs of barrel.
4. Hydrostatic test of barrel.
5. Maintenance of barrel fittings.
6. Examination of cradles.
7. Any design modifications notified for incorporation.
8. Test report & record of Inspection.

#### **10.1.1 Cleaning of Barrel for Inspection-**

- i. Open all fittings and manhole cover and wash them clean of commodity.
- ii. Dispatch all fittings for maintenance.
- iii. Clean the empty barrel free of products before internal inspection. The following procedure shall be followed for internal cleaning of barrel.
  - a. The barrel requiring steam cleaning should be placed as near to the steam supply line as possible and protected against any movement.
  - b. After removal of manhole cover and other fittings, the barrel shall be exposed to atmosphere for 04 hrs.
  - c. Entry of staff in tank barrel should be strictly prohibited before cleaning and signs with suitable legends displayed at a reasonable

- distance away from the barrel to be steam cleaned.
- d. In order to clean the barrel thoroughly, steam/dry air pipe should be inserted through manhole and steam/air be injected for 12 hrs. The steam/air pipe shall be provided with a 'T' connection at its lower end and so directed as to blow steam/dry air towards ends.
  - e. After condensation of steam 0.2% to 0.3% Sodium Nitrate as per IS: 879-81 may be added to the condensate to act as corrosion inhibitor. Condensed steam collected at the bottom shall be removed at the earliest and the barrel kept exposed to atmosphere for 24 hrs.
  - f. The outer surface of the barrel shall be cleaned free of dirt and paint markings.
  - g. The barrel is now ready for internal and external examination.

### **10.1.2 Internal and External Examination of Barrel-**

Generally 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 plate at the time of hydraulic tests.

Following procedures shall be followed during examination:

- i. No one shall be allowed to enter into the barrel for internal examination until a work permit has been signed by an authorized supervisor indicating that the barrel has been washed and found to be safe.
- ii. The barrel should be examined by a competent inspector nominated by CME, who must examine the interior of the barrel and the internal fittings for their general condition and damage.
- iii. Make arrangement to illuminate the internal surface of the barrel.
- iv. Examine the internal surface of the barrel for any sign of pitting or injury. Lower part of the barrel, weld seams and pipe junction should be paid special attention.
- v. Mark the defective area with chalk for repairs.
- vi. Examine the outer surface for any damage or crack. The portion of the barrel in contact with cradle as also the junctions of anchoring with dished ends and barrel should be paid special attention.
- vii. Mark the defective area with chalk for repairs.

### **10.1.3 Repairs of Barrel-**

The barrel has been fabricated from steel to IS: 2062 E 450. Depending upon the defects indicated below, the repairs shall be carried out-

- i. Pitting
- ii. Cracks

In case of pitting, where pits are not deep enough i.e. up to 1.5 mm, the defective area may be chipped off to sound metal and then chipped off portion shall be filled up by welding. The welded location should then be ground flush to the original thickness of plate. When pits are closely grouped and are deep enough to affect the strength of the metal, the affected area must be removed and an insert applied



and joined by welding.

In case of cracks, cracks should be fully explored to ascertain their extent. A 12mm dia. hole should be drilled at the end of the crack and metals shall be chipped off along the crack on one side of the barrel to form a groove for welding. Then the grooves shall be welded. The opposite side of the weld shall be gauged to sound metal and then welding shall be completed penetrating into the weld of first side. Finished weld shall be ground flush on both sides. Inserts whenever applied must have a double butt joint, with 25mm minimum corner radius. Entire length of the butt weld should be radiographed to ascertain the soundness of the butt joint. It must be ensured that insert is of same material and thickness as the parent metal.

In repairs of Barrel involving welding, an approved welding procedure and an approved grade of electrodes should be used. A qualified welder shall be employed for welding. Welding should, as far as possible, be done in down hand position. Welding current and other details like polarity etc. should be set as recommended by electrode manufacturer. After repairs the barrel should be sent for hydrostatic tests.

#### **10.1.4 Hydrostatic test of Barrel-**

- a. Hydrostatic test of barrel shall be carried out after its repair. In case no repairs have been carried out on the barrel, the hydrostatic test is not required.
- b. Following procedures shall be followed during hydrostatic test.
  - i. Ensure removal of all low pressure lines which should not be subjected to test pressure.
  - ii. Close off nozzles/ opening for fittings by means of dummy flange except that Vapour extractor cock.
  - iii. Connect a water pump to the flange of filling pipe.
  - iv. Fill the barrel with water at ambient temperature till water comes out through nozzles of vapour extractor cock.
  - v. Stop the water pump and close the nozzles of the vapour extractor cock with dummy flange which has a provision for a pressure gauge connection.
  - vi. Pump in more water in the barrel till the pressure is increased gradually to 2.8 kg/cm<sup>2</sup> (40 PST).
  - vii. The pressure shall be maintained for a period of 5 minutes so that through examination of repaired zones and weld seams can be carried out to see if there is any leakage or drop of pressure indicated in the pressure gauge. The weld seams of the barrel should be examined thoroughly by applying soap solution which will show up the crack and other source of leakage.
  - viii. Test shall be carried out in presence of Inspecting Agency who will issue a clear fit certificate.
  - ix. Drain out the water from the barrel and expose the barrel to atmosphere till it is dried.

