

OPERATIONS & MAINTENANCE

Industrial and Ag Bulk Storage Facilities

Facility Name _____
Street Address: _____
City, State, Zip Code: _____
Facility Telephone Number: _____

MANAGEMENT CONTACT INFORMATION

Authorized/Responsible Facility Representative: _____
Representative's Emergency Contact Telephone Number(s): _____

LOCAL EMERGENCY RESPONDER CONTACT INFORMATION

Fire Department

Telephone Number: 911

Emergency Medical Responders

Telephone Number: 911

Hospital/ Emergency Medical Facility

Telephone Number: 911

Police Telephone Numbers

State: 800-525-5555 or *55

Local: _____

LP-Gas Inspection Agency : Missouri Propane Safety Commission

Telephone Number: 573-893-1073

Ammonia Contamination

Brass fittings are commonly used in LP-Gas service. Ammonia will damage these brass system components by a corrosion phenomenon commonly called "season cracking" (a form of stress corrosion cracking), potentially resulting in unanticipated and premature failure.

Therefore, it is important that stored LP-Gas is essentially free of ammonia. The gas must be tested for ammonia and must contain quantities less than what will turn red litmus paper to blue. Furthermore, when a transportation or storage system is being converted from ammonia service to LP-Gas, it must be tested for ammonia contamination at the time of the initial fill.

Storage Operating Procedures

Bulk Storage Containers

Startup

1. Before beginning any operation ensure the transfer equipment is in good condition, the bulk storage container is safe to be filled, and the surrounding area is free from hazards that may constitute a source of ignition.
2. Ensure that all the appropriate manual valves (i.e., globe, angle, or ball) are open on the bulk storage containers.
3. If the container has manually operated internal valves, ensure that the emergency shutdown system is operational and that internal valves are opened.

a. Pneumatically operated systems – ensure that there is adequate pressure (typically, 30-70 psig) and that the system is leak free.

b. Cable operated systems – ensure that all cables are operational

Operation

1. Now the system is operational and is ready to:

b. Unload a CTMV (bobtail or transport) –

c. Unload a Railcar

Shutdown

1. Ensure that all the appropriate manual valves (i.e., globe, angle, or ball) are closed on the bulk storage containers.

2. If the container has remotely operated internal valves, ensure that these valves are closed by releasing the pressure in emergency shutdown system or by pulling the cable for the system.

Unloading a Cargo Tank Motor Vehicle

Procedures for liquid transfer operations at LP-Gas bulk storage tanks from transports are based on common industry practices, manufacturer's instructions, and provisions listed in NFPA 58-2004 and U.S. DOT cargo tank unloading regulations. Furthermore, the major steps in the unloading procedures will vary according to the emergency discharge system used on the CTMV.

These procedures are designed to be as universal as possible and are to be used as a guide only and do not replace company policies or federal, state or local codes. Be sure to check company policy and state and local codes before beginning the unloading operation. Before the unloading operation, you should review bulk plant layout and operating procedures. Make sure you are familiar with the bulk plant equipment, piping functions, and company operating procedures.

US Department of Transportation Requirements

US DOT unloading rules include:

1. A qualified person must be in attendance at all times during unloading.

2. A person is "qualified" if he or she has been made aware of the nature of the hazardous material which is to be loaded or unloaded, has been instructed on the procedures to be followed in emergencies, is authorized to move the cargo tank, and has the means to do so.

3. The qualified person attending the unloading operation must be awake and remain within **25 feet** of the cargo tank when the CTMV internal self-closing stop valve is open.

4. The qualified person attending the unloading operation must have an unobstructed view of the cargo tank and delivery hose to the maximum extent practicable, except during short periods when it is necessary to activate controls or monitor the receiving container.

New transport cargo tanks placed into service after July 1, 2001, must be equipped with either a passive emergency shutdown system or, if the transport is used in metered delivery service, a remote (radio frequency) shutdown system with a query feature for unloading operations lasting more than 5 minutes. Cargo tanks that are used in **both metered and non-metered service** must have **both** types of emergency shutdown systems.

