

Cargo Tanks: Attendance, Unloading and Emergency Shutdown Requirements

Description:

The regulations set out requirements for operators of cargo tanks used to transport liquefied compressed gases, including LP-gases, and procedures and equipment required for unloading liquefied compressed gases from cargo tanks.

Regulatory Reference

49 CFR PART 173	SHIPPERS-GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGING
49 CFR § 173.315	Compressed gases in cargo tanks and portable tanks
49 CFR PART 177	CARRIAGE BY PUBLIC HIGHWAY
49 CFR PART 177	Subpart B-Loading and Unloading
49 CFR § 177.834	General requirements
49 CFR § 177.840	Class 2 (gases) materials
49 CFR PART 178	SPECIFICATIONS FOR PACKAGING
49 CFR § 178.337-11	Emergency discharge control

Applies to:

The regulations apply to company drivers and others who are in control of unloading operations of cargo tank motor vehicles. Procedures and emergency shutdown system requirements are specific to cargo tanks in metered delivery service¹ (bobtails) and cargo tanks in other than metered delivery service (transports).

General Requirements:

Cargo Tank Attendance

49 CFR § 177.834 establishes the general requirements for loading and unloading cargo tanks, as follows:

A motor carrier who transports hazardous materials by cargo tank must ensure that the cargo tank is attended by a qualified person at all times during loading or unloading. A person is qualified if he/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.

49 CFR § 177.840 (p), *Unloading procedures for liquefied petroleum gas and anhydrous ammonia in metered delivery service*, requires:

- (1) For a cargo tank with a capacity of 3,500 water gallons or less, excluding delivery hose and piping, the qualified person attending the unloading operation must remain within 150 feet

¹ "Metered delivery service" means an unloading operation conducted at a metered flow rate of 100 gallons per minute or less through an attached delivery hose with a nominal inside diameter of 1.25 inches or less.

of the cargo tank and 25 feet of the delivery hose and must observe both the cargo tank and the receiving container at least once every five minutes when the internal self-closing stop valve is open during unloading operations that take more than five minutes to complete.

- (2) For a cargo tank with a capacity greater than 3,500 water gallons, excluding delivery hose and piping, the qualified person attending the unloading operation must remain within 150 feet of the cargo tank and 25 feet of the delivery hose when the internal self-closing stop valve is open.
- (3) Except as provided in paragraph (p)(2)(ii) of § 177.840, 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.

49 CFR § 177.840 (p)(2)(ii) states, "For deliveries where the qualified person attending the unloading operation cannot maintain an unobstructed view of the cargo tank, when the internal self-closing stop valve is open, the qualified person must observe both the cargo tank and the receiving container at least once every five minutes during unloading operations that take more than five minutes to complete. In addition, by the compliance dates specified in §§173.315(n)(5) and 180.405(m)(3) of this subchapter, the cargo tank motor vehicle must have an emergency discharge control capability that meets the requirements of §173.315(n)(2) or §173.315(n)(4) of this subchapter." For these specific control system capabilities and requirements, refer to the chart and descriptions shown in the section titled Requirements for emergency shutdown systems and delivery hose assemblies on later pages of this compliance guide.

49 CFR § 177.840 (q), *Unloading procedures for liquefied petroleum gas and anhydrous ammonia in other than metered delivery service*, requires:

- (1) The qualified person attending the unloading operation must remain within 25 feet of the cargo tank when the internal self-closing stop valve is open.
- (2) 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.

Cargo Tank Unloading and Emergency Shutdown Procedures

Other unloading requirements given in 49 CFR § 177.834 include:

- (1) Smoking on or about any motor vehicle while unloading Division 2.1 (flammable gas) materials is forbidden. Extreme care must be taken during loading or unloading to keep fire away and to prevent persons in the vicinity from smoking, lighting matches, or carrying any flame or lighted cigar, pipe, or cigarette.
- (2) No hazardous material shall be loaded into or unloaded from any motor vehicle unless the handbrake is securely set and all other reasonable precautions are taken to prevent motion of the vehicle during the loading or unloading process.

49 CFR § 177.840 contains the following requirements:

- (1) Engine to be stopped in cargo tanks, except for transfer pump. No Division 2.1 (flammable gas) material shall be loaded into or on or unloaded from any cargo tank with the engine running unless the engine is used for the operation of the transfer pump of the vehicle. Unless the delivery hose is equipped with a shut-off valve at its discharge end, the engine

of the motor vehicle shall be stopped at the finish of such loading or unloading operation while the filling or discharge connections are disconnected.

