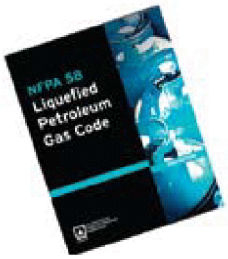
LP-Gas Excess Flow Valves

Safety Warning



Purpose

In its continuing quest for safety, Engineered Controls International, Inc. publishes a series of bulletins explaining the hazards associated with the use, misuse, and aging of LP-Gas valves and regulators. It is hoped that these factual bulletins will make clear to LP-Gas dealer managers and service personnel, that the utmost care and attention must be used in the installation, inspection, and maintenance of these products, or problems could occur which would result in injuries and property damage.

The National Fire Protection Association Pamphlet #58, "Storage and Handling Of Liquefied Petroleum Gases" states in Section 1-6 that "In the interest of safety, all persons employed in handling LP-Gases shall be trained in proper handling and operating procedures." These "ECII® Safety Warnings" may be useful in training new employees and reminding older employees of hazards that can occur.

It is recommended that all employees be furnished with a copy of NPGA Safety Pamphlet 306-88 "LP-Gas Regulator and Valve Inspection and Maintenance."

Nature of Warnings

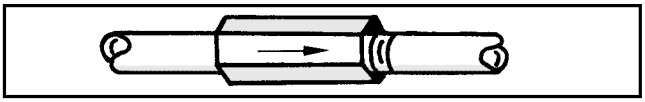
It is recognized that warnings should be as brief as possible, but the factors involved in excess flow valve failures to perform are not simple. They need to be fully understood. If there is a simple warning, it would be:

Make sure that the excess flow valve really closes when the flow exceeds normal transfer flow.

This bulletin is not intended to be an exhaustive treatment of excess flow valves, and certainly does not cover all safety practices that should be followed in installation, operation and maintenance of LP-Gas systems which include excess flow valves.

Selection and Installation

The selection of a given closing rating of an excess flow valve involves an analysis of the complete piping system and is beyond the scope of this bulletin.



It is sufficient to say that an excess flow valve must be installed in the correct direction and will close only if the flow of liquid or vapor exceeds its designed closing rating. Many valves have been installed with closing ratings considerably higher than any flow that could be obtained by a downstream rupture in piping or hoses and thus give none of the protection for which they are intended.

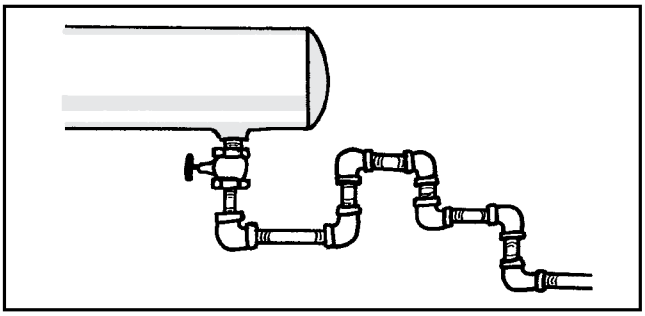
Engineered Controls International, Inc. provides excess flow valves with a number of closing ratings. Engineered Controls International, Inc. obviously can take no responsibility for the proper selection or correct installation of any valve.

Excess flow valves do not provide complete shut-off because there is a bleed at the check to permit pressure equalization.

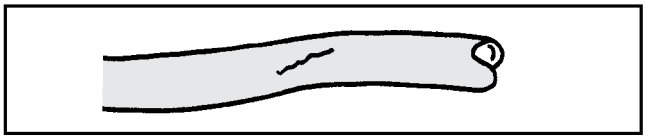
Causes of Failure to Close

Installers, LP-Gas plant managers and service personnel should be aware that the excess flow valves may not close if these conditions are present.

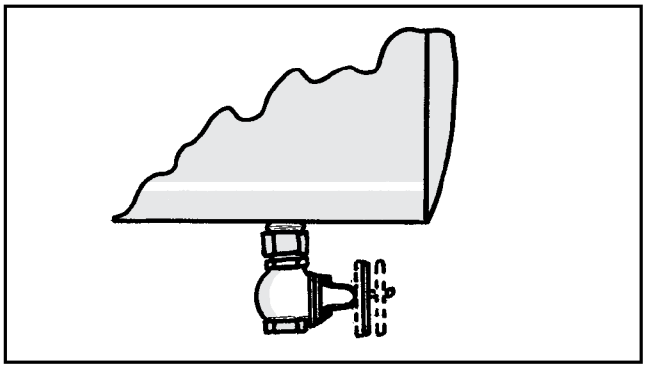
1. **The piping system restrictions (due to pipe length, branches, reduction in pipe size or number of other valves) decrease the flow rate to less than the valve's closing flow.**



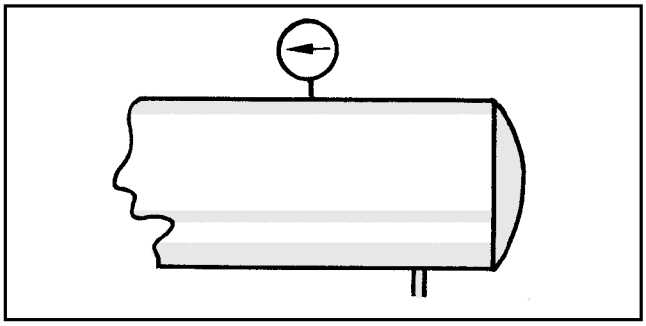
2. **The break or damage to the downstream line is not large enough to allow enough flow to close the valve.**



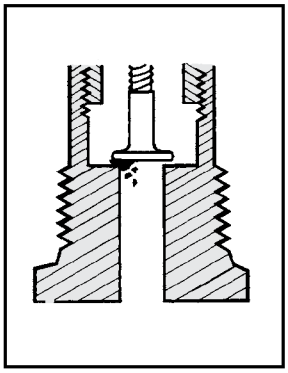
3. **A shut-off valve in the line is only partially open and will not allow enough flow to close the excess flow valve.**



4. **LP-Gas pressure upstream of the excess flow valve, particularly due to low temperature, is not high enough to produce a closing flow rate.**



5. **Foreign matter (such as welding slag, scale or sludge) is lodged in the valve and prevents closing.**



Because of these limitations, it is good industry practice to NOT rely entirely on excess flow valves for protection. Installation of emergency shut-off valves with remote controls is recommended in addition to excess flow valves.

Testing

The National Propane Gas Association Safety Bulletin #113-78 states:

> "In order to test an excess flow valve in a piping system, the flow through the valve must be made to exceed the valve's closing rating. This testing should only be attempted by trained personnel familiar with the process. If no one at the facility has experience in proper testing, outside expert help should be obtained. The exact procedure used may vary with the installation, advisability of gas discharge and availability of equipment.

In general, most testing makes use of the fact that excess flow valves are "surge sensitive" and will close quicker under a sudden flow surge than under steady flow. A sufficient surge can often be created by using a quick open/close valve to control sudden, momentary flow into a tank or piping section containing very low pressure. An audible click from the excess flow valve (and corresponding stoppage of flow) indicates its closure.