Startup

1. Inspect the transfer area, before giving the driver the signal to enter the plant area.

2. Spot the CTMV (most commonly, a "transport") and guide it into position at

the unloading bulkhead. To prevent unnecessary wear on the PTO (power take-off) drive shaft and the pump during unloading, the centerlines of the tractor and trailer should coincide.

3. Set the brakes and turn off all electrical devices.
4. Set the chock blocks at the front and back of one of the tractor drive wheels.
5. If applicable, check with company policy for procedures to follow if a water or ammonia test is required.

Operation

1. Determine the maximum amount of LP-Gas to be transferred to the plant storage tanks. In most cases, a transport will arrive only when there is enough room in the plant storage tank(s) for the entire load of LP-Gas. To avoid accidentally overfilling the storage tank(s), calculate the maximum amount of LP-Gas that can be added safely.
2. Review and follow company procedures for checking the operation of the ESVs and pull-a-way protection installed in the plant. If the ESVs will not operate properly, do not continue the transfer operation. Notify the bulk plant's manager or supervisor.
3. Check the manual shutoff valves on the transport liquid and vapor connections to be sure they are fully closed. Slowly remove the dust caps.
4. Remove the dust caps from the connectors on the transfer hoses. Check the connectors to be sure they are clean. Check the O-rings on the valve connectors to be sure they are in good condition. If necessary, clean the connectors with a rag and replace worn, flattened, or damaged O-rings before making connections to be transport.
5. Conduct a visual inspection of delivery hose deployed during each unloading operation. Rejection criteria include exposed reinforcement, permanently deformed wire braid reinforcement, soft spots, bulging, loose outer covering, damaged couplings, and loose/missing/corroded bolts.
6. Connect hoses between the transport and the bulkhead. When using ACME connectors, spin on the connectors until they are hand-tight. While tightening the connectors, move the hose or hose end valve up and down slightly to prevent the threads from seizing. When each connection is hand-tight, tighten it to "wrench tight" with a hook spanner. Never bang on the connector with the dust cap, a hammer, or other device.
7. Check each connection for leaks by isolating it from the system and charging it with LP-Gas. If any connection leaks, close all valves and retighten the connection. If the leak persists, examine the condition of connection o-rings or gaskets, and replace them if they are defective.
Do not transfer liquid if leaking LP-Gas is present.
8. Verify that the LP-Gas being delivered to the bulk plant is odorized by conducting a sniff test or other means, and document the results.
9. When all valves are fully open, start the pump by engaging the PTO. Listen carefully for sounds of erratic pump behavior and check the sight gauge or flow indicator to be sure liquid is flowing through the system.
[Note: If an excess-flow valve slugs shut, stop the pump; then, reopen the excess-flow valve by equalizing pressure across the valve before continuing.]
10. Unload the transport tank. Remember that a qualified person must be present during the entire transfer operation to handle emergencies and monitor the condition of the transfer system. Monitor the liquid level gauges in the plant storage tanks carefully during the operation. If possible, equalize pressure between the transport and the plant storage tank.

11. When a tank reaches its maximum permitted filling level, stop the pump and adjust the valves in the plant piping to route the remainder of the load to another tank.

Shutdown

1. When the plant storage tank reaches its maximum permitted filling level or the transport tank is empty, stop the pump and immediately close all liquid and vapor lines involved in the transfer operation.

2. Bleed down and disconnect the hoses. Store them away as necessary.

Caution: Never disconnect any hose until the LP-Gas trapped in the connection has been safely bled off. This should be done through either the bleeder valve on the hose-end valve or a pipe-away adaptor in the transport or bulkhead connections.

3. Replace all caps on hose-end valves and on transport and plant liquid and vapor connections.

4. Complete the plant unloading form, any necessary accounting forms, and the return bill of lading.

5. Check to be sure that all bulkhead or transport hoses have been disconnected and securely stored and that all valves are tightly closed and capped.