#### **10.1.5 Maintenance of Barrel fittings-**

- a. All the barrel fittings mentioned in para 9 of this manual shall be subjected to pneumatic test during POH. Details of such test are same as indicated in ROH.
- b. All gaskets/ packings of different fittings shall be changed.
- c. All damaged/worn out parts shall be changed.

#### **10.1.6 Examination of Cradles-**

Cradles shall be examined in position for any corrosion or any visible defect.

#### **10.1.7 Test Report and Records of Inspection**

- a. Test of tank barrel and safety valves must be certified by official conducting the test and their records be maintained in the office of Chief Mechanical Engineer. The certification must show the Railway initials, number of tank wagons, pressure to which tested, date and place of test etc.
- b. Testing authority must maintain detailed record of test carried out on each individual tank wagon.
- c. A special report must be submitted to the Chief Mechanical Engineer concerned in every case where maximum permissible working pressure cannot be maintained unless certain repairs are carried out. Such tank wagon must not be commissioned in service till it is certified fit for use after repair by retesting it under specified pressure by the testing authority.

#### **10.2 Underframe, Coupler and Bogie:**

A large number of underframe, couplers and bogies similar to one used in BTFLN are already in use and are being maintained regularly by Indian Railways. POH of these special assemblies shall, therefore, be carried out as per procedure laid down in the Indian Railway Maintenance Manual for wagon issued by Railway Board.

#### **10.3 Brakes:**

Maintenance of brake equipment shall be carried out as per maintenance procedure laid down in maintenance manual G-97 (latest amendment) as revised from time to time except for brake cylinder and automatic pressure modification device (APM). For other details of brake cylinder & APM refer maintenance manual supplied by BMBS manufacturer

#### **10.4 Bogies:**

Maintenance of bogies shall be carried out as per maintenance instructions laid down in maintenance manual G-95 with latest revision.

#### **10.5 Painting & lettering:**

Painting and lettering shall be carried out in accordance with the instructions contained in "Indian Railway Maintenance Manual for wagon" issued by Railway Board, Ministry of Railways in its chapter of Tank Wagon and/ or the marking diagram of BTFLN wagon.