> A test involving venting gas to the atmosphere is hazardous and may be impractical, or illegal.

Any test of any excess flow valve will not prove that the valve will close in an emergency situation, due to reasons cited before. This test will only check the valve's condition, and the flow rate sizing for those test conditions."

General Warning

All ECII® products are mechanical devices that will eventually become inoperative due to wear, contaminants, corrosion and aging of components made of materials such as metal and rubber.

The environment and conditions of use will determine the safe service life of these products. Periodic testing at least once a year when tank pressures are low and maintenance, as required, are essential.

Because ECII® products have a long and proven record of quality and service, LP-Gas dealers may forget the hazards that can occur because an excess flow valve is used beyond its safe service life. Life of an excess flow valve is determined by the environment in which it "lives". The LP-Gas dealer knows better than anyone what this environment is.

NOTE: There is a developing trend in state legislation and in proposed national legislation to make the owners of products responsible for replacing products before they reach the end of their safe useful life. LP-Gas dealers should be aware of legislation which could effect them.

Troubleshooting Excess Flow Valve Installations

Periodical Inspections for Excess Flow Valves

> Excess flow valves should be tested and proven at the time of installation and at periodic intervals not to exceed one year. CAUTION: Testing an excess flow valve in the summer when tank pressures are high will not prove that the same valve will also function under low pressure conditions in the winter. Once a year testing should be conducted during the winter.

The test should include a simulated break in the line by the quick opening of a shut-off valve at the farthest point in the piping that the excess flow valve is intended to protect. If the excess flow valve closes under these conditions, it is reasonable to assume that it will close in the event of accidental breakage (clean break) of the piping at any point closer to the excess flow valve.

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> In order to test an excess flow valve in a piping system, the flow through the valve must be made to exceed the valve's closing rating. This testing should only be attempted by trained personnel familiar with the process. If no one at the facility has experience in proper testing, outside expert help should be obtained. The exact procedure used may vary with the installation, advisability of gas discharge and availability of equipment.

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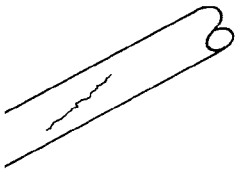
Any test of any excess flow valve will not prove that the valve will close in an emergency situation, due to reasons cited before. This test will only check the valve's condition and the flow rate sizing for those test conditions.

What prevents excess flow valves from closing when the line breaks?

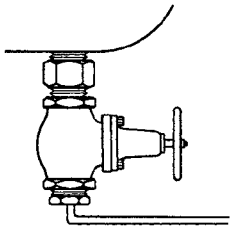
For one or a combination of the following reasons, excess flow valves have been prevented from closing in emergencies:

1. Not a Clean Break



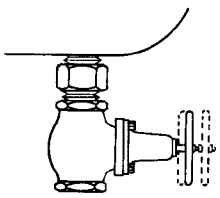
Hoses with a split or tear, and pipe lines not completely severed may be emitting LP-Gas in an amount insufficient to cause an "excess" flow. The amount of LP-Gas which can escape through such breaks may be even less than the flow during normal transfer service and under these conditions the excess flow valve could not be expected to close.

2. Line Restriction Too Great



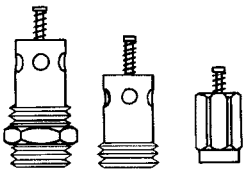
An excess flow valve installed in a tank outlet will not close if the line beyond it is reduced or if the flow is otherwise restricted by too many fittings or too long a run because the line is incapable of passing the amount of LP-Gas necessary to create an "excess" flow. This condition should be corrected when testing a system by simulating a break at the farthest possible point and replacing any restrictive hose, pipe or fittings.

3. Improper Operating Practice



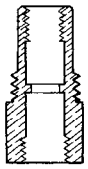
A restriction can also be imposed upon the excess flow valve by an improperly opened valve at the tank outlet. The shut-off valve should be either fully opened or fully closed. If "throttled," the valve could reduce the amount of LP-Gas passing through the excess flow valve in a sufficient amount to keep it from closing. Throttling operations should not be performed in the lines being protected by excess flow valves.

4. Improper Selection



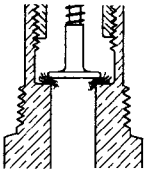
The many types of excess flow valves available are designed for specific jobs. The excess flow valve selected should remain open during normal flow but close at "excess" flow. An inspection which simulates a line break prior to start-up operations will determine if the proper valve has been selected.

5. Tampering with Excess Flow Valves



Sometimes an operator, annoyed with frequent closures of an excess flow valve with too low a rating, has mutilated the valve and forgotten to replace it with a properly rated excess flow valve. A pre-test of the system would reveal this and allow the excess flow valve to be replaced.

6. Impurities in the Line



Dirt, weld slag, broken drill taps, and various other foreign objects have been found jammed between the valve disc and valve seat to prevent excess flow valves from closing. A pre-test of the system would also discover this.

Excess Flow Valves

General Information

RegO® Excess Flow Valves have been designed, developed, and manufactured for a wide variety of industry needs for more than three decades.

Throughout the years, those concerned with installing and operating bulk plant facilities have looked to RegO® products with confidence for reliable, long-lasting valves as required by the National Fire Protection Association (NFPA) Standards 58 and 59, as well as any state, provincial, and local regulations.

It is a responsibility we have not taken lightly. RegO® products continue to not only assess the most effective designs, but anticipate and meet the industry's changing requirements. Toward that goal, RegO® products include over fifty different types and sizes of excess flow valves (most of which are listed by Underwriters Laboratories) to meet the needs of the LP-Gas and anhydrous ammonia industries.

An Explanation and Warning

An excess flow valve is a spring-loaded check valve which will close only when the flow of fluid through the valve generates sufficient force to overcome the power of the spring holding it open. Each valve has a closing rating in gallons per minute and CFH/air.

The selection of a proper closing rating is critical. It requires a technical understanding of the flow characteristics of the piping system, including restrictions of the piping and other valves and fittings downstream of the excess flow valve.

System designers and operating people must understand why an excess flow valve, which remains open in normal operations, may fail to close when an accident occurs.

Warning: A downstream break in piping or hoses may not result in sufficient flow to close the valve.

How They Work

Excess flow valves permit the flow of liquid or vapor in either direction. This flow is controlled in only one direction (the direction of the arrow stamped on the valve). If the flow in that direction exceeds a predetermined rate (shown in this catalog for each valve), the valve automatically closes.

The valve disc is held in the open position by a spring. When the flow creates a pressure drop across the valve disc that overcomes the preset load on the spring, the valve disc moves to the closed position. It remains closed until the force on both sides of the valve disc are approximately equal (a small bleed hole in the disc of each valve permits equalization), then the spring automatically reopens the valve. When a line is completely broken, the pressure cannot equalize and the excess flow valve remains closed until the line is repaired. Because the bleed hole in each valve disc permits equalization of pressure, excess flow valves do not provide a 100 percent type shut-off.