6. Before removing the chock blocks, walk around the CTMV and check for any obstacles that may be in its path. When determined to be clear, remove the chock blocks and store them on the vehicle.

7. Move the truck only after it has been determined the path is clear and any discharge of LP-Gas has dissipated.

Maintenance Manuals

Written maintenance procedures provided by equipment manufacturers may be used as maintenance manuals for the related equipment.

Maintenance Procedures

- Maintenance procedures are in written form in order to be used as the basis for maintaining the mechanical integrity of bulk plant LP-Gas systems.
- Whenever a change in equipment or the system occurs, the affected procedure(s) must be updated.

Maintenance Record Keeping

Maintenance records provide the tracking and documented verification that the facility is being properly maintained and in a safe condition in accordance with NFPA 58-2004.

• *Record Storage* - Maintenance records for all fixed equipment used to store and transfer LP-Gas must be kept at each facility. For unattended facilities, these records can be maintained at the unattended facility or another designated location.

• *Accessibility* – These records must be available to an authority having jurisdiction at any time during normal business hours.

• *Retention* – Maintenance records must be retained for the life of the equipment.

Sample charts for preventive maintenance record keeping (see Chart 6.1) and for logging equipment repairs (see Chart 6.2) are provided at the end of this section.

General Maintenance and Inspection Requirements

Maintenance Personnel - Training

- Individuals performing maintenance on the LP-Gas systems must be trained in the hazards of the system.
- Maintenance personnel also must be trained in the maintenance and testing procedures applicable to the systems or equipment on which they are working.
- In order to perform the maintenance procedures, all maintenance contractors must train the personnel under their supervision as noted in the previous two requirements, or ensure that personnel working on a system or LP-Gas equipment are under the supervision of a properly trained individual.

Physical Protection of Equipment

The following bulk plant equipment must be protected against physical damage due to impact from vehicles:

- LP-Gas containers.
- Aboveground piping, which also must be properly supported.
- Dispensers.

Corrosion Control

Aboveground Containers

- Aboveground containers must be painted to protect against atmospheric corrosion.
- The portion of an ASME container that comes in contact with saddles or foundations (including masonry) must be protected against localized corrosion by coating the affected area or by some other means (e.g., felt, weather stripping).
- Where necessary, non-metallic materials must be provided with protection to prevent deterioration due to atmospheric or chemical exposures. Corrosion protection of non-metallic materials should be in accordance with accepted engineering practice.

Emergency Shutoff Valves

- Emergency shutoff valves (ESVs) and backflow check valves that are required by the Code must be tested annually for their functionality. ESVs must be specifically tested for:
 - Automatic shutoff associated with thermal (fire) actuation.
 - Manual shutoff from a remote location.
 - Manual shutoff at the valve

The results of these tests must be documented (see sample Chart 6.3 at the end of this section). The Code does not set requirements for the retention and maintenance of these test results. Therefore, you should check with established company policy for the manner in which and the length of time that these records should be kept.

- Temperature-sensitive elements (i.e., thermal links) cannot be painted nor have any ornamental finishes applied after they have been manufactured.