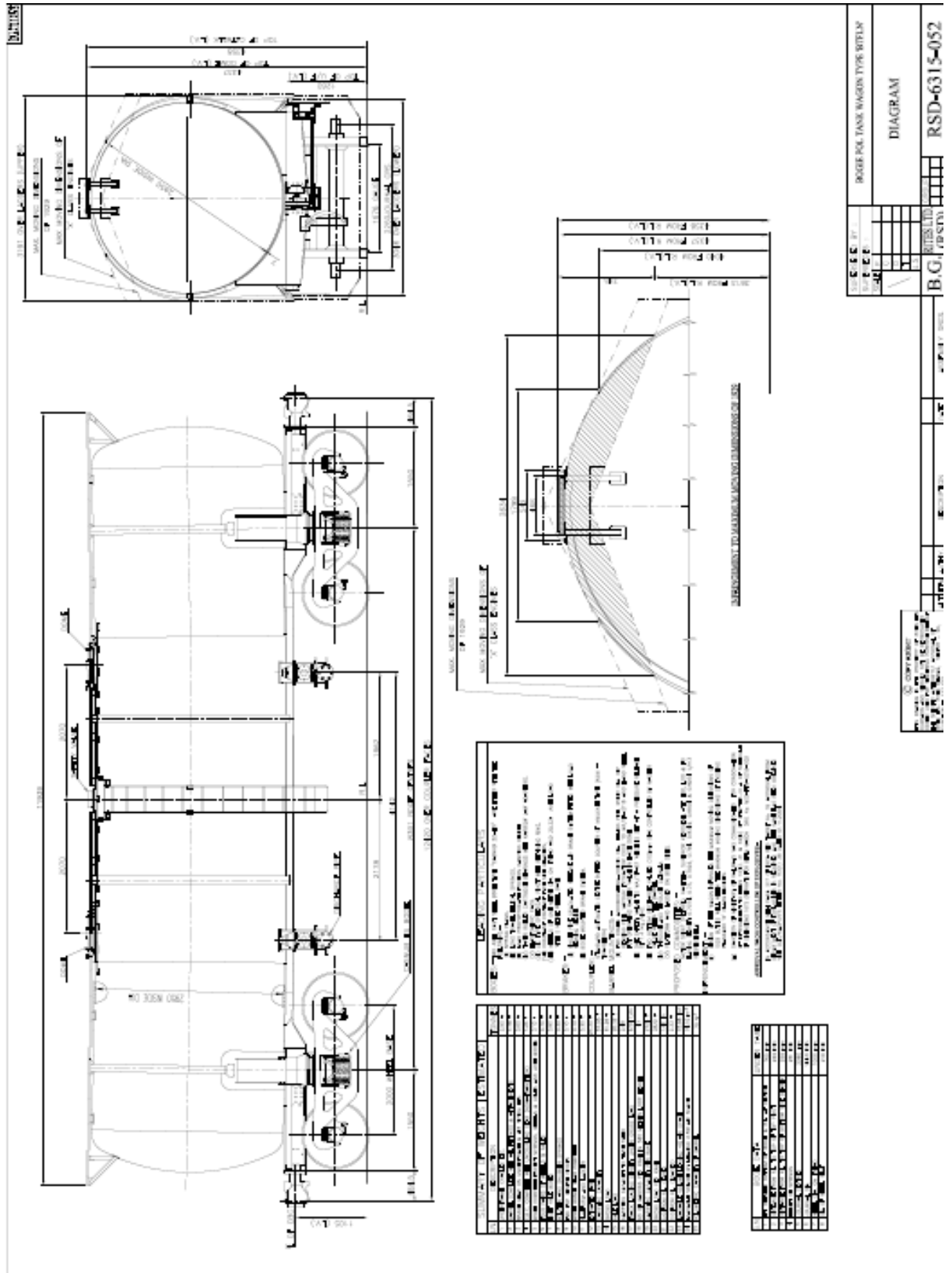


Fig-1

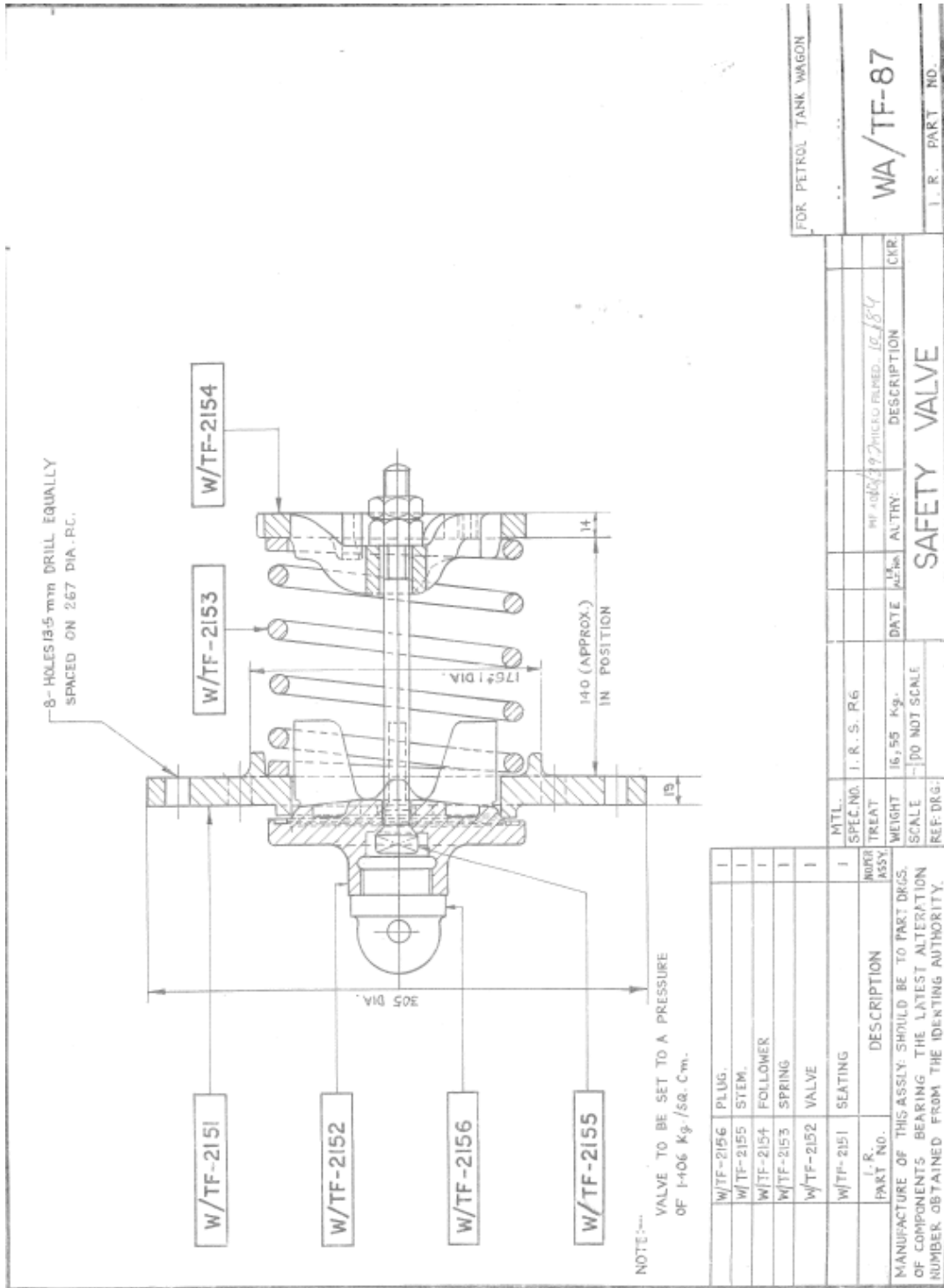


