

Safety Warning — LP-Gas Pressure Relief Valves

Purpose

In its continuing quest for safety, RegO is publishing safety warning bulletins explaining the hazards associated with the use, misuse and aging of RegO Products. LP-Gas dealer managers and service personnel must realize that the failure to exercise the utmost care and attention in the installation, inspection and maintenance of these products can result in personal injury and property damage.

The National Fire Protection Association NFPA 58 Liquefied Petroleum Gas Code - 2017 Edition states in Section 4.4 Qualification of Personnel; "Persons whose duties fall within the scope of this code shall be provided with training that is consistent with the scope of their job activities and that includes proper handling and emergency response procedures... Refresher training shall be provided at least every 3 years, initial and subsequent training shall be documented". These "RegO Safety Warnings" may be useful in training new employees and reminding older employees of hazards that can occur. It is recommended that all employees complete the Propane Education Research Council's Certified Employee Training Program.

This Warning Bulletin should be provided to all purchasers of RegO and all personnel using or servicing these products. Additional copies are available from RegO and your Authorized RegO Distributor.

WARNING

What You Must Do:

- **Read This Entire Warning**
- **Install Properly**
- **Inspect Regularly**

Scope

This bulletin applies to pressure relief valves installed on stationary, portable and cargo containers and piping systems utilized with these containers. This bulletin is not intended to be an exhaustive treatment of this subject and does not cover all safety practices that should be followed in the installation and maintenance of LP-Gas systems. Each LP-Gas employee should be provided with a copy of NPGA Safety Pamphlet 306 "LP-Gas Regulator and Valve Inspection and Maintenance" as well as the NPGA "LP-Gas Training Guidebooks" relating to this subject.

Warnings should be as brief as possible. If there is a simple warning, it is:

Inspect pressure relief valves regularly. Replace unsafe or suspect valves immediately. Use common sense.

Inspect Regularly

A pressure relief valve discharges when some extraordinary circumstance causes an over pressure condition in the container. If a pressure relief valve is known to have discharged, the relief valve, as well as the entire system, should be immediately and thoroughly inspected to determine the reason for the discharge. In the case of discharge due to fire, the valve should be removed from service and replaced.

Relief valves should be inspected each time the container is filled but no less than once a year. If there is any doubt about the condition of the valve, it must be replaced.

Eye protection must be worn when performing inspection on relief valves under pressure. Never look directly into a relief valve under pressure or place any part of your body where the relief valve discharge could impact it. In some cases a flashlight and a small mirror are suggested to assist when making visual inspections.

To Properly Inspect A Pressure Relief Valve, Check For:

1. **A rain cap.** Check protective cap located in valve or at end of pipeaway for a secure fit. Protective caps help protect the relief valve against possible malfunction caused by rain, sleet, snow, ice, sand, dirt, pebbles, insects, other debris and contamination. **REPLACE DAMAGED OR MISSING CAPS AT ONCE AND KEEP A CAP IN PLACE AT ALL TIMES.**
2. **Open weep holes.** Dirt, ice, paint and other foreign particles can prevent proper drainage from the valve body. **IF THE WEEP HOLES CANNOT BE CLEARED, REPLACE THE VALVE.**
3. **Deterioration and corrosion on relief valve spring.** Exposure to high concentrations of water, salt, industrial pollutants, chemicals and roadway contaminants could cause metal parts to fail. **IF THE COATING ON THE RELIEF VALVE SPRING IS CRACKED OR CHIPPED, REPLACE THE VALVE.**
4. **Physical damage.** Ice accumulations and improper installation could cause mechanical damage. **IF THERE ARE ANY INDICATIONS OF DAMAGE, REPLACE THE VALVE.**
5. **Tampering or readjustment.** Pressure relief valves are factory set to discharge at specified pressures. **IF THERE ARE ANY INDICATIONS OF TAMPERING OR READJUSTMENT, REPLACE THE VALVE.**
6. **Seat leakage.** Check for leaks in the seating area using a noncorrosive leak detection solution. **REPLACE THE VALVE IF THERE IS ANY INDICATION OF LEAKAGE.** Never force a relief valve closed and continue to leave it in service. This could result in damage to the valve and possible rupture of the container or piping on which the valve is installed.
7. **Corrosion and contamination.** **REPLACE THE VALVE IF THERE ARE ANY SIGNS OF CORROSION OR CONTAMINATION ON THE VALVE.**
8. **Moisture, foreign particles or contaminants in the valve.** Foreign material such as paint, tar or ice in relief valve parts can impair the proper functioning of the valves. Grease placed in the valve body may harden over time or collect contaminants, thereby impairing the proper operation of the relief valve. **DO NOT PLACE GREASE IN THE VALVE BODY. REPLACE THE VALVE IF THERE ARE ANY INDICATIONS OF MOISTURE OR FOREIGN MATTER IN THE VALVE.**
9. **Corrosion or leakage at container connection.** Check container to valve connection with a non-corrosive leak detection solution. **REPLACE THE VALVE IF THERE IS ANY INDICATION OF CORROSION OR LEAKAGE AT THE CONNECTION BETWEEN THE VALVE AND CONTAINER.**

CAUTION: Never plug the outlet of a pressure relief valve. Any device used to stop the flow of a properly operating pressure relief valve that is venting an overfilled or overpressurized container - raises serious safety concerns!