- (2) Operating procedure. By January 1, 2000, each operator of a cargo tank motor vehicle transporting a liquefied compressed gas must carry on or within the cargo tank motor vehicle written emergency discharge control procedures for all delivery operations. The procedures must describe the cargo tank motor vehicle's emergency discharge control features and, for a passive shutdown capability, the parameters within which they are designed to function. The procedures must describe the process to be followed if using a facility-provided hose for unloading when the cargo tank motor vehicle has a specially equipped delivery hose assembly to meet the requirements of §173.315(n)(2), [listed later in this guide].
- (3) Cargo tank safety check. Before unloading from a cargo tank motor vehicle containing a liquefied compressed gas, the qualified person performing the function must check those components of the discharge system, including delivery hose assemblies and piping, that are readily observed during the normal course of unloading to assure that they are of sound quality, without obvious defects detectable through visual observation and audio awareness, and that connections are secure. This check must be made after the pressure in the discharge system has reached at least equilibrium with the pressure in the cargo tank. Operators need not use instruments or take extraordinary actions to check components not readily visible. No operator may unload liquefied compressed gases from a cargo tank motor vehicle with a delivery hose assembly found to have any condition identified in §180.416(g)(1) [hose rejection criteria] or with piping systems found to have any condition identified in §180.416(g)(2) [piping system rejection criteria]. Rejection criteria and general information for emergency shutdown systems are shown at the end of this section.
- (4) Emergency shut down. If there is an unintentional release of product to the environment during unloading of a liquefied compressed gas, the qualified person unloading the cargo tank motor vehicle must promptly shut the internal self-closing stop valve or other primary means of closure and shut down all motive and auxiliary power equipment.
- (5) Daily test of off-truck remote shut-off activation device. For a cargo tank motor vehicle equipped with an off-truck remote means to close the internal self-closing stop valve and shut off all motive and auxiliary power equipment, an operator must successfully test the activation device within 18 hours prior to the first delivery of each day. For a wireless transmitter/receiver, the person conducting the test must be at least 150 feet from the cargo tank and may have the cargo tank in his line of sight.
- (6) Unloading using facility-provided hoses. A cargo tank motor vehicle equipped with a specially designed delivery hose assembly to meet the requirements of §173.315(n)(2) of this subchapter may be unloaded using a delivery hose assembly provided by the receiving facility under the following conditions:
 - (A) The qualified person monitoring unloading must visually examine the facility hose assembly for obvious defects prior to its use in the unloading operation.
 - (B) The qualified person monitoring unloading must remain within arm's reach of the mechanical means of closure for the internal self-closing stop valve when the internal self-closing stop valve is open except for short periods when it is necessary to activate controls or monitor the receiving container.
 - (C) If the facility hose is equipped with a passive means to shut off the flow of product that conforms to and is maintained to the performance standard in §173.315(n)(2),

the qualified person may attend the unloading operation in accordance with the attendance requirements prescribed for the material being unloaded in §177.834.

- (7) Off-truck remote shut-off activation device. For a cargo tank motor vehicle with an off-truck remote control shut-off capability as required by §§173.315(n)(3) or (n)(4), the qualified person attending the unloading operation must be in possession of the activation device at all times during the unloading process. This requirement does not apply if the activation device is part of a system that will shut off the unloading operation without human intervention in the event of a leak or separation in the hose.
- (8) Unloading without appropriate emergency discharge control equipment. Until a cargo tank is equipped with emergency discharge control equipment in conformance with §§173.315(n)(2) and 180.405(m)(1), the qualified person attending the unloading operation must remain within arm's reach of a means to close the internal self-closing stop valve when the internal self-closing stop valve is open except during short periods when the qualified person must activate controls or monitor the receiving container.

Requirements for emergency shutdown systems and delivery hose assemblies.

REJECTION CRITERIA

You must not unload liquefied compressed gas from a cargo tank if the delivery hose or delivery hose assembly has any of these defects:

- Damage to the hose cover that exposes the reinforcement.
- Wire braid reinforcement that has been kinked or flattened so as to permanently deform the wire braid.
- Soft spots when the hose is not under pressure or bulging when the hose is under pressure.
- Loose outer covering.
- Damaged, slipping, or excessively worn hose couplings.
- Loose or missing bolts or fastenings on bolted hose coupling assemblies.

You must not unload liquefied compressed gas from a cargo tank if the piping system has any of these defects:

- Any external leak identifiable without the use of instruments.
- Bolts that are loose, missing, or severely corroded.
- Manual stop valves that will not actuate.
- Rubber hose flexible connectors with any condition outlined above for hose assemblies.
- Stainless steel flexible connectors with damaged reinforcement braid.
- Internal self-closing stop valves that fail to close or that permit leakage through the valve detectable without the use of instruments.
- Pipes or joints that are severely corroded.

EMERGENCY DISCHARGE CONTROL EQUIPMENT

The new requirements for emergency discharge control equipment on cargo tanks used to transport liquefied compressed gases are keyed to the degree of risk associated with the transportation of specific liquefied compressed gases. The regulation specifies two types of emergency discharge control equipment –

- **Passive Shutdown Equipment**

Passive shutdown equipment must shut off the flow of product without human intervention within 20 seconds of an unintentional release caused by complete separation of a delivery hose.