Fig-2

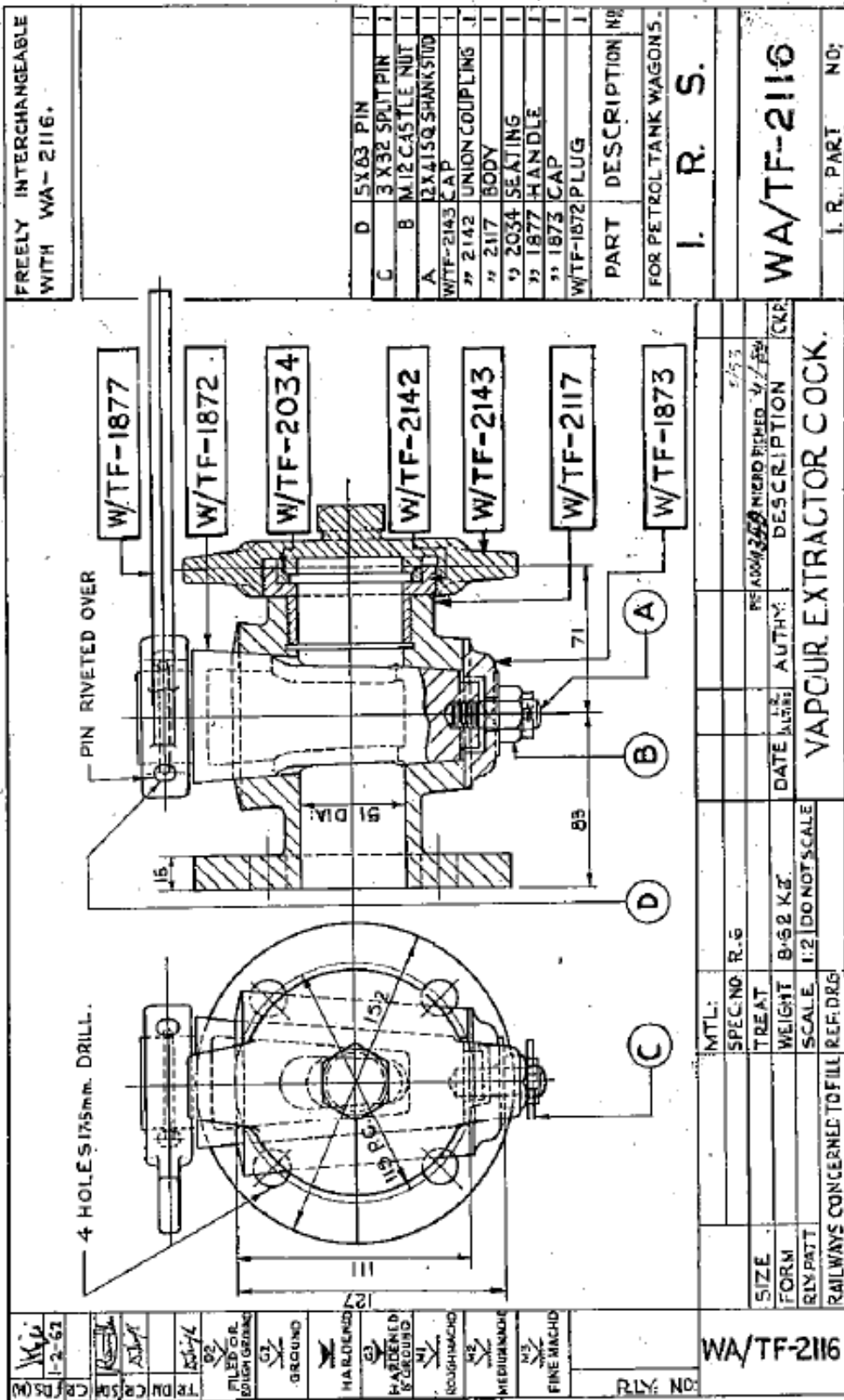


Fig-3