

LP-Gas Emergency Shut-Off Valves (ESV's)

Why and how they should be used for Bobtail Filling and Transport Unloading.

General Information

The primary purpose of Emergency Shut-Off Valves in bobtail filling and transport unloading is to allow quick shut-off of liquid and vapor flow in the event there is an accidental pull-away of a truck or a hose rupture, both of which could cause a fire.

A system using Emergency Shut-Off Valves will not prevent some spillage of liquid and vapor, but the total system should be constructed so this spillage will be kept to a minimum.

This can be accomplished either by making possible, quick action by the driver or plant personnel in closing the valves by manual remote or pneumatic remote actuation; or in case of a pull-away, by automatic closing of the liquid valve by means of a cable connected to the liquid hose.

By minimizing the presence of liquid and vapor, the chance of a fire or explosion will be reduced. In case of a fire, thermal links at the valves or at other appropriate locations could close the valves and prevent further release of liquid and vapor.

The valve closing systems will be discussed later in this section. The user should decide which system is most appropriate, depending on the piping configuration and the general layout of the filling/unloading area.

ESV Application for Bobtail Loading and Transport Unloading

A very important function of the typical LP-Gas storage plant is to transfer LP-Gas into bobtails for delivery to customers. How efficiently and rapidly these bobtails can be filled often determines the number of customers that can be served each day, as well as how many bobtails are required to satisfactorily serve all customers. Therefore, the selection of an ESV for the bobtail liquid loading line should be done with care so as to maximize efficiency in filling and have year-round dependability.

The RegO® 2" liquid ESV (6016) has a full open port so that the restrictions of flow would be no more than you would expect through an equivalent length of 2" schedule 80 pipe. To improve the overall efficiency of the system, the valve was also designed as an operating valve so it could replace an existing globe or angle valve already installed at the end of the fixed piping. Thus, installing a RegO® ESV could actually result in a more efficient pumping operation than the existing system.

Equally important in the consideration of an ESV is its performance in an emergency, especially bobtail pull-aways. According to the NPGA, it is the bobtail filling transfer process that produces almost 99% of all bulk plant accidents and fires. Therefore, when selecting the proper ESV for bobtail filling, also consider the dependability of performance, and simplicity of operation and maintenance.

The RegO® ESV clearly indicates to the operator its open or closed position. It allows full manual control by the operator and provides means for remote operation in emergencies from either in front of the valve or in the rear.

No complicated systems of pulleys and cables are necessary since direct, straight pulls will close the valve. Means are even provided to secure a length of cable to the transfer hose so as to produce an automatic closing in the event the driver pulls away without disconnecting the hose.

NFPA Provisions (1986)

The pertinent provisions of NFPA Pamphlet 58, as they apply to Emergency Shut-Off Valves and how they are to be installed, are as follows:

Section 2-4.5.4 Emergency shutoff valves shall be approved and incorporate all the following means of closing:

(a) Automatic shutoff through thermal (fire) actuation. When fusible elements are used they shall have a melting point not exceeding 250° F. (121° C).

(b) Manual shutoff from a remote location.

(c) Manual shutoff at the installed location.

This provision sets for the basic criteria for the emergency shutoff valve, a key valve in the protection of many liquid transfer operations. Actuating means for remote control may be electrical, mechanical or pneumatic.

Many systems use a pneumatic system where the tubing itself acts as a fusible element releasing the pressure holding the valve open. With respect to the feature of manual shutoff at the installed location, it is recommended that this valve be operated occasionally. Also, the system should be tested periodically to determine that it will function properly.

Section 3-2.7.9 on new installations, and by December 31, 1980 on existing installations, (1) stationary single container systems of over 4,000 gal. (15.1 m³) water capacity, or (2) stationary multiple container systems with an aggregate water capacity of more than 4,000 gal. (15.1 m³) utilizing a common or manifolded liquid transfer line, shall comply with 3-2.7.9 (a) and (b).