- **Off-truck Remote Control Shutdown Equipment**

Off-truck remote control shutdown equipment must close the internal self-closing stop valve and shut off the engine and auxiliary power upon activation by the person attending the unloading operation.

Each MC 330, MC 331, and non-specification cargo tank transporting liquefied compressed gases must have emergency discharge control equipment as specified in the following chart:

	Material	Cargo Tank Capacity	Delivery Service	New Required Emergency Discharge Control Equipment
1	Flammable gases (Division 2.1 materials), and anhydrous ammonia	All	Other than metered delivery service	Passive shut-down equipment
2	Flammable gases (Division 2.1 materials), and anhydrous ammonia	3,500 water gallons or less	Metered delivery service	Off-truck remote shut-down equipment
3	Flammable gases (Division 2.1 materials), and anhydrous ammonia	Greater than 3,500 water gallons	Metered delivery service	Off-truck remote shut-down equipment and, for obstructed view deliveries where permitted by the regulations, an off-truck remote with a query feature or passive shut-down capability

COMPLIANCE DATES FOR NEW EMERGENCY DISCHARGE CONTROL EQUIPMENT

- All newly manufactured MC 331 cargo tank motor vehicles after July 1, 2001, were required to be equipped with emergency discharge control equipment as specified in the chart.
- MC 330, MC 331, and non-specification cargo tank motor vehicles that are already in service must be retrofitted with required emergency discharge control equipment at their first scheduled pressure test after July 1, 2001. All required retrofits must be complete by July 1, 2006.
- MC 330, MC 331, and non-specification cargo tank motor vehicles in metered delivery service with water capacities greater than 3,500 gallons and used to transport flammable gases (Division 2.1 materials), compressed gases (Division 2.2 materials) with a subsidiary hazard, and anhydrous ammonia were required to be retrofitted with required emergency discharge control equipment by July 1, 2003.

CERTIFICATION OF NEW EMERGENCY DISCHARGE CONTROL EQUIPMENT

The regulations include specific requirements for certifying the design and installation of emergency discharge control equipment.

- **Passive Shut-down Equipment**

A Design Certifying Engineer (DCE) must certify the design for each passive shutdown system. The certification must consider any manufacturing specifications for components used in the system, explain how the system operates, and outline the parameters (such as temperature, pressure, types of product) within which the system is designed to operate. Installation must be performed under the supervision of a Registered Inspector who must certify that the equipment is installed and tested according to the DCE certification.

- **Off-truck Remote Control Shutdown Equipment**

Off-truck remote control shutdown equipment must be installed under the supervision of a Registered Inspector, who must certify that the equipment is installed according to the original component manufacturer's specifications.

ADDITIONAL EMERGENCY DISCHARGE CONTROL EQUIPMENT

After July 1, 1999, all newly manufactured MC 331 cargo tanks used to transport liquefied compressed gases must be equipped with a thermal means of closure for each internal self-closing stop valve that will activate at a temperature of 250° F. All MC 330, MC 331, and non-specification cargo tanks already in service must be retrofitted at the date of their first scheduled leakage test after July 1, 1999.

Training Requirements:

DOT hazmat employee training, sometimes called HM-125f training, must be provided to any employee involved in the transportation of hazardous materials prior to assigning tasks involving the handling, storage, shipment or transportation of LP-gas and any other hazardous material. Refresher hazmat employee training is required every 3 years after initial training, or if the employee's duties involving hazardous materials change. Company hazmat training programs should be reviewed to ensure that attendance, unloading procedures, and emergency procedures are fully covered and employee knowledge of these subjects is tested and documented.

Maintenance and Review

Operating companies should periodically examine unloading operations to ensure that:

- (1) Only qualified attendants and drivers whose hazmat employee training is documented are allowed to perform unloading operations. Requirements for documented qualifications should be applied to company employees and to contract carrier personnel.
- (2) Written unloading procedures specific to the cargo tank motor vehicle (CTMV) are carried in each CTMV, whether company owned and operated, or owned and operated by contract carrier.
- (3) All CTMVs are equipped with required emergency shutdown systems appropriate to the type of CTMV by the dates required in the regulations.
- (4) Drivers and attendants to unloading operations are complying with inspection, attendance, and all procedure requirements.
- (5) Each CTMV is equipped the required emergency discharge control equipment on or

before the specified deadline, and all CTMVs are properly equipped by the final July 1, 2006 deadline.

Additional Information and Resources

Propane Delivery, Certification Area 2.0, Certified Employee Training Program, Propane Education and Research Council, Washington, DC

Initial OSHA and DOT Training: For the Handling and Transport of Hazardous Materials, Propane Education and Research Council, Washington, DC