Replace Pressure Relief Valves In 10 Years Or Less

The safe useful life of pressure relief valves can vary greatly depending on the environment in which they live.

Relief valves are required to function under widely varying conditions. Corrosion, aging of the resilient seat disc and friction all proceed at different rates depending upon the nature of the specific environment and application. Gas impurities, product misuse and improper installations can shorten the safe life of a relief valve.

Predicting the safe useful life of a relief valve obviously is not an exact science. The conditions to which the valve is subjected will vary widely and will determine its useful life. In matters of this kind, only basic guidelines can be suggested. For example, the Compressed Gas Association Pamphlet S-1.1 Pressure Relief Device Standards — Cylinders, section 9.1.1 requires all cylinders used in industrial motor fuel service to have the cylinder's pressure relief valves replaced by new or unused relief valves within twelve years of the date of manufacture of cylinder and within each ten years thereafter. The LP-Gas dealer must observe and determine the safe useful life of relief valves in his territory. The valve manufacturer can only make recommendations for the continuing safety of the industry.

WARNING: Under normal conditions, the useful safe service life of a pressure relief valve is 10 years from the original date of manufacture. However, the safe useful life of the valve may be shortened and replacement required in less than 10 years depending on the environment in which the valve lives. Inspection and maintenance of pressure relief valves is very important. Failure to properly inspect and maintain pressure relief valves could result in personal injuries or property damage.

For Additional Information Read:

1. CGA Pamphlet S-1.1 Pressure Relief Standards - Cylinders, Section 9.1.1.
2. RegO Catalog L-500.
3. RegO Warning # 8545-500.
4. NPGA Safety Pamphlet 306 "LP-Gas Regulator and Valve Inspection and Maintenance" and "LP-Gas Training Guidebooks".
5. NFPA # 58, "Storage and Handling of Liquefied Petroleum Gases".
6. NFPA # 59, "LP-Gases at Utility Gas Plants".
7. ANSI K61.1 Safety Requirements for Storage and Handling of Anhydrous Ammonia.

RegO Pressure Relief Valves

Requirements for Pressure Relief Valves

Every container used for storing or hauling LP-Gas and anhydrous ammonia must be protected by a pressure relief valve. These valves must guard against the development of hazardous conditions which might be created by any of the following:

Hydrostatic pressures due to overfilling or the trapping of liquid between two points.

High pressures resulting from exposure of the container to excessive external heat.

High pressures due to the use of incorrect fuel.

High pressures due to improper purging of the container.

Consult NFPA Pamphlet #58 for LP-Gas and ANSI #K61.1 for anhydrous ammonia, and/or any applicable regulations governing the application and use of pressure relief valves.

Operation of Pressure Relief Valves

Pressure relief valves are set and sealed by the manufacturer to function at a specific "start-to-discharge" pressure in accordance with regulations. This set pressure, marked on the relief valve, depends on the design requirement of the container to be protected by the relief valve. If the container pressure reaches the start-to-discharge pressure, the relief valve will open a slight amount as the seat disc begins to move slightly away from the seat. If the pressure continues to rise despite the initial discharge through the relief valve, the seat disc will move to a full open position with a sudden "pop". This sharp popping sound is from which the term "pop-action" is derived.

Whether the relief valve opens a slight amount or pops wide open, it will start to close if the pressure in the container diminishes. After the pressure has decreased sufficiently, the relief valve spring will force the seat disc against the seat tightly enough to prevent any further escape of product. The pressure at which the valve closes tightly is referred to as the "re-seal" or "blow-down" pressure. Generally, the re-seal pressure will be lower than the start-to-discharge pressure. The re-seal pressure can be, and in most cases is, adversely affected by the presence of dirt, rust, scale or other foreign particles lodging between the seat and disc. They interfere with the proper mating of the seat and disc and the pressure in the container will usually have to decrease to a lower pressure before the spring force embeds foreign particles into the resilient seat disc material and seals leak-tight. The degree by which the presence of dirt decreases the re-seal pressure, is, of course, dependent on the size of the interfering particles.

Once particles have been trapped between the disc and seat, the start-to-discharge pressure is also affected. For example, the pressure relief valve will start-to-discharge at some pressure lower than its original start-to-discharge pressure. Again, the pressure at which the valve will start to discharge is dependent on the size of the foreign particles.

In the case of a pressure relief valve that has opened very slightly due to a pressure beyond its start-to-discharge setting, the chances of foreign material lodging between the seat and disc is negligible although the possibility is always present. If the relief valve continues to leak at pressures below its start-to-discharge setting it must be replaced.