(a) When a hose or swivel type piping 1½" or larger is used for liquid transfer or a 1¼" or larger vapor hose or swivel type piping is used in this service (excluding flexible connectors in such liquid and vapor piping), and emergency shutoff valve complying with 2-4.5.4 shall be installed in the fixed piping of the transfer system within 20 ft (6m) of lineal pipe from the nearest end of the hose or swivel type piping to which the hose or swivel type piping is connected. The preceding sizes are nominal. Where the flow is only in one direction, a backflow check valve may be used in lieu of an emergency shutoff valve if installed in the fixed piping down-stream of the hose or swivel type piping, provided the backflow check valve has a metal-to-metal seat or a primary resilient seat with a secondary metal seat not hinged with combustible material. When either a liquid or vapor line has two or more hoses or swivel type piping of the sizes designated, either an emergency shutoff valve or a backflow check valve shall be installed in each leg of the piping.

(1) Emergency shutoff valves shall be installed so that the temperature sensitive element in the valve, or a supplemental temperature sensitive element [250° F. (121° C) maximum] connected to actuate the valve, is not more than 5 ft. (1.5 m) from the nearest end of the hose or swivel type piping connected to the line in which the valve is installed.

(b) The emergency shutoff valve(s) or backflow check valve(s) specified in 3-2.7.9 (a) shall be installed in the plant piping so that any break resulting from a pull will occur on the hose or swivel type piping side of the connection while retaining intact the valves and piping on the plant side of the connection. This may be accomplished by use of concrete bulkheads or equivalent anchorage or by the use of a weakness or shear fitting. Such anchorage is not required for tank car unloading.

These provisions have been interpreted by the National Propane Gas Association as to how bobtail filling and transport unloading stations should be configured. The diagrams shown here are in essential conformance with NPGA Bulletin 128-77.

LP-Gas Emergency Shut-Off Valves (ESV's)

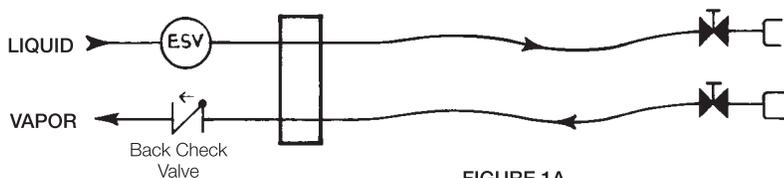


FIGURE 1A
Bobtail Filling Only

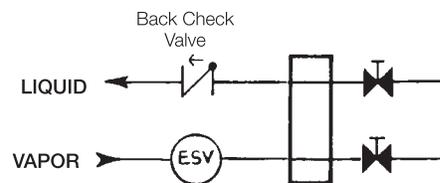


FIGURE 1B
Transport Unloading Only

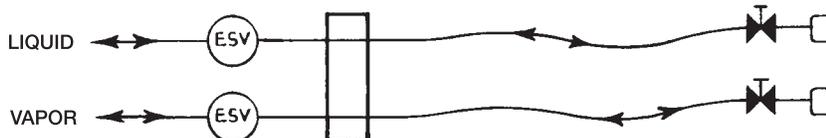


FIGURE 1C
Combined Bobtail Filling
and Transport Unloading

Installation Compliance with NFPA Requirements

A valve that is approved as an ESV may be installed in the fixed piping up to a distance of 20 feet (along the pipe) from the point where the transfer hose is attached to the fixed piping.

However, when the ESV is located more than five feet from the end of the fixed piping, an additional fusible element must be installed within five feet of the point of attachment of the hose, and be connected to the ESV valve in such a manner that it will cause the ESV to close in the event of a fire.

The ideal location of the ESV is as close to the end of the fixed piping as possible. This position eliminates the need for an additional fusible element and cable, and it may also permit the elimination of a restrictive valve already installed at the end of the fixed piping.

To this point, our comments have been principally concerned with ESV protection of the liquid line at bulk plants because this is the area of greatest potential danger in the event of a pull-away or hose rupture.

However, regulations also require an ESV in the vapor transfer line when the vapor hose is 1¼" or larger. A helpful rule of thumb in determining whether or not an ESV control valve is required in your vapor

system is this: If the vapor flow is out of the storage tank, an ESV is required. ESV systems are designed to protect the storage tank contents against uncontrolled release.