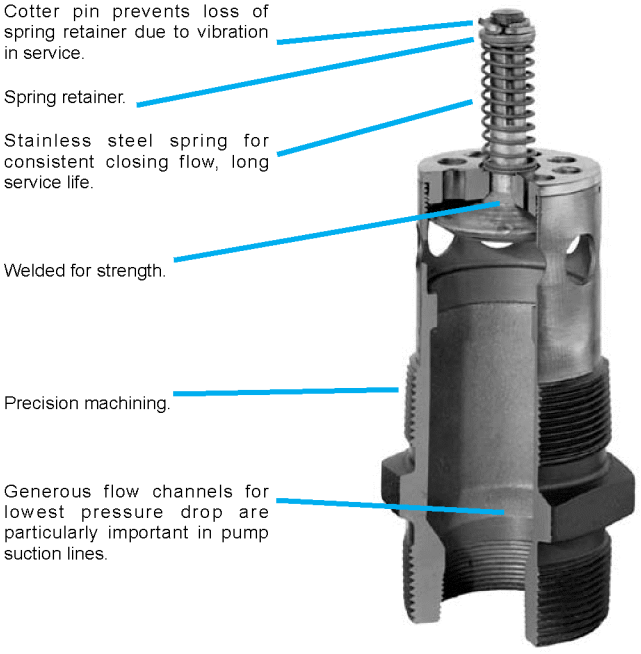
Proper Installation

Since excess flow valves depend on flow in order to close, the line downstream of the excess flow valve should be large enough not to excessively restrict the flow. If the piping is too small, unusually long or restricted by too many elbows, tees and other fittings, consideration should be given to the use of larger size pipe fittings.

An excess flow valve in a pump suction line cannot be expected to close in the case of a clean break in the line beyond the pump, as the pump constitutes too great a restriction, even if running.

Good piping practices dictate the selection of an excess flow valve with a rated closing flow of approximately 50 percent greater than the anticipated normal flow. This is important because valves which have a rated closing flow very close to the normal flow may chatter or slug closed when surges in the line occur during normal operation, or due to the rapid opening of a control valve.

All installations must be in accordance with NFPA Standards 58 and 59, as well as state, provincial and local regulations.



The Limitations of Excess Check Valves for LP-Gas

Excess flow check valves have been of help in limiting gas loss in many incidents involving breakage of hoses and transfer piping. Thus, they do provide a useful safety function in LP-Gas systems. However, there have also been transfer system accidents where excess flow valves have been ineffective in controlling gas loss due to a variety of conditions and to the inherent limitations of these valves. This bulletin explains what protection excess flow valves can offer, points out conditions which can interfere with that protection, and offers suggestions for effective excess flow valve installation.

An excess flow valve is a protective device to help control the discharge of product in the event of complete breakage of pipe lines or hose rupture. However, an excess flow valve can only offer limited protection from gas discharge, because it will only close under those conditions which cause the flow through the valve to exceed its rated closing flow, and even when closed it necessarily allows some "bleed" past the valve.

An excess flow valve is not designed to close and thus may not provide protection, if any of the following conditions are present:

1. The piping system restrictions (due to pipe length, branches, reduction in pipe size, or number of other valves) decrease the flow rate to less than the valve's closing flow. (Valve should be selected by closing flow rating — not just by pipe size).
2. The break or damage to the downstream line is not large enough to allow enough flow to close the valve.
3. A shut-off valve in the line is only partially open and will not allow enough flow to close the excess flow valve.
4. LP-Gas pressure upstream of the excess flow valve, particularly due to low temperature, is not high enough to produce a closing flow rate.
5. Foreign matter (such as welding slag) is lodged in the valve and prevents its closing.
6. A buildup of process material (sludge), which may be found in LP-Gas, may occur over a period of time and cause the valve to stick open.
7. The piping break or damage occurs upstream of an in-line excess flow valve, so the escaping product is not passing through the valve.
8. The flow through the valve is in the wrong direction. (Excess flow valves only respond to flow in one direction.)
9. The excess flow valve has been damaged, or is otherwise not in operating condition.

Because of these limitations of excess flow valves, they *should not* be relied upon as the only means of controlling the escape of product in the event of piping damage. When possible, shut-off protection by quick closing valves, with shut-off controls accessible in spite of likely line damage, should be provided in addition to, or instead of excess flow valves.

Where excess flow valves are installed, they should be checked to see that:

1. They are installed in the correct direction — the arrow on the valve indicates the shut-off direction.
2. The flow rating on the valve is proper for the installation. The rating must be above the normal system flow, but not higher than necessary to prevent "nuisance" closing in normal conditions. If the manufacturer's catalog information is not sufficient, the valve suppliers can provide sizing assistance.
3. In-line excess flow valves are installed so likely piping damage will occur downstream of the valve and will not separate the valve from the upstream piping.

When the excess flow valves can be examined separate from the line (before the installation or if removed for system maintenance), they should be checked to see that the parts are in good condition and that the poppet can be pushed fully closed.

Testing of Excess Flow Valves

In order to test an excess flow valve in a piping system, the flow through the valve must be made to exceed the valve's closing rating. This testing should only be attempted by trained personnel familiar with the process. If no one at the facility has experience in proper testing, outside expert help should be obtained. The exact procedure used may vary with the installation, advisability of gas discharge, and availability of equipment.

In general, most testing makes use of the fact that excess flow valves are "surge sensitive" and will close quicker under a sudden flow surge than under steady flow. A sufficient surge can often be created by using a quick-closing valve to control sudden, momentary flow into a tank or piping section containing very low pressure. An audible click from the excess flow valve (and corresponding stoppage of flow) indicates its closure.

A test involving venting gas to the atmosphere is hazardous and may be impractical, or illegal.

Any test of any excess flow valve will not prove that the valve will close in an emergency situation, due to reasons cited before. This test will only check the valve's condition, and the flow rate sizing for those test conditions.

For additional information on excess flow valves and other means of shut-off protection, contact Engineered Controls International, Inc. and refer to NFPA 58.

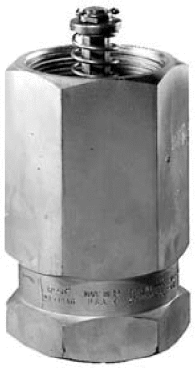
Prepared by
NATIONAL PROPANE GAS ASSOCIATION

Excess Flow Valves for Liquid or Vapor Service

Designed for top mounting in storage tank manhole covers for liquid or vapor applications. The tapped inlet allows for an optional 1" NPT dip pipe connection to withdraw liquid from the top of the tank.

The 1519C4 is designed for installation in long line or branch piping applications.