Relief valves which have "popped" wide open must also be checked for foreign material lodged between the seat and disc, as well as for proper reseating of the seat and disc. Continued leakage at pressures below the start-to-discharge setting indicate the relief valve must be replaced.

The pressure at which a pressure relief valve will start to discharge should never be judged by the reading of the pressure gauge normally furnished on the container.

The reasons for this are two-fold:

If the relief valve is called upon to open, the resulting discharge produces an increased vaporization of the product in the container with the result that the liquid cools to a certain extent and the vapor pressure drops. A reading taken at this time would obviously not indicate what the pressure was when the relief valve opened.

The pressure gauges usually on most containers provide somewhat approximate readings and are not intended to provide an indication of pressure sufficiently accurate to judge the setting of the relief valve.

Repair and Testing

RegO Pressure Relief Valves are tested and listed by Underwriters Laboratories, Inc., in accordance with NFPA Pamphlet #58. Construction and performance of RegO Pressure Relief Valves are constantly checked at the factory by U.L. inspectors. Therefore, testing of RegO Pressure Relief Valves in the field is not necessary.

Any pressure relief valve which shows evidence of leakage, other improper operation or is suspect as to its performance must be replaced immediately using approved procedures.

Pipe-Away Adapters

Pipe-away adapters are available for most RegO Pressure Relief Valves, where it is required or desirable to pipe the discharge above or away from the container. Each adapter is designed to sever if excessive stress is applied to the vent piping – thus leaving the relief valve fully operative.

Weep hole deflectors are available on larger relief valves. These deflectors provide protection against flame impinging on adjacent containers which could occur from ignition of LP-Gas escaping through the relief valve drain hole when the valve is discharging.

Selection of RegO Pressure Relief Valves For ASME Containers

The rate of discharge required for a given container is determined by the calculation of the surface area of the container as shown in "Chart A" for LP-Gas and "Chart B" for anhydrous ammonia. See page D9.

Setting - The set pressure of a pressure relief valve depends upon the design pressure of the container. Refer to NFPA Pamphlet #58 for more information.

Selection of RegO Pressure Relief Valves for DOT Containers

To determine the proper relief valve required for a given DOT container, refer to the information shown with each pressure relief valve in the catalog. This information will give the maximum size (pounds water capacity) DOT container for which the relief valve has been approved.

Setting - The standard relief valve setting for use on DOT cylinders is 375 PSIG.

RegO Pressure Relief Valves

Ordering RegO Pressure Relief Valves

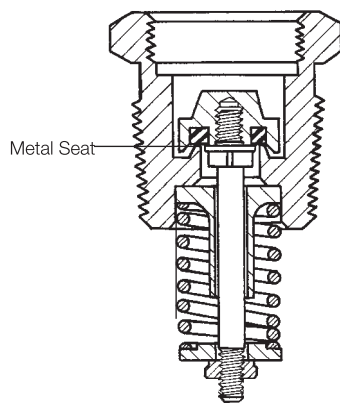
When ordering RegO Pressure Relief Valves, be sure you are certain that it will sufficiently protect the container as specified in the Foreword section, NFPA Pamphlet #58 and any other applicable standards or specifications.

All adapters, protective caps and deflectors must be ordered separately, unless specified otherwise.

Part Number Explanation

Products carrying an "A" or "AA" prefix contain no brass parts and are suitable for NH₃. Hydrostatic relief valves carrying an "SS" prefix are of stainless steel construction and are suitable for use with NH₃. The products are also suitable for use with LP-Gas service except relief valves carrying an "AA" prefix. These are of partial aluminum construction and are listed by U.L. for NH₃ service only.

Safety Information - Relief Valves Don't Last Forever



RegO Relief Valve for lift truck containers

The internal spring is protected from external contamination but the other external parts must be protected with a cap. Circular rubber seat disc ring seats on brass shoulder approximately 3/64" wide.

This article was prepared by the engineers of RegO products, after technical consultation with valve manufacturers and other industry sources. Its purpose is to alert and remind the LP-Gas industry of the importance of proper maintenance of pressure relief valves. It applies most particularly to separate relief valves with emphasis on lift truck and motor fuel containers where the hazards of contamination are greatest.

Since the beginning of our industry, manufacturers of equipment and distributors of LP-Gas have worked diligently to provide a safe environment for employees and consumers. The history of the industry testifies to the success of their efforts.

But the industry is now entering its sixth decade and equipment installed years ago is failing because of age. Every year, additional equipment will fail unless it is replaced. Pressure relief valves are no exception. The valve manufacturers and LP-Gas dealers are naturally concerned about this situation.

Causes of Relief Valve Failure

A relief valve is designed to have a safe useful life of many years, but that life will vary greatly depending on the environment in which it "lives." To attempt to estimate the safe useful life of a relief valve and the effect of environment on its performance, a brief discussion of the materials used and the nature of its performance should be helpful.

