

# Refillable Gas Tanks

## Filling, Safety & Maintenance Instructions.

We have recently encountered situations where a vertical refillable gas tank develops a bulge on the otherwise flat bottom of the tank. (See later)

Our tanks are routinely pressure tested beyond International Standards specifications. To understand the issue, we have subjected a stock tank to pressure well beyond that, to the highest pressure that our test station can deliver.

The tank showed no sign of a bulge in the base plate, and we are confident that the design, construction, and testing of the tanks is not a factor.

This would indicate that the bulges may be caused by the contents developing extremely high pressures.

Lagging, operating, and the refilling routines for the tanks are the main suspects currently.

These are matters that entirely the responsibility of the users.

To ensure that our customers are fully aware of how to **safely** refill a refillable gas tank, we have rewritten the filling instructions printed on the current gas tank Test Certificates as follows:

### Filling.

1. Place the **Master Refilling Gas Tank** on a clean horizontal surface and screw the **Refill Adapter** (P/N's 5358/97) into the tank. Do not apply any pressure to the end of the refill adapter at this stage (This will cause unwanted gas to discharge into the atmosphere).



2. Place the **Refillable Gas Tank** on a clean horizontal surface with the refill valve at the top.

3. Open the **Gas Control Cock** to allow venting during refilling.

4. Turn the master refilling gas tank upside down and position it with the refill adapter vertically above the gas refill tank. The adaptor and the filling valve must be vertically aligned as shown.

5. Slowly apply a firm vertical force to the master refilling gas tank. Excessive pressure or failure to fully meet the needs of Step 4. above, could cause damage to the tank filler valve and refill adapter. If liquid gas is expelled to atmosphere between the refill adapter and gas tank valve this indicates that the adaptor has not been correctly located on the refill valve. Filling must not be continued until correct alignment has been achieved.

6. When correct alignment has been achieved and liquid gas is being correctly transferred to the refillable gas tank, gas vapour will be expelled from the gas control cock. Refilling can take several minutes. When the tank is full, liquid gas will replace the vapour and the master refilling tank can be removed. Turn off the gas control cock and the refillable gas tank is ready for use.

The refillable gas tanks are designed to accept approximately 75% of its volume as a full charge. This is for safety reasons. In high ambient temperatures it prevents excessive pressure build up in the tank and prevents liquid gas from reaching the burner.

**NOTE:** The refill valve is designed to vent when the liquid gas reaches it inside the tank. It is known that this venting may not occur and if the user is dependent on this to signal “tank full”, an over filled tank can result. This **NOT** a safe result! We strongly recommend the use of the gas control cock to correctly determine the correct fill level for the tank.

The illustration above shows only one of the four refillable gas tanks in our product range. The above procedures apply to all of them.

We have knowledge of users:

- not removing the gas tank from the boat to refill a tank.
- on 2” horizontal refillable gas tanks, deliberately re-plumbing the gas line to enable access to the refill valve without disconnecting it. The gas cock output is deliberately aligned with the centerline of the tank. This a **SAFETY** design – not a design fault!
- Smoking a cigarette while undertaking the refilling.
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Please don't participate in these or any other similar actions.

Common sense and safe practices are good companions!

### **SAFETY:**

#### **We make the following recommendations in the strongest terms:**

1. **NEVER** use a gas Propane/Butane mixture containing more than 30% Propane. Propane, Isobutane & Butane mixtures are acceptable. Propane/Butane mixtures are sold under a variety of trade names and a wide range of mix ratios. You may have to search around to find a suitable product in your area.
2. **NEVER** attempt to modify the tank connections. The design of each item of equipment is integrated to provide a reliable and safe product and a safe refilling system.
3. **NEVER** conduct a tank refill close to naked lights or glowing items such as a cigarette.
4. **NEVER** conduct a tank refill in an enclosed space. The gases used are heavier than air and will collect at the lowest level of the area. You may not be able to see it but the gas that is discharged during the filling process WILL be present at the bottom of that enclosed space. When filling a tank that is fixed inside a model space, such as in a model boat, either use an air blower to displace the gas after the filling operation is complete or turn the model upside-down to drain the gas into the atmosphere outside the model.
5. **NEVER** depend on liquid gas leaking from the refill valve to be an indication of a full tank. It is known that the “bleed” function of the classic Ronson valve can fail and the tank can be overfilled. See this website blog “Gas Tank Lagging and Refilling” for further information.
6. **ALWAYS** remove the refillable gas tank from the boat for refilling. The horizontal refillable tanks have the gas control valve mounted so that the gas pipe **MUST** be disconnected to refill. All MSM built steam plants have the refillable gas tank mounted on pins to enable easy removal and installation of the tank.

#### **Additional Advice:**

7. Whenever you open a threaded connection please use an appropriate thread sealant on reconnection. Even the smallest leak can result in problems as outlined in 4. above.
8. As the gas flows out of the tank during use, the tank will chill and condensate may form on the outside of the tank. This is normal. However, the lowered gas temperature can interfere with the efficient delivery of gas to the burner. The amount of condensate can be reduced, or even eliminated, by providing some warming for the tank. Excessive heating should be avoided.

Human body temperature is a safe measure.

9. When refilling a tank, insert the refill adaptor attached to the master tank into the refillable tank with the refillable tank underneath. The recharging process involves transferring liquid gas that would otherwise remain at the bottom of the master tank.
10. During refilling some gas vapor is exhausted to make room for the new liquid. This is normal. The refilling process is complete when liquid gas is expelled.
11. All moving parts in the system should be lightly oiled periodically. Once again this will help to maintain efficient sealing and free operation of the taps and connections in the system.
12. If you are concerned about the possibility of a system leak, simply immerse the tank in tepid water to identify the source – if any.

### **Maintenance:**

Refillable and disposable gas tanks normally contain a butane or a butane/propane gas mix. Under normal operating conditions the gas tanks are subject to ambient temperatures of less than 30C/86F.

When filling the gas tanks the temperature of the gas tank can drop to just above freezing.

The same low temperature condition also applies when gas is drawn off from the gas tank.

If wood lagging is applied, or the gas tank is placed in a wooden box, it insulates the gas tank and keeps it cold, significantly reducing the flow of gas and preventing the gas tank from reaching ambient temperature.

It is desirable to keep the gas tank near the boiler so that it can receive radiated heat from the boiler and keep the gas tank warm during use. We recommend against lagging in all circumstances. If you plan to operate a steam plant in very cold conditions, please contact us for recommendations. There are variety of options, depending on the actual plant layout.

If the gas refill valve is damaged it can be replaced using the special removing tool P/N 4225, to remove the old one and insert a new “MSM Easy Fill Valve” P/N 4226.

If the tank is being put into long term storage, it should be drained of gas and the gas control cock closed.

### **Final safety recommendations:**

When not in use, a full or partly full tank should not be stored in a warm to hot location, such as sustained direct exposure to sun light, next to warm or hot surfaces. This may cause excessive pressures above the design limits of the gas tank and cause permanent damage to the gas tank.

Following is an image sent to us from a client who had happily used the lagged tank, for about two years in normally moderate ambient temperatures. One day it was left, exposed to direct tropical sunlight for a time!

The otherwise flat bottom of the tank developed a bulge for the development of very high pressure in the tank. For safety reasons he is now replacing the tank, AND wont lag the new one!