1519C2



1519C4

Part Number	Inlet Connection NPT	Filling Connection F. NPT	Wrench Hex Flats	Approximate Closing Flows		
				Liquid (GPM Propane)	Vapor SCFH (Propane)	
					25 PSIG Inlet	100 PSIG Inlet
1519C2	1½" Male*	1"	2¼"	25	5,000	8,800
1519C4	2" Female	2"	3"	170	28,590	48,600

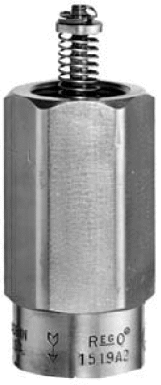
* 1" Female Dip Pipe Connection

** Based on horizontal installation of excess flow valve.
Flows are slightly more when valves are installed with outlet up; slightly less when installed with outlet down.

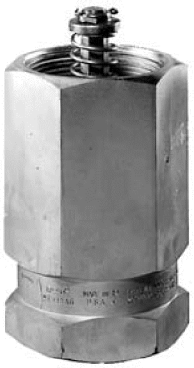
NOTE: Multiply flow rate by .94 to determine liquid butane flow.

Excess Flow Valves for Liquid or Vapor Line Service

Designed for top installation, in any position, in liquid or vapor service lines. They are intended for long lines or branch piping where tank mounted excess flow valves cannot suffice.



1519A2



A1519A6

Part Number	Brass or Steel	Inlet Connection NPT	Outlet Connection F. NPT	Wrench Hex Flats	Approximate Closing Flows*		
					Liquid (GPM Propane)	Vapor SCFH (Propane)	
						25 PSIG Inlet	100 PSIG Inlet
1519A2	Brass	1"	1"	1¾"	25	5,000	8,800
A1519A2	Steel						
1519A3	Brass	1½"	1½"	2¼"	60	11,500	20,200
1519A4		2"	2"	3"	100	19,000	34,500
A1519A4	Steel						
1519B4	Brass				133	27,700	50,300
A1519B4	Steel						
A1519A6		3"	3"	4"	225	45,000	82,000

* Based on horizontal installation of excess flow valve. Flows are slightly more when valves are installed with outlet up; slightly less when installed with outlet down.

NOTE: Multiply flow rate by .94 to determine liquid butane flow and by .90 to determine liquid anhydrous ammonia flow.

Excess Flow Valves for Liquid or Vapor

Designed for liquid or vapor use for filling, withdrawal and vapor equalizing in container or line applications. They are intended for long lines or branch piping where tank-mounted excess flow valves are inadequate.

Part Number	Brass or Steel	A Inlet Connection (M. NPT)	B Outlet Connection (F. NPT)	C Wrench Hex Flats	D Effective Length (Approx.)	Approximate Closing Flow*		
						Liquid (GPM Propane)	Vapor SCFH (Propane)	
							25 PSIG Inlet	100 PSIG Inlet
12472	Brass	¾"	¾"	1⅜"	1⅜"	4	1,050	1,700
3272E						10	2,100	3,700
3272F						15	2,800	5,000
3272G						20	3,700	6,900
A3272G	Steel							
3282A	Brass	1¼"	1¼"	2"	1 15/16"	30	5,850	10,000
3282B						40	7,600	13,600
3282C						50	9,000	16,300
A3282C	Steel							
7574	Brass	1½"	1½"	2¼"	1¾"	90	15,200	28,100
7574L						70	14,000	25,000
3292A		2"	2"	2⅞"	1⅞"	75	14,200	24,800
A3292A	Steel							
3292B	Brass					100	18,100	32,700
A3292B	Steel							
A3292C						122	22,100	37,600

* Based on horizontal installation of excess flow valve. Flows are slightly more when valves are installed with outlet up; slightly less when installed with outlet down.

NOTE: Multiply flow rate by .94 to determine liquid butane flow and by .90 to determine liquid anhydrous ammonia flow.

Excess Flow Valves for Container Service

Designed for mounting in threaded full or half couplings in container installations. They may be used for filling, withdrawal or vapor equalizing applications. The exceptionally low pressure drop makes them ideal for pump suction lines. If a riser pipe to the vapor space is used with these valves, the minimum inside diameter of the riser pipe must be at least two times the valve thread size in order not to restrict flow to the side inlet ports.

Part Number	For Use With This Type Coupling	Inlet Connection M. NPT	Outlet Connection NPT	Wrench Hex Flats	Approximate Closing Flow*		
					Liquid (GPM Propane)	Vapor SCFH (Propane)	
						25 PSIG Inlet	100 PSIG Inlet
A8523	Half	¾"	¾" Male	1⅛"	15	5,170	8,800
A8525	Half	1¼"	1¼" Male	1¾"	35	12,540	21,560
A7537L4	Half	2"	2" Male and 1¼" Female	2⅝"	75	13,000	25,600
A7537L4F	Full						
A7537N4	Half				125	25,000	42,500
A7537N4F	Full						
A7537P4	Half				150	30,500	52,000
A7537P4F	Full						
A7539R6	Half	3"	3" Male and 2" Female	3¾"	150	32,100	55,500
A7539R6F	Full						
A7539T6	Half				200	39,400	68,300
A7539T6F	Full						
A7539V6	Half				250	51,100	88,700
A7539V6F	Full						

* Based on horizontal installation of excess flow valve. Flows are slightly more when valves are installed with outlet up; slightly less when installed with outlet down.

NOTE: Multiply flow rate by .94 to determine liquid butane flow and by .90 to determine liquid anhydrous ammonia flow.

Excess Flow Valves for Vapor or Liquid

Designed especially for filling, withdrawing or vapor equalizing in half and full coupling installations. Ideal for container service where welded-in dip pipes are not provided. For vapor use, mount in the bottom opening with a threaded dip pipe. For liquid use, mount in the top opening with a threaded dip pipe. These may also be installed in pipe lines provided the connection is made to the male inlet thread and not the female dip pipe connection.

Part Number	Inlet Connection NPT	Outlet Connection F. NPT	Wrench Hex Flats	Approximate Closing Flows***		
				Liquid (GPM Propane)	Vapor SCFH (Propane)	
					25 PSIG Inlet	100 PSIG Inlet
A2137	2"*	2" Male and 1¼" Female	2 7/16"	50	10,000	17,000
A2137A				70	14,000	25,000
2139	3"**	3" Male and 2" Female	3½"	125	26,500	46,000
2139A				160	32,700	57,200

* 1¼" F. NPT Dip Pipe Connection
** 2" F. NPT Dip Pipe Connection
*** Based on horizontal installation of excess flow valve. Flows are slightly more when valves are installed with outlet up; slightly less when installed with outlet down.

NOTE: Multiply flow rate by .94 to determine liquid butane flow and by .90 to determine liquid anhydrous ammonia flow.

Excess Flow Valves for Flange Mounting in Container Service

Designed for mounting in flanged tank connections with internal threads in the bottom of a container. They may be used in filling, withdrawal or vapor equalizing application. They provide high flow capacity with low pressure drop to minimize pump inlet line cavitation.

If a riser pipe to the vapor space is used with these excess flow valves, the minimum inside diameter of the riser pipe must be at least two times the valve thread size in order not to restrict flow to the side inlet ports.

Flange mounted excess flow valves are readily accessible for servicing and completely enclosed and protected in event of fire. Because there is no direct connection between external piping and the valve, stresses imposed on piping will not affect the excess flow valve.