Relief valve bodies are generally made of brass or steel. Springs are made from various spring wires which are plated or painted, or made of stainless steel. Valve seat discs are made of synthetic rubber compounds which will remain serviceable in an atmosphere of LP-Gas. Relief valve stems, guides, etc. are generally made from brass or stainless steel.

Relief valves, over the years, may not function properly in several ways:

They may leak at pressures below the set pressure.

They may open and fail to properly reseal.

They may open at higher than the set pressure.

These failures to function properly are due primarily to four "environmental" conditions:

1. Corrosion of metal parts (particularly springs) which result in the component parts failing to perform.
2. Deterioration of the synthetic rubber seat disc material.
3. Clogging or "cementing" of the movable relief valve components so that their movement is restricted.
4. Debris on the valve seat after the relief valve opens, effectively preventing the valve from reseating.

Corrosion is caused by water, corrosive atmospheres of salt and industrial pollutants, chemicals, and roadway contaminants. High concentrations can attack the metal parts vigorously. No suitable metals are totally resistant to such corrosion.

Synthetic rubber and seat disc materials can also be attacked by impurities in the gas and corrosive atmospheres, particularly those with sulphur dioxide. There are no suitable rubber materials which resist all contaminants.

"Cementing" of relief valve parts has been caused by normal industrial atmospheres containing particles of dirt, iron oxide, metal chips, etc. combined with water, oil, or grease. Ice collecting in recessed valves could cause relief valves to fail to open. Paint and tar in relief valves also cause failure to function properly.

Safety Information - Relief Valves

Debris on valve seats which prevents reseating can occur whenever the valve collects material in the relief valve opening which is not blown out when the relief valve opens.

Inspection of Relief Valves

Unfortunately many of the above problems may not be easily observed because of the compact nature of some relief valve designs.

A casual visual inspection of a relief valve may not necessarily disclose a potential hazard. On the other hand, a visual inspection will often disclose leakage, corrosion, damage, plugging and contamination.

If additional light is required, a flashlight should be used.

If there is any doubt about the condition of the valve, or if there is a suspicion that the valve has not been protected by a cap for some time, it should be replaced before refilling the container.

Eye protection must be used when examining relief valves under pressure.

Smaller Relief Valves

The industry's requirement for a small full-flow safety relief valve challenged design engineers some years ago:

The valve must be leakproof before operating and must reseal leakproof each time after each operation. The only known satisfactory seat disc materials to accomplish this have been special synthetic rubber compounds.

- Valve discharge settings are relatively high and require high spring loads to keep the valve closed.
- Because of the small interior diameter of the valve, the round metal seating area is small.

All of these parameters may result in the development of a significant indentation in the rubber seat disc after some years. The seat disc may have a tendency to cling to the metal seat. This may result in the relief valve not opening at the set pressure as the seat disc ages.

Tests have been conducted on small LP-Gas relief valves of all the U.S. valve manufacturers. Valves over 10 years old were removed from service and tested to determine at what pressure the valves discharged. In many of the valves, the pressure required to open the valve exceeded the set pressure.

Because of the critical importance of proper functioning of relief valves, common sense and basic safety practice dictate that small relief valves should be replaced in about 10 years.

Some larger relief valves on bulk storage tanks can be replaced with rebuilt valves obtained from the manufacturers. Small relief valves cannot be rebuilt economically, thus, new valves are required. Most LP-Gas dealers find it impractical and costly to test relief valves and field repairing of relief valves is not sanctioned by the manufacturers, Underwriter's Laboratories, or ASME.

Use of Protective Caps

Many of the problems that cause inoperative relief valves could be prevented if proper protective caps were kept in place at all times.

Collection of debris would be prevented. Contamination caused by corrosive atmospheres would be reduced. Water collection in the valves would be eliminated. Relief valves protected with caps from the time of installation in the container would obviously have a much longer safe useful life, but they still should be replaced at some time because of the gradual deterioration of the rubber seat disc due to age alone.

NFPA 58 requires that protective caps must be kept in place as a protective cover on some relief valves. This is a mandatory requirement on several types of relief valves. The fact that use of caps may make inspection more time consuming should not be viewed as a reason for either not using the caps, or not making required periodic inspections.

In the event a relief valve has been used without the required cap, the relief valve should be thoroughly inspected and the required cap placed on the relief valve. If damage is noted to the relief valve, it should be replaced and the replacement valve should be capped. Relief valves with pipe-away adapters or deflectors used on lift truck containers have been found choked with debris. Inspection of relief valves with deflectors can only be accomplished by removing the deflector.

Similarly, larger relief valves with vent stacks have been found choked with debris and water. Valves have failed because springs rusted through. The weep hole was plugged. It was obvious that the relief valves had not been inspected in many years. These conditions must be alleviated by periodic inspections and replacement of relief valves as needed.

