To ensure safe operating procedures, follow safety rules, practice proper maintenance and use common sense.

General service tank cars are equipped with various top and bottom fittings to allow loading, unloading, gauging and testing operations. For additional information, read AAR BOE Pamphlet 34, your company’s instructions, applicable government regulations, and AAR’s NAR web site at nar.aar.com.

SAFETY VALVES IN VENTS

The purpose of a safety valve or vent is to prevent the tank pressure from exceeding a specified limit. A SAFETY VALVE re-closes after this limit is exceeded and excess tank pressure has been relieved. A SAFETY VENT does not re-close and requires that a flangible disk (rupture disk) be replaced every time a pressure relief event occurs. The pressure setting on general service valves and vents is 15 psi maximum.

Safety valves and vents are typically mounted on the fittings nozzle cover plate or on a separate tank nozzle specifically for the safety valve. Safety vents may be mounted on the manway cover plate as well.

MANWAY AND FILL HOLE NOZZLES

A manway consists of a flanged nozzle located at the top of the tank. It is equipped with either a bolted cover or a flanged and bolted cover with a gasket to provide a seal in the closed position. Hinged manway covers are typically sealed with eye-bolts that rotate into position for tightening.

A fill hole is configured similar to a manway. However, it is typically much smaller and is used exclusively as a loading nozzle for some commodities.

A gauge hole is typically located on the inner edge of the manway nozzle. It serves as one means of verifying the required outage space in the tank. It consists of a scale that indicates the fill level of the tank.

FITTINGS NOZZLE AND ATTACHMENTS

A fitting nozzle consists of a flanged nozzle with a bolted plate and gasket. A number of devices are mounted to the coverplate. Mounting connections to the cover plate may be either flanged or bolted.

The liquid valve is typically a ball type valve that is used for both loading and unloading of the tank. For top unloading, it is connected to a pipe mounted to the fittings nozzle coverplate that extends to within 2” of the inside bottom of the tank. These pipes are called eduction tubes. Eduction tubes may be of the stiff or flexible type.

For bottom unloading, a bottom operated ball valve (BOV) is mounted and secured to the bottom of the tank and operated at ground level (See Figure 2). Some cars of older vintage are equipped with a “Pulis Positive” or top-operated BOV (See Figure 2) for bottom unloading. This is essentially a plug type valve mounted to a saddle on the bottom of the tank that is controlled at the top of the tank via a red attachment. When the valve cover is removed, it may be inverted and used as a tool to operate the valve.

The vapor valve is typically a ball type valve. It is usually attached to the top of the fittings crossplate using flanged or screwed connections. Since it does not extend into the liquid, it will only expel vapor when opened.

During top unloading processes, the unloading line is attached to the liquid valve, and an air or gas line is attached to the vapor valve. Pressure is applied to the tank by forcing air or inert gas into the vapor space of the tank through the vapor valve such that the tank contents are forced through the eduction tube.

During a bottom unloading process, the manway cover or vapor valve is opened to vent the tank. If the plug on the BOV cap is removed to ensure the valve is not leaking. The cap is then removed, and the unloading hose is attached to the outlet nozzle of the BOV. When the BOV cap is opened, pressure allows air to flow to a pump which then moves the commodity to its destination.

Most valves have self-lubricating Teflon packings and Teflon seats. Most valves have self-lubricating Teflon packings and Teflon seats.

THERMOMETER WELL

A thermowell is a long tube mounted to the fittings crossplate that extends into the tank and is typically filled with antifreeze. A screened cap is removed from the top of the thermowell, and a long thermistor is inserted into the thermowell to measure the temperature of the antifreeze. The temperature of the antifreeze is representative of the temperature of the tank contents.

VACUUM RELIEF VALVES

Vacuum relief valves are typically located on the fittings arrangement nozzle. Their purpose is to prevent implosion of a sealed tank in the event that residual vapor condenses into a liquid, thereby resulting in negative pressure inside the tank.

HEATER COILS

Some tank cars are equipped with heater coil systems for the purpose of heating the tank contents to facilitate unloading. Heater coils may be located on the interior or exterior of the tank. Steam is the typical heating medium, although hot oil is sometimes used to achieve higher heating temperatures. In some cases, auxiliary heating systems are fed by the heater coil system to allow localized heating of valves and fittings.

Interior heater coils are supported by brackets mounted to the bottom interior surface of the tank. Interior heater coils offer more efficient heating of the tank. However, the use of interior coils has diminished significantly due to the potential for product contamination and extensive maintenance.

Exterior heater coils are located on the exterior surface of the tank in a serpentine pattern and utilize a low profile, oval shaped coil section. The heating medium is led to the coil system via threaded coil sections. The design pressure of the coils is 200 psi, and the maximum recommended operating temperature is 350° F. The maximum temperature of the heating medium is limited to 250° F for a foam insulated car and 440° F for a glass wool blanket insulation system.

Unloading Arrangements

Thermowell/Thermistor

Sealed tank in the event that residual vapor cools and condenses into a liquid, thereby resulting in negative pressure inside the tank.

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