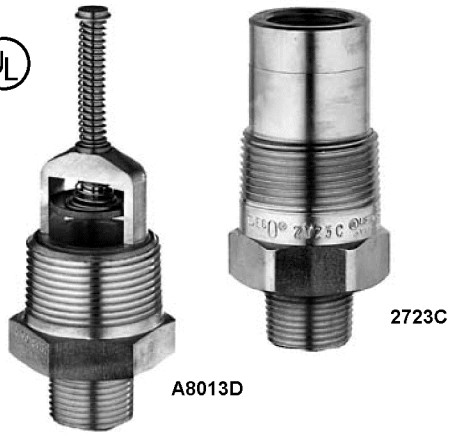
Part Number	Inlet Connection NPT	For Installation	Approximate Closing Flows*		
			Liquid (GPM Propane)	Vapor SCFH (Propane)	
				25 PSIG Inlet	100 PSIG Inlet
A3500L4	2"	Slotted Body	75	13,000	22,500
A3500N4			125	25,000	42,500
A3500P4			150	30,500	52,000
A3500R6	3"		150	32,100	55,500
A3500T6			200	39,400	68,300
A3500V6			250	51,100	88,700
A4500Y8	4"		500	89,000	154,000

* Based on horizontal installation of excess flow valve. Flows are slightly more when valves are installed with outlet up; slightly less when installed with outlet down.

NOTE: Multiply flow rate by .94 to determine liquid butane flow and by .90 to determine liquid anhydrous ammonia flow.

Excess Flow Valves for Liquid or Vapor Withdrawal

These valves are designed for bottom mounting in consumer storage tanks for liquid service. They may also be top mounted for vapor service. These valves are designed especially for use with RegO® globe and angle valves.



Part Number	Inlet Connection M. NPT	Outlet Connection NPT	Wrench Hex Flats	Approximate Closing Flow**		
				Liquid (GPM Propane)	Vapor SCFH (Propane)	
					25 PSIG Inlet	100 PSIG Inlet
A8013D	1¼"	¾"	1⅞"	39	8,700	14,700
A8013DA		1"		44		
A8013DB		1¼"		55	10,900	19,300
2723C	1¼"	¾"	1 1/16"	20	3,900	6,900

* ¾" F. NPT Dip Pipe Connection
** Based on horizontal installation of excess flow valve. Flows are slightly more when valves are installed with outlet up; slightly less when installed with outlet down.

NOTE: Multiply flow rate by .94 to determine liquid butane flow and by .90 to determine liquid anhydrous ammonia flow.

Excess Flow Valve for Pressure Gauges

Designed for container use in pressure gauge installations to minimize excess gas discharge in the event the pressure gauge is sheared. A suitable shut-off valve should be installed between this valve and the pressure gauge to allow convenient gauge replacement.

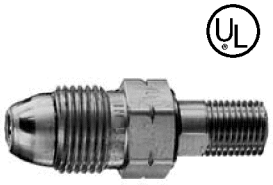
Part Number	Inlet Connection M. NPT	Outlet Connection F. NPT	Wrench Hex Flats	Approximate Closing Flow*		
				Liquid (GPM Propane)	Vapor SCFH (Propane)	
					25 PSIG Inlet	100 PSIG Inlet
2884D	¾"	¼"	1 1/16"	N/A	60	110

* Based on horizontal installation of excess flow valve. Flows are slightly more when valves are installed with outlet up; slightly less when installed with outlet down.

NOTE: Multiply flow rate by .94 to determine liquid butane flow.

Excess Flow Valve for DOT Cylinders

Designed for use on portable systems with vapor or liquid including torches, heaters, lead melting burners, tar and asphalt burners, wallpaper steamers and other applications involving portable DOT cylinders. The POL inlet attaches directly to the cylinder valve and the outlet mounts to the regulator.



Part Number	Inlet Connection	Outlet Connection	Wrench Hex Flats	Approximate Closing Flow*		
				Liquid (GPM Propane)	Vapor SCFH (Propane)	
					25 PSIG Inlet	100 PSIG Inlet
3199W	Male POL	¼"	⅞"	.95	265	500

* Based on horizontal installation of excess flow valve. Flows are slightly more when valves are installed with outlet up; slightly less when installed with outlet down.

NOTE: Multiply flow rate by .94 to determine liquid butane flow.

Chek-Lok® Excess Flow Valves

Designed to provide a convenient means of withdrawing liquid from stationary containers prior to moving the container.

NFPA Pamphlet 58 standards require: 1) containers with 125 gallons water capacity, or more, have a connection for liquid evacuation which is at least ¾" NPT, and 2) containers designed for stationary use, have no more propane than 5% of their water capacity in liquid form during transportation. These rules apply to containers manufactured after July 1, 1961.

The Chek-Lok® permits one transfer shut-off valve with an adapter to be used interchangeably on a number of tanks. With a Chek-Lok® on each tank and a high capacity RegO® 7550P Series transfer valve and adapter on all your service and delivery trucks – the need for individual transfer valves is eliminated. This provides a substantial savings without sacrificing safety.

Chek-Lok® Operation

Instructions to Open Chek-Lok®

1. Loosen cap to vent any accumulated LP-Gas from the Chek-Lok. After venting stops, remove the cap. If venting does not stop, retighten the cap and use other approved means to withdraw liquid from the container.

   NOTE: Use a suitable size wrench when removing the cap and adapter from the Chek-Lok. Do not allow the Chek-Lok to un-thread from the tank during removal. When necessary, use a second wrench to secure the Chek-Lok in position.

2. Before beginning withdrawal, securely connect an ECII® 7550P angle valve or suitable shut-off valve to the adapter. Fully open the shut-off valve – the valve's handwheel must be fully opened before connecting adapter to tank.

3. Completely thread the adapter and shut-off valve assembly onto the Chek-Lok by turning adapter's coupling nut clockwise until it is tight. Immediately close the shut-off valve. Listen for an audible click to signal that the Chek-Lok has opened and is actuated for liquid withdrawal. The flow can now be controlled by the transfer valve.

4. Check the coupling nut and adapter assembly for leaks using a suitable leak detection solution.

   If the Chek-Lok fails to open after following this procedure, the pressure downstream of the shut-off valve should be increased to equalize pressure in the Chek-Lok. It is simple to equalize pressures using vapor from either the vapor return valve or service valve, or from a hose end valve connected to the delivery truck.

Instructions to Close Chek-Lok®

1. To re-lock the Chek-Lok, container pressure must be in excess of 35 PSIG. Close shut-off valve and disconnect the hose or piping.