Summary Recommendations

Predicting the safe useful life of a relief valve is obviously not an exact science. The conditions to which the valve is subjected will vary widely and will largely control its life. In matters of this kind, only basic guidelines can be suggested. The LP-Gas dealer must observe and determine the safe useful life of relief valves in his territory. The valve manufacturers can only make recommendations for the continuing safety of the industry:

1. Make sure proper protective caps are in place at all times. Do not release a container for service or fill a container unless it has a protective cap in place.
2. Replace relief valves periodically, at least every 10 years. Every relief valve has the month and year of manufacture stamped on the valve. This is most particularly true of small separate relief valves.
3. Carefully inspect valves each time before the container is filled. Replace valves showing any signs of contamination, corrosion, damage, plugging, leakage, or any other problem. Eye protection must be used when examining relief valves under pressure.

Minimum Required Rate of Discharge for Pressure Relief Valves Used on ASME Containers

Chart A — Minimum Required Rate of Discharge for LP-Gas Pressure Relief Valves Used on ASME Containers

From NFPA Pamphlet #58, Appendix D (1986).

Minimum required rate of discharge in cubic feet per minute of air at 120% of the maximum permitted start-to-discharge pressure for pressure relief valves to be used on containers other than those constructed in accordance with Interstate Commerce Commission specification.

Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air
20 or less	626	85	2050	150	3260	230	4630	360	6690	850	13540	1500	21570
25	751	90	2150	155	3350	240	4800	370	6840	900	14190	1550	22160
30	872	95	2240	160	3440	250	4960	380	7000	950	14830	1600	22740
35	990	100	2340	165	3530	260	5130	390	7150	1000	15470	1650	23320
40	1100	105	2440	170	3620	270	5290	400	7300	1050	16100	1700	23900
45	1220	110	2530	175	3700	280	5450	450	8040	1100	16720	1750	24470
50	1330	115	2630	180	3790	290	5610	500	8760	1150	17350	1800	25050
55	1430	120	2720	185	3880	300	5760	550	9470	1200	17960	1850	25620
60	1540	125	2810	190	3960	310	5920	600	10170	1250	18570	1900	26180
65	1640	130	2900	195	4050	320	6080	650	10860	1300	19180	1950	26750
70	1750	135	2990	200	4130	330	6230	700	11550	1350	19780	2000	27310
75	1850	140	3080	210	4300	340	6390	750	12220	1400	20380		
80	1950	145	3170	220	4470	350	6540	800	12880	1450	20980		

Surface area = Total outside surface area of container in square feet.

When the surface area is not stamped on the name plate or when the marking is not legible, the area can be calculated by using one of the following formulas:

1. Cylindrical container with hemispherical heads. Area (in sq. ft.) = overall length (ft.) x outside diameter (ft.) x 3.1416.
2. Cylindrical container with semi-ellipsoidal heads. Area (in sq. ft.) = overall length (ft.) + .3 outside diameter (ft.) x outside diameter (ft.) x 3.1416.
3. Spherical container. Area (in sq. ft.) = outside diameter (ft.) squared x 3.1416.

Flow Rate SCFM Air = Required flow capacity in cubic feet per minute of air at standard conditions, 60°F. and atmospheric pressure (14.7 psia).

The rate of discharge may be interpolated for intermediate values of surface area. For containers with total outside surface area greater than 2000 square feet, the required flow rate can be calculated using the formula, Flow Rate-SCFM Air = 53.632 A^{0.82} Where A = total outside surface area of the container in square feet.

Chart B — Minimum Required Rate of Discharge for Anhydrous Ammonia Pressure Relief Valves Used on ASME Containers

From ANSI K61.1-1981, Appendix A (1981).

Minimum required rate of discharge in cubic feet per minute of air at 120% of the maximum permitted start-to-discharge pressure for pressure relief valves to be used on containers other than those constructed in accordance with United States Department of Transportation cylinder specifications.

Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air	Surface Area Sq. Ft.	Flow Rate SCFM Air
20	258	95	925	170	1500	290	2320	600	4200	1350	8160	2100	11720
25	310	100	965	175	1530	300	2380	650	4480	1400	8410	2150	11950
30	360	105	1010	180	1570	310	2450	700	4760	1450	8650	2200	12180
35	408	110	1050	185	1600	320	2510	750	5040	1500	8900	2250	12400
40	455	115	1090	190	1640	330	2570	800	5300	1550	9140	2300	12630
45	501	120	1120	195	1670	340	2640	850	5590	1600	9380	2350	12850
50	547	125	1160	200	1710	350	2700	900	5850	1650	9620	2400	13080
55	591	130	1200	210	1780	360	2760	950	6120	1700	9860	2450	13300
60	635	135	1240	220	1850	370	2830	1000	6380	1750	10090	2500	13520
65	678	140	1280	230	1920	380	2890	1050	6640	1800	10330		
70	720	145	1310	240	1980	390	2950	1100	6900	1850	10560		
75	762	150	1350	250	2050	400	3010	1150	7160	1900	10800		
80	804	155	1390	260	2120	450	3320	1200	7410	1950	11030		
85	845	160	1420	270	2180	500	3620	1250	7660	2000	11260		
90	885	165	1460	280	2250	550	3910	1300	7910	2050	11490		

Surface area = Total outside surface area of container in square feet.