Therefore, a bobtail loading system could use a 1¼" or larger back pressure check valve in the vapor system since the flow of vapor is always from the bobtail being filled back to the storage tank. To improve transfer rates, the use of the RegO® 6586D back check valve at this location would provide protection at minimum pressure drop.

If the bobtail vapor line is also used when unloading transports, then the RegO® 6010 ESV should be used. The 6010 provides thermal protection, manual closing and a remote emergency closing system similar to the RegO® 2" liquid ESV, 6016.

Remote Control Systems

Usually in transfer loading operations, the valve handles and cables are located in close proximity to the area of greatest potential danger during an emergency. Therefore, each bobtail filling system or transport unloading system should have installed in it at least one readily accessible, alternate remote operating device.

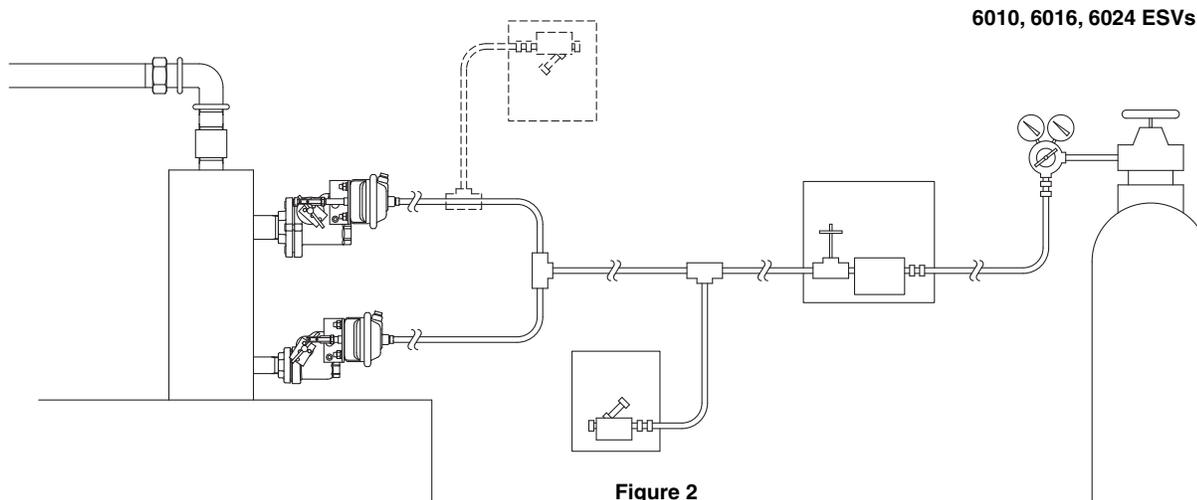


Figure 2
RegO® ESV's with Remote Pneumatic
and Transfer Hose Cable Release
Systems Typical Installation

6010, 6016, 6024 ESVs

Emergency
Shutdown Valves

2" & 3" Swing-Check ESVs for Bulk Plants

Designed for installation in liquid transfer lines at LP-Gas or Anhydrous Ammonia bulk plants to provide for quick shut-off of liquid or vapor flow in the event of an accidental pull-away, line break, or hose rupture.



Part Number	For Use With:	Inlet and Outlet Connections	Liquid Flow Capacity at 10 PSIG Drop (GPM)
6016	LP-Gas	2" F-NPT	711 (LP-Gas)
AA6016	NH ₃	2" F-NPT	640 (NH ₃)
6024	LP-Gas	3" F-NPT	1325 (LP-Gas)
AA6024	NH ₃	3" F-NPT	1173 (NH ₃)