	Yes	No	N/A
Are connections on containers greater than 2,000 gallon water capacity marked "vapor" or "liquid"?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all fittings that are subject to container pressure rated for at least 250 psig working pressure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all unused openings plugged or capped?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all fittings leak-free?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(E) Container Gauges			
Are pressure gauges in good condition and suitable for 250 psig service (such as 0 - 400 psig)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are thermometers in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are liquid level gauges arranged and installed so that the liquid level can be accurately determined?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(F) Container Pressure Relief Valves			
Is relief valve data legible?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the relief valve marked for use with LPGas and labeled by an independent testing agency?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the relief capacity sufficient, as determined by NFPA 58?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do relief valves communicate with the container vapor space and discharge upward, unobstructed to the open air?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are relief valves on containers >2000 gallons water capacity equipped with vent stacks of proper diameter and length?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are relief valve vent stacks on containers >2000 gallons water capacity equipped with breakaway couplings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do relief valves or vent stacks have loosefitting protective caps or closures to prevent entry of foreign matter?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are weep holes for moisture drainage open and is gas impingement of the container prevented?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(G) Container - Internal Valves			
Are the valve body seams leak-free?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the cables operating correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	YES	NO	N/A
Is the thermal link intact and free of paint?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(H) Container - Emergency Shut-off Valves			
Are ESVs in good working condition and leak free?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has an annual test been performed and documented as required by NFPA 58?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are operating cables working correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are remote emergency shutoff devices between 25 and 100 feet from the ESV and within the path of egress?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the thermal link intact and free of paint?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(I) Container - Manual Shut-off Valves			
Are valves located so that they can be easily reached during normal operations and in an emergency?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are valves in good condition and leak-free?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(K) Container – Presence of Combustibles			
Is the area within 10 feet of the containers free of weeds, long grass, rags, paper, wood or other loose or piled combustible debris?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Piping			
(A) Condition of Pipe and Paint			
Are aboveground pipes properly painted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are pipes free of corrosion damage, dents, gouges or other damage?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are pipes adequately supported?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are pipes adequately protected against physical damage by vehicles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(B) Pipe Fittings			
Are all flanges and fittings properly sized for the pressure rating, equal to or greater than the maximum allowable working pressure of the system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all stainless steel flex connectors in good working condition (i.e., reinforcement braid is not damaged)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all flow indicators and sight checks in proper working condition and leak-free?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are all fittings and pipes leak-free?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. VAPORIZERS

A. GENERAL

- Is the vaporizer(s) leak-free and in good working condition?***

The specific inspection steps will vary depending on the type of device being used to heat the liquid LP-Gas and the manufacturer's design. Refer to the equipment manufacturer's instructions for inspection requirements and procedures.

- Have pilot lights been cleaned on a regular basis?***

Refer to the equipment manufacturer's instructions for the frequency and instructions for inspecting and cleaning pilots.

- On a periodic basis, have all strainers been cleaned at the inlet side of the vaporizer(s)?***

Refer to the equipment manufacturer's instructions for the instructions and suggested frequency for inspecting and cleaning strainers.

- Have heavy ends been cleaned from the vaporizer?***

Refer to the equipment manufacturer's instructions for the instructions and suggested frequency for cleaning heavy ends from the vaporizer.

- Have the burner openings, thermostat and flue been cleaned?***

Self-explanatory.

- Is the vaporizer(s) located in accordance with NFPA 58?***

Vaporizers are generally installed outdoors. If the vaporizer is installed in a separate or attached structure, check with your supervisor for the specific requirements in Chapter 10 of NFPA 58 that are associated with the type of vaporizer in use.

Vaporizing burners must be installed outside of buildings, per NFPA 58. The minimum separation distance between a burner and container having >2,000 gallons water capacity is 50 feet. The minimum distance between a burner and container ≤500 gallons is 10 feet, and 25 feet for containers in the 501 – 2,000 gallon range.

Portable Fire Extinguishers

Portable fire extinguishers must be maintained in accordance with NFPA 10, *Standard for Portable Fire Extinguishers*.

Since NFPA 10 provides the detailed requirements regarding the placement, maintenance, inspection and recharging, this handbook section simply provides an overview of the basic requirements for placement, maintenance and inspection of fire extinguishers such that LP-Gas marketers and distributors have a familiarity with the basic requirements. Additionally, a sample maintenance and inspection recordkeeping list is provided.

Summary of Requirements

- At least one approved portable fire extinguisher with a capacity of 18 pounds dry chemical with a B:C rating must be provided if the aggregate quantity of LP-Gas stored is more than 720 pounds.
 - b) Fire extinguishers must be located, identified, and be readily accessible to all employees.
 - c) A fire extinguisher must be on each vehicle that transports a hazardous material (LP-Gas).
 - d) Each fire extinguisher must be maintained in a fully charged and operable condition at all times.