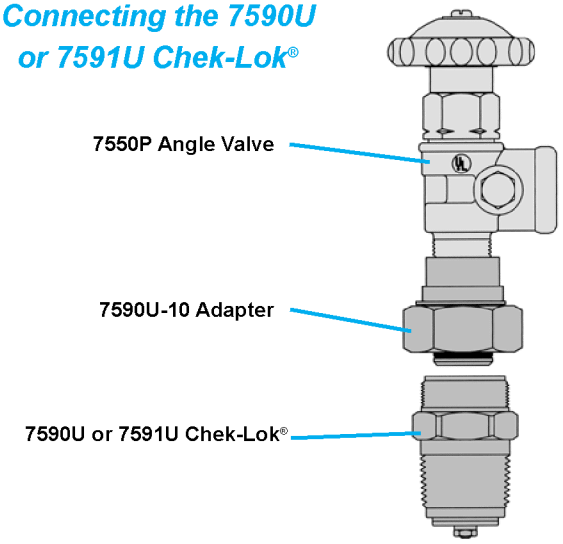
2. Open shut-off valve fully. Liquid discharging to the atmosphere should cause the excess flow feature of the Chek-Lok to close, provided tank pressure is 35 PSIG or more.

   If, for any reason, the excess flow valve does not close, the shut-off valve must be closed immediately and must not be removed until the system can be evacuated and the unit repaired.

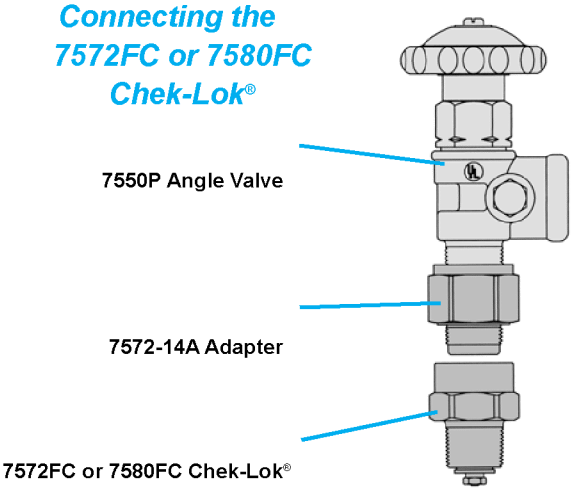
3. After the excess flow valve closes, remove the Adapter and Shut-Off Valve Assembly.

4. Clean face of Chek-Lok and install the Cap with a gasket. IMPORTANT: Only use the proper Chek-Lok Cap. Do not use a standard pipe cap.

Connecting the 7590U or 7591U Chek-Lok®



Connecting the 7572FC or 7580FC Chek-Lok®



In the absence of a 7550P transfer valve, a ¾" A7505A Globe Valve or A7506AP Angle Valve may be used. Follow the above procedures using the 7572C-15A adapter instead of the 7572C-14A. Use an ECII 7550P without an adapter in an emergency only.

CAUTION: Always wear approved protective gloves when working with the Chek-Lok®. Do not vent LP-Gas near possible source of ignition.

7590U and 7591U Chek-Lok® Valves

Designed with unique 1" NPS threads on both Chek-Lok® outlet and adapter inlet. This helps prevent activation of the Chek-Lok® without use of the 7590U-10 adapter. Extra strength connection between body and adapter provides increased strength. An o-ring seal on adapter provides a gas tight seal before the adapter opens the equalizing stem.

These Chek-Loks® are also designed for use on permanent installations provided the excess flow valve is sized properly for the system and piping. NOTE: In some cases, it may be necessary to use an in-line excess flow valve to protect the downstream piping. This valve is not recommended for use as a liquid source for pumps.

7590U
with Cap

7590U-10
Union Style Adapter

Chek-Lok® Number	Inlet Connection	Outlet Connection	Body Wrench Hex Flex	Approximate Effective Length	Cap Wrench Hex Flats	Approximate Closing Flow, Liquid GPM (Propane)*
7590U	¾" M. NPT	1⅝" UNF	1⅝"	1 7/16"	1 5/16"	20
7591U	1¼" M. NPT		1¾"	1 11/16"		35

* Based on horizontal installation of excess flow valve. Flows are slightly more when valves are installed with outlet up, and slightly less when installed with outlet down.
Note: Multiply flow rate by .94 to determine liquid butane flow.

Union Style Adapters for 7590U and 7591U

The 7590U-10 adapter must be used to connect to the 7590U and 7591U Chek-Lok. This insures a proper connection to open the check mechanism. A built in nylon gasket provides a gas tight seal.

Adapter Number	Inlet Connection	Outlet Connection	Wrench Hex Flats
7590U-10	1⅝" UNF	¾" F. NPT	1¾"

Chek-Lok® Liquid Evacuation Adapter for 7590U and 7591U Valves

Designed specifically for use with RegO® 7590U and 7591U Chek-Lok® Excess Flow Valves. Adapter's operating handle opens and closes equalizing stem in the Chek-Lok® valve. Eliminates gas flow through Chek-Lok® valve when installing or removing adapter. Use of RegO® adapter ensures proper connections and opening of the check mechanism.

Adapter Number	Inlet Connection	Outlet Connection	A Wrench Hex Flats	B Approximate Length
7590U-20	1 5/8" F. UNF	3/4" F. NPT	1 3/4" F. NPT	4 1/8" F. NPT

Adapters for the 7572FC and 7580FC

These adapters must be used to connect to the 7572FC and 7580FC Chek Loks to open the check mechanism properly. A built in nylon gasket provides a gas tight seal.

7572C-14A

7572C-15A

Adapter Number	Inlet Connection	Outlet Connection	Wrench Hex Flats
7572C-14A	¾" M. NPT	¾" F. NPT	1⅜"
7572C-15A		¾" M. NPT	

Double-Check Filler Valves

General Information

RegO® Double-Check Filler Valves incorporate a resilient upper check valve, normally designated as a filler valve, and a lower check valve, commonly called a back pressure check valve. Available in a range of sizes to cover virtually all LP-Gas storage containers, these valves are UL listed and meet NFPA standards, as well as other safety requirements.

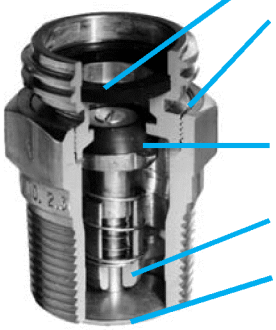
Flow of liquid into the storage container opens both check valves. When flow stops, they both are designed to close automatically to permit the operator to disconnect the hose coupling. The automatic closing action also helps prevent the discharge of container contents in the event of hose failure. The lower back pressure check affords extra protection by restricting the discharge if the upper check fails to function properly due to accidents or other causes.

The double back check construction allows emergency inspection, repair, or replacement of the upper fill assembly without removing product from the container. When the upper filler valve body is removed, the lower back check valve provides a seal, permitting only some leakage, allowing a new upper filler valve body to be installed.

Spare Gasket Ordering Information

ACME	Part Number
1¼"	A2797-20R
1¾"	A2697-20R
2¼"	A3184-8R
3¼"	A3194-8R

Seal cap made of tough, resilient molded plastic. Protects threads and internal working parts. Caps are designed to contain normal tank pressures, and must be kept on valves at all times.



Long-wearing gasket permits hand-tight connection of cap and hose coupling.