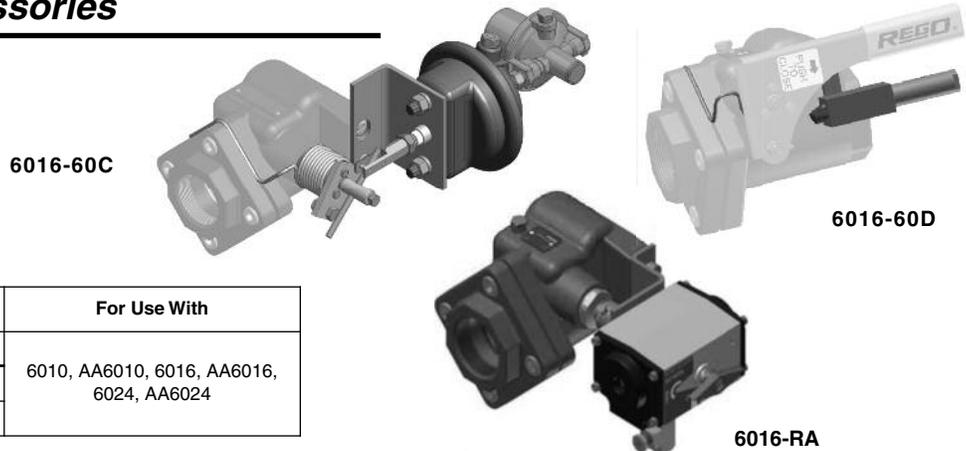
1-1/4" Swing-Check ESV for Bulk Plants

Designed for installation in liquid or vapor transfer lines at LP-Gas or Anhydrous Ammonia bulk plants to provide for quick shut-off of liquid or vapor flow in the event of an accidental pull-away, line break, or hose rupture.



Part Number	For Use With	Inlet and Outlet Connections	Accessories		Liquid Flow Capacity @ 10 PSIG Pressure Drop (GPM)
			Remote Pneumatic Close	Remote Pneumatic Open/Close	
6010	LP-Gas	1 1/4" F. NPT	6016-60D	6016-60C	259
AA6010	NH ₃	1 1/4" F. NPT			233

Swing-Check ESV Accessories



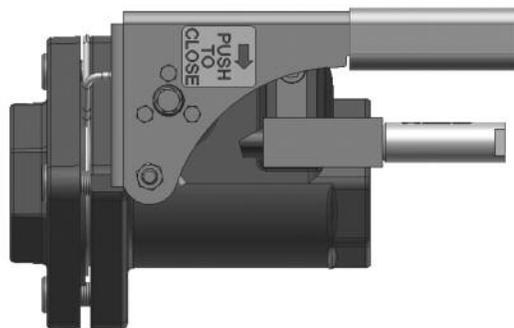
Part Number	Description	For Use With
6016-60D	Remote Pneumatic Close	6010, AA6010, 6016, AA6016, 6024, AA6024
6016-60C	Remoter Pneumatic Open/Close	
6016-RA	Rotary Remote Actuator	

ESV Pneumatic Controls

RegO® Emergency Shut-Off Valves modified for remote pneumatic shutdown operation retain all the operating features of the standard valves.



Once equipped with pneumatic cylinders and then pressurized, the pneumatic cylinder piston rod disengages from a striker plate, allowing the ESV to be manually opened and the striker plate to act as a latch and hold the valve open. Release of the control system pressure for any reason closes the ESV for fail-safe operation.



6016 with 6016-60D Remote Close Actuator

Features

Convenience

- Closes the liquid and vapor ESV from a convenient remote location.
- Independent closed loop system allows the ESV to be pneumatically charged, but opened or closed manually or with cable controls to conserve pressurized gas.

Reliability

- Independent closed loop system will continue to hold pressure and close ESV in an emergency - even if supply pressure is cut off.

Security

- Any loss of pressure from the control line, such as accidents or the line melting from fire, automatically shuts down the liquid and vapor ESV.
- ESV must be reset after automatic shutdown.



7605PN-50 Pneumatic Remote Control Kit

Control kit with components for connecting and charging the pneumatic controls from a source of compressed gas (air or nitrogen) to a RegO® liquid or vapor ESV. Includes charging valves with low pressure indicator, operating valves, 100 feet of ¼" plastic tubing and tube fittings.

7781AFP-1	Cylinder assembly kit to convert 7781AF ESVs to pneumatic shutdown.
6016-60D	Cylinder assembly kit to convert 6016 ESVs to pneumatic shutdown.
7605PN-50	Pneumatic remote shutdown system kit, complete with 100' of tubing, fittings, 1 charging valve assembly and 1 remote shutdown valve assembly
7605APN-8A	Extra shutdown valve assembly
RSA-PTSAE	100' roll of ¼" pneumatic tubing.
7605AP-16	¼" tubing tee, with nuts.