When the surface area is not stamped on the name plate or when the marking is not legible, the area can be calculated by using one of the following formulas:

1. Cylindrical container with hemispherical heads. Area (in sq. ft.) = overall length (ft.) x outside diameter (ft.) x 3.146.
2. Cylindrical container with other than hemispherical heads. Area (in sq. ft.) = overall length (ft.) + .3 outside diameter (ft.) x outside diameter (ft.) x 3.1416.
3. Spherical container. Area (in sq. ft.) = outside diameter (ft.) squared x 3.1416.

Flow Rate SCFM Air = Required flow capacity in cubic feet per minute of air at standard conditions, 60°F. and atmospheric pressure (14.7 psia).

The rate of discharge may be interpolated for intermediate values of surface area. For containers with total outside surface area greater than 2,500 square feet, the required flow rate can be calculated using the formula, Flow Rate-SCFM Air = 22.11 A^{0.82} where A = outside surface area of the container in square feet.

Conversion Factor

$$\begin{aligned} \text{ft}^2 \times 0.092903 &= \text{m}^2 \\ \text{SCFM} \times 0.028317 &= \text{m}^3/\text{min} \\ \text{ft} \times 0.3048 &= \text{m} \end{aligned}$$

“Pop-Action” Pressure Relief Valves

General Information

The “Pop-Action” design permits the RegO Pressure Relief Valve to open slightly to relieve moderately excessive pressure in the container. When pressure increases beyond a predetermined point, the valve is designed to “pop” open to its full discharge capacity, reducing excess pressure quickly. This is a distinct advantage over ordinary valves which open gradually over their entire range, allowing excessive pressure to develop before the relief valve is fully open. All RegO internal, semi-internal, and external relief valves incorporate this “Pop-Action” design.

Relief Valves in this catalog are only intended for use in LP-Gas or anhydrous ammonia service. Do not use any other service commodity. If you have an application other than conventional LP-Gas or anhydrous ammonia service, contact RegO before proceeding.

Fully Internal “Pop-Action” Pressure Relief Valves for Transports and Bobtail Delivery Vehicles

A8434 and A8436 Series

Designed specifically for use as a primary relief valve on ASME cargo tanks for transportation and bobtails with 2” and 3” F.NPT couplings.



A8434-SERIES

Ordering Information

Part #	Start To Discharge Setting PSIG	A Container Connection	B Overall Height (Approx.)	C Height Above Coupling (Approx.)	UL (At 120% of Set Pressure)	ASME (At 120% of Set Pressure)	LP-Gas	NH3	Propylene	Protective Cap (Included)
A8434G	250	2" M. NPT	9-1/16"	1/2"	3700	3456	Yes	Yes	No	A8434-11B
A8434N	265					3659				
A8436G	250	3" M. NPT	17-7/8"	3/4"	10210	9598				A8436-11B
A8436N	265					9839				
VA8436G	250				-	9596		No	Yes	
VA8436N	265					9839				

* Per NFPA Pamphlet #58, Appendix D. Area shown is for UL or ASME flow rating—whichever is larger.

Semi-Internal “Pop-Action” Pressure Relief Valves for ASME Portable Containers

7583, 8684 and 8685 Series

Designed for use as a primary relief valve on ASME containers such as 250, 500 and 1,000 gallon tanks. Underwriters' Laboratories lists containers systems on which these types of valves are mounted outside the hood without additional protection, if mounted near the hood and fitted with a protective cap.



7583G

Ordering Information

Part #	Start To Discharge Setting PSIG	A Container Connection M. NPT	B Overall Height (Approx.)	C Height Above Coupling (Approx.)	D Wrench Hex Section	Flow Capacity SCFM/Air		Protective Cap (Included)
						UL (At 120% of Set Pressure)	ASME (At 120% of Set Pressure)	
7583G	250	3/4"	8-3/16"	1-7/16"	1-3/4"	1980	1806	7583-40X
8684G		1"	9-3/8"	1-9/16"	1-7/8"	2620	2565	8684-40
8685G		1-1/4"	11-1/16"	1-11/16"	2-3/8"	4385	4035	7585-40X

Fully Internal “Pop-Action” Pressure Relief Valves for Motor Fuel Containers

8543, 8544 and 8546 Series

8543 Series relief valves are designed for use as a primary relief valve in larger ASME motor fuel containers such as on buses, RV's, trucks and construction equipment.

8544 Series relief valves are designed for use as a primary relief valve in smaller ASME and DOT motor fuel containers such as on tractors, lift trucks, cars and taxicabs.