Safety groove is designed to shear below the ACME thread, leaving the valve seats closed and unaffected if the delivery truck pulls away with the hose connected.

Seat disc of special synthetic composition is extra thick for longer life.

Valve guide is precision machined to assure positive seal.

Exclusive swing-away lower back check valve for extra fast filling is provided on Models 6579 and 6587. Differs from conventional design by swiveling to a vertical position when opened.

Double Check Filler Valves for Forklift, Motor Fuel and RV Tanks

Designed to provide fast filling of forklift, motor fuel, and recreational vehicle tanks.

7647HF

7647H

7647SA

Lanyard and Cap

7647SC

7647DC

Part Number		A Hose Connection	B Tank Connection M. NPT	C Wrench Flats	D Effective Length (Approx.)	Propane Liquid Capacity at Various Differential Pressures (GPM)***				
Basic	w/Lanyard and Cap					10 PSIG	20 PSIG	30 PSIG	40 PSIG	50 PSIG
7647H	-	½" F. NPT	¾"	1½"	2 7/16"	14	20	24	27	50
7647HF	-	½" SAE Flare			2⅝"					
-	7647DC	1¾" ACME & F. POL			3"					
-	7647SA**	1¾" ACME			3 1/16"					
-	7647SC*			1¾"	2¼"*					

* Large 1¾" hex wrench flats.
** 30° angle on 1-1/4" ACME hose connection.
*** Multiply flow rate by .94 to determine liquid butane capacity.

Double-Check Filler Valves for Large Motor Fuel and ASME Tanks

Designed to provide fast filling of large motor fuel and ASME domestic tanks.

The 6579 Series incorporates a swing-away lower check which greatly reduces pressure drop across the valve. This lower pressure drop promotes faster filling rates and greater efficiency resulting in more profitable operations.

7579 6579 7579P

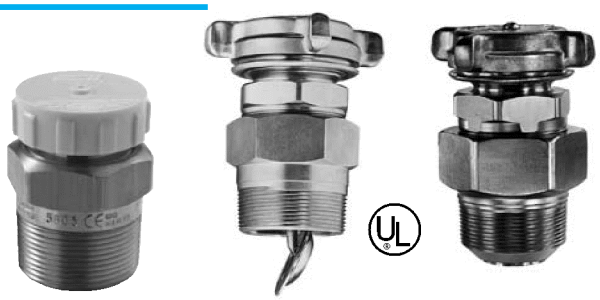
Part Number		ACME Hose Connection	Tank Connection M. NPT	Wrench Hex Flats	Propane Liquid Capacity at Various Differential Pressures (GPM)				
Cap Only	Cap, Chain and Ring				5 PSIG	10 PSIG	25 PSIG	50 PSIG	75 PSIG
7579	**7579C**	1¾"	1¼"	1⅞"	50	70	111	157	192
7579P	**-**		1¼"		37	52	82	116	142
6579**	**6579C****		1¼"		78	110	174	246	301

* Incorporates ¾ F. NPT dip pipe connection
** Swing-away lower back check valve design for higher filling rate.
NOTE: Multiply flow rate by .94 to determine liquid butane capacity.

Double Check Filler Valves for Delivery Truck Tanks and Large Storage Containers

Designed to provide fast filling of bobtails, transports and large bulk storage tanks.

The 6587CD incorporates a swing-away lower check which greatly reduces pressure drop across the valve. This lower pressure drop promotes faster filling rates and greater efficiency resulting in more profitable operations.



7579S 6587EC 3197C

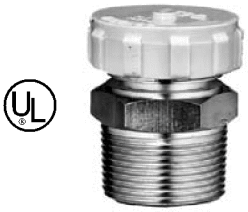
Part Number	ACME Hose Connection	Tank Connection M. NPT	Wrench Hex Flats	Propane Liquid Capacity at Various Differential Pressures (GPM)				
				5 PSIG	10 PSIG	25 PSIG	50 PSIG	75 PSIG
7579S	1¾"	1½"	2"	44	62	98	139	170
6587EC*	2¼"	2"	2⅞"	92	130	206	291	356
3197C	3¼"	3"	4"	148	210	332	470	575

* Swing-away lower back check valve design for higher filling rates.
NOTE: Multiply flow rate by .94 to determine liquid butane capacity.

Single Check Filler Valves for Storage Tanks with Supplementary Back Check Valves

Designed for use with RegO® Back Check Valves to provide fast filling of bulk storage tanks. Also may be used as a spare or replacement part.

These single check filler valves must never be installed directly into container couplings. They must be used with the appropriate back check valve to comply with NFPA Pamphlet #58.



3174C

3194C, 6584C

Part Number	ACME Hose Connection	Outlet Connection M. NPT	Wrench Hex Flats	Propane Liquid Capacity at Various Differential Pressures (GPM)				For Use With Back Check Valve:
				5 PSIG	10 PSIG	25 PSIG	50 PSIG	
3174C	1¼"	1¼"	1¾"	23	33	52	74	3176
6584C*	2¼"	2"	2⅜"	156	220	348	492	A3186
3194C	3¼"	3"	3½"	147	208	329	465	A3196

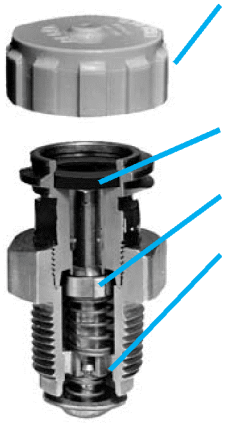
* Stem Assembly designed for higher filling rates.
NOTE: Multiply flow rate by .94 to determine liquid butane capacity.

Vapor Equalizing Valves

General Information

RegO® Vapor Equalizing Valves consist of an upper back check valve and lower excess flow valve. In the closed position, the attachment of a vapor hose coupling with its projecting nozzle, opens the back check valve to permit flow in either direction. The lower excess flow valve is designed to close automatically when flow out of the container being filled exceeds the rated capacity. The valve closes automatically when the coupling is removed. Like the double-check filler valves, the vapor equalizing valves utilize a two-piece body construction. The lower excess flow valve will permit some leakage when the upper back check valve is removed for emergency repairs or replacement.

RegO® Vapor Equalizing Valves are designed for use in both ASME and DOT containers.



Seal cap made of tough, resilient molded plastic. Protects threads and internal working parts. Caps are designed to contain normal tank pressures, and must be kept on valves at all times.

Long-wearing gasket permits hand-tight connection of cap and hose coupling.

Seat disc of special synthetic composition is extra thick for longer life.

Valve guide is precision machined to assure positive seal.

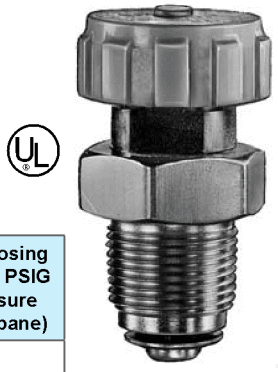
Spare Gasket Ordering Information

ACME	Part Number
1¼"	**A2797-20R**
1¾"	**A2697-20R**

Double Check Vapor Equalizing Valves for ASME and DOT Containers

Designed to facilitate loading operations by providing equalization of pressures in the supply and storage containers. The supplementary excess flow valve closes when the flow from the container being filled exceeds a predetermined rate.

The 7573 Series is designed for use in bulk delivery systems and motor fuel containers. The 3183AC is designed for use in delivery trucks and other large containers.



Part Number		ACME Hose Connection	Tank Connection M. NPT	Wrench Hex Flats	Approx. Closing Flow at 100 PSIG Inlet Pressure (SCFH/Propane)
Basic	W/ Chain & Cap				
7573D	**7573DC**	1 1/4"	3/4"	1 1/4"	4,100
-	**3183AC**	1 3/4"	1 1/4"	2"	10,000

Single Check Vapor Equalizing Valves for ASME and DOT Containers with Supplementary Excess Flow Valves

Designed for use with RegO® Excess Flow Valves to facilitate loading operations by providing equalization of pressures in the supply and storage containers. Also may be used as a spare or replacement part.

These vapor equalizing valves must never be installed directly into container couplings. They must be used with the appropriate excess flow valve to comply with NFPA Pamphlet #58.

Part Number		Inlet Connection	Outlet Connection	Wrench Hex Flats	Approximate Closing Flow at 100 PSIG Inlet Pressure (SCFH/Propane Vapor)	For Use With Excess Flow Valve:
Basic	With Cap & Chain					
3170	-	1¼"	¾"	1¼"	7.600	3272E
-	3180C	1¾"	1¼"	1¾"	10,000	3282A

Back Pressure Check Valves

General Information

RegO® Back Pressure Check Valves are designed to allow flow in one direction only. The check, normally held in the closed position by a spring, precludes the possibility of flow out of the container. When flow starts into the container, the pressure overcomes the force of the spring to open the check. When the flow stops or reverses, the check closes.

Metal-to-metal seats will allow slight leakage after closure. These valves will restrict the escape of container contents in the event of accidental breakage of the piping or fittings.

Back Pressure Valves for Container or Line Applications

Designed to provide protection of a container opening when desired flow is always into the vessel. May be used in line applications where flow must be limited to one direction.

When used with the appropriate single check filler valve, the combination forms a double check filler valve suitable for use in filling of bulk storage tanks.

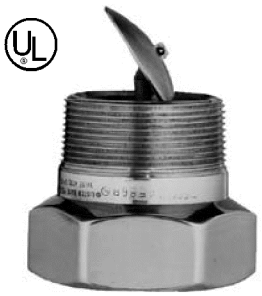
A3176

A3187S

Part Number		A Inlet Connection F. NPT	B Outlet Connection M. NPT	C Wrench Hex Flats	D Effective Length (approx.)	Propane Liquid Capacity at various differential pressures (GPM)			
Brass	Steel					5 PSIG	10 PSIG	25 PSIG	50 PSIG
3146	A3146	3/4"	3/4"	1 3/8"	1 15/16"	11	16	25	36
3146S*									
3176	A3176	1 1/4"	1 1/4"	2"	1 3/8"	28	40	63	89
	A3276BC				2 1/2"	32	45	73	103
	A3186	2"	2"	2 7/8"	2 7/16"	124	175	276	391
	A3187S*	2" M & 1 1/4" F	2" M & 1 1/4" F	2 3/8"	4 3/8"	60	110	225	350
	A3196	3"	3"	4"	3 15/16"	297	420	664	939

*Soft seat version.
NOTE: Multiply flow rate by .94 to determine liquid butane capacity and by .90 to determine liquid anhydrous ammonia capacity.

Swing-Away Back Pressure Check Valves for Container or Line Applications



Designed to provide protection of a container opening when desired flow is always into the vessel. May also be used in the line applications where flow must be limited to one direction.

When used with the appropriate single check filler valve, the combination forms a double check filler valve suitable for use in filling of bulk storage tanks.

The swing-away check offers more efficient flow rates than conventional designs. It swivels open vertically to reduce pressure drop across the valve and improves flow rates.

Part Number		Inlet Connection F. NPT	Outlet Connection M. NPT	Wrench Hex Flats	Propane Liquid Capacity at Various Differential Pressures (GPM)			
Brass	Steel				5 PSIG	10 PSIG	25 PSIG	50 PSIG
6586C	A6586C	2"	2"	2⅞"	190	270	420	600

NOTE: Multiply flow rate by .94 to determine liquid butane capacity.

Back Pressure Check Valves for Flanged Installation

A3400L6

Designed to provide high flow capacity and allow more efficient tank filling than conventional designs. The unobstructed throat area reduces flow turbulence through the valve, thereby reducing pressure drop. Large flow channels and spacious side ports assure ample capacity for the most demanding high capacity filling operations.

The valve is designed for installation in internally threaded flanges in container bottoms.

Part Number	Flange Connection M. NPT	Wrench Hex Flats	Overall Length	Propane Liquid Capacity at Various Differential Pressures (GPM)			
				5 PSIG	10 PSIG	25 PSIG	50 PSIG
A3400L4	2"	Slotted	5¼"	223	316	500	707
A3400L6	3"		5 3/32"	424	600	949	1342

NOTE: For installation in flange tank connections with internal threads, see the "Flanged Installation in Container" section under "Excess Flow Valves." Multiply flow rate by .94 to determine liquid butane capacity and by .90 for liquid anhydrous ammonia capacity.

Chek-Lok® Adhesive Warning Labels

These adhesive warning labels are intended for application as close as possible to the Chek-Lok® once the Chek-Lok® is installed.

Part Number	Description
7572-400	Adhesive Warning Label

DANGER **WARNING**

LP-GAS IS EXTREMELY
FLAMMABLE AND EXPLOSIVE

AVOID SERIOUS INJURY AND PROPERTY DAMAGE. IF YOU SEE, SMELL, OR HEAR ESCAPING GAS... EVACUATE AREA IMMEDIATELY! CALL YOUR LOCAL FIRE DEPARTMENT! DO NOT ATTEMPT TO REPAIR. DO NOT STORE IN BUILDING OR ENCLOSED AREA. DO NOT USE ON HOT AIR BALLOONS OR AIRCRAFT.

CAUTION!

Use this CHECK-LOK® connection only for liquid evacuation before moving tank in accordance with NFPA Pamphlet 58, which is the law in many states. This publication is available from NFPA, Batterymarch Park, Quincy, MA 02269. Read and follow ECII ® product instruction number 7572FA-301.

DO NOT REMOVE, DEFACE OR OBLITERATE THIS LABEL.
DO NOT FILL THIS CONTAINER UNLESS THIS LABEL IS READABLE.

ADDITIONAL SAFETY INFORMATION IS AVAILABLE FROM

ECII Engineered Controls International, Inc.
100 RegO Drive PO Box 247 Elon College, NC 27244 USA Phone (336) 449-7707 Fax (336) 449-6594 www.regoproducts.com

Printed in U.S.A. 03-0994-1189
Part No. 7572-400