8546-11 3/4"



7544-11A 1"



7543-10 1-1/4"



8544

Ordering Information

Part #	Container Type	Start To Discharge Setting PSIG	A Container Connection M. NPT	B Overall Height (Approx.)	C Height Above Coupling (Approx.)	D Hex Wrenching Section	Flow Capacity SCFM/Air****		Protective Cap (Included)	Accessories Pipeaway Adapter
							UL (At 120% of Set Pressure)	ASME (At 120% of Set Pressure)		
8546G	ASME	250	3/4"	4-1/2"	15/16"	1-1/16"	723	651	11565-26	8546-11
8544G			1"	5-7/16"	7/8"	1-5/16"	1020	936	7544-41G	7544-11A*
8543G			1-1/4"			1-11/16"	1465	1400	7543-40C	7543-10**
8546T		312	3/4"	4-1/2"	15/16"	1-1/16"	880	792	11565-26	8546-11
8544T			1"			1-5/16"	1282	1158	7544-41	7544-11A
8543T			1-1/4"			1-11/16"	1990	1731	7543-40C	7543-10**
8544A375T	DOT	375	1"	5-7/16"	7/8"	1-5/16"	NA	1384	7544-41G	7544-11A
8544K							1545***	NA	7544-41	7544-11A

* 1" M. NPT outlet connection.

** 1-1/4" M. NPT outlet connection.

*** Rating also applies to DOT requirements.

**** Flow rates shown are for bare relief valves. Adapters and pipeaway will reduce flow as discussed in the Foreword section.

Fully Internal “Pop-Action” Pressure Relief Valve for DOT Fork Lift Cylinders

8545AK

Designed specifically for use as a primary relief valve on forklift cylinders, the 8545AK reduces the possibility of improper functioning of the relief mechanism due to foreign material build up. All guides, springs, stem and adjusting components are located inside the cylinder - removed from the direct exposure of foreign materials and debris from the atmosphere.

NFPA Pamphlet #58 requires that:

“All containers used in industrial truck (including forklift truck cylinders) service shall have the container pressure relief valve replaced by a new or unused valve within 12 years of the date of manufacture of the container and each 10 years thereafter.”



7545-12 90° Adapter



7545-14 45° Adapter



8545AK

Ordering Information

Part #	Container Type	Start To Discharge Setting PSIG	Container Connection M. NPT	Flow Capacity SCFM/Air** (RegO Rated at 480 PSIG)	Accessories (Order Separately)		
					Protective Cap	Deflectors***	
8545AK	DOT	375	3/4"	400*	11557-19	45° Elbow	90° Elbow
8545AKT†						7545-14	7545-12

† With thread sealant.

*Classified by U.L. in accordance with Compressed Gas Association Pamphlet S-1.1 Pressure Device Standards for Cylinders. Meets requirements for use on DOT containers with 262 pounds or less weight of water or 109 pounds or less of LP-Gas.

** Flow rates are shown for bare relief valves. Adapters and pipeaways will reduce flow as discussed in the Foreword section.

*** Order protective cap #8545-41 or 7545-40.

Semi-Internal “Pop-Action” Pressure Relief Valves for Large Storage Containers

7534B and 7534G

Designed especially for use as a primary relief valve on large stationary storage containers, these low profile relief valves are generally mounted in half couplings. However, they are designed so that the inlet ports clear the bottom of a full 2” coupling. This ensures that the relief valve should always be capable of maximum flow under emergency conditions.



7534

Ordering Information

Part #	Start To Discharge Setting PSIG	Container Connection M. NPT	Flow Capacity SCFM/Air*		Accessories	
			UL (At 120% of Set Pressure)	ASME (At 120% of Set Pressure)	Protective Cap	Pipeaway Adapter
7534B	125	2"	6,025	-	7534-40X	7534-20**
7534G***	250		11,675	10,422		

* Flow rates shown are for bare relief valves. Adapters and pipeaways will reduce flow as discussed in the Foreword section.

** 3" F. NPT outlet connection.

*** Other seat materials are available.

External “Pop-Action” Pressure Relief Valves for ASME Containers and Bulk Plant Installations

AA3126, AA3130, 3131, 3132, 3133, 3135, AA3135, and A3149 Series

Designed for use as a primary relief valve on ASME above ground and underground containers, bulk plant installations and skid tanks. The 3131 Series may also be used as a primary or secondary relief valve on DOT cylinders, or as a hydrostatic relief valve. All working components of these relief valves are outside the container connection, so the valves must be protected from physical damage.



3135-10



3132-10



3135



A3149



AA3135



W3132G

Ordering Information

Part #	Start To Discharge Setting PSIG	A Container Connection M. NPT	B Overall Height (Approx.)	C Wrench Hex Section	Flow Capacity SCFM/Air (a)		Accessories				
					UL (At 120% of Set Pressure)	ASME (At 120% of Set Pressure)	Protective Cap	Pipeaway Adapter		Weep Hole Deflector	
								Part #	Outlet Size		
AA3126L030	30	1/2"	2-3/8"	7/8"	(b)	-	9103-54	AA3126-10	1/2" M. NPT	-	
A3149L055	55	2-1/2"	10-1/2"	4-1/8"	2608(c)	-	3149-40	(h)		Included (j)	
A3149L200	200				8770 (c)	-					
AA3126L250	250	1/2"	2-3/8"	7/8"	277 (c)	-	9103-54	AA3126-10	1/2" M. NPT	-	
3131G		3/4"	3-7/16"	1-3/4"	2060	1939	3131-41 (g)	-			
AA3130UA250					2045	1838	11557-110	AA3131-10	1" F. NPT		
W3132G		1"	6-1/32"	2-3/8"	3340	-	3132-54 (g)	3132-10	1-1/4" F. NPT		
3132G					4130	-		-			
T3132G					3790	-		3132-10	1-1/4" F. NPT		
MV3132G					3995	-		-			
3135G		5-21/32"	2-11/16"	5770	-	3135-54 (g)	3135-10	2" F. NPT			
AA3135UA250		6-13/32"		6430	6341	AA3135-40PR	AA3135-10				
3133G		1-1/2"	5-15/16"	3-1/8"	6080	-	3133-54 (g)	3133-10	(h)	Included (j)	
A3149MG		2-1/2"	10-1/2"	4-1/8"	-	-	3149-40				
A3149G					9153	-					
AA3130UA265	265	3/4"	3-7/16"	1-3/4"	2125	1912	11557-110	AA3131-10	1" F. NPT	-	
AA3135UA265		1-1/4"	6-13-32"	2-11/16"	6615	6703	AA3135-40PR	AA3135-10	2" F. NPT	3133-11	
AA3126L312	312	1/2"	2-3/8"	7/8"	330 (c)	-	9103-54	AA3126-10	1/2" M. NPT	-	

(a) Flow rates shown are for bare relief valves. Adapters and pipeaways will reduce flow as discussed in the Foreword section.

(b) Not UL or ASME rated. .059 square inch effective area.

(c) Not UL or ASME rated. RegO rated at 120% of set pressure.

(g) Cap supplied with chain.

(h) Outlet 3-1/2-8N (F) thread, will accept 3" M. NPT pipe thread.

(j) Weep hole deflector is Part No. A3134-11B.

External “Pop-Action” Supplementary Pressure Relief Valves for Small ASME Containers and DOT Cylinders

3127 and 3129 Series

Designed for use as a supplementary relief valve on small ASME above ground and underground containers. They may also be used as a primary or secondary relief device on DOT cylinders, or as hydrostatic relief valves.

All working components of these relief valves are outside the container connection, so the valves must be protected from physical damage.



3129-10 Pipe Away Adapter



3127 Series

Ordering Information

Part #	Container Type	Start To Discharge Setting PSIG	A Container Connection M. NPT	B Overall Height (Approx.)	C Wrench Hex Section	Flow Capacity SCFM/Air		Suitable for Tanks w/Surface Area Up To:*	Protective Cap	Accessories	
						UL (At 120% of Set Pressure)	RegO Rated at 480 PSIG***			Pipeaway Adapter	
3127G	ASME	250	1/4"	1-31/32"	7/8"	295	-	-	9103-54	-	-
3129G			1/2"	2-19/32"	1-1/8"	465			3129-40P	3129-10	1/2" F. NPT
3127K	DOT	375	1/4"	1-31/32"	7/8"	-	450	100 lbs./Propane	9103-54	-	-
3129K			1/2"	2-19/32"	1-1/8"		780	200 lbs./Propane	3129-40P	3129-10	1/2" F. NPT

* Flow rates shown are for bare relief valves. Adapters and pipeaways will reduce flow as discussed in the Foreword section.

** Not UL or ASME rated. RegO rated at 480 PSIG.

*** Meets DOT requirements.

External Hydrostatic Relief Valves

3125, 3127, 3129, SS8001, SS8002, SS8021 and SS8022 Series

Designed especially for the protection of piping and shut-off valves where there is a possibility of trapping liquid LP-Gas or anhydrous ammonia. They may be installed in pipelines and hoses located between shut-off valves or in the side boss of RegO shut-off valves.



Ordering Information

Part #	Start To Discharge Setting PSIG	Valve Body Material	Container Connection M. NPT	Height (Approx.)	Wrench Hex Section	Accessories	
						Protective Cap	Pipeaway Adapter or Threads
SS8001G	250	Stainless Steel	1/4"	7/8"	11/16"	-	-
SS8002G			1/2"		7/8"		-
SS8021G			1/4"		11/16"		1/4" NPSM Thrds
SS8022G			1/2"	7/8"	3/8" NPT Thrds		
3127G		275	Brass	1/4"	1-31/32"	7/8"	9103-54
3129G	1/2"			2-19/32"	1-1/8"	3129-40P	3129-10*
3127H	1/4"			1-31/32"	7/8"	9103-54	-
3129H	1/2"			2-19/32"	1-1/8"	3129-40P	3129-10*
3127P	300		Brass	1/4"	1-31/32"	1-1/8"	9103-54
3129P		1/2"		2-19/32"	1-1/8"	3129-40P	3129-10*
SS8022P		Stainless Steel		1/2"	1-3/8"	7/8"	-
3127J	350	Brass		1/4"	1-31/32"	7/8"	9103-54
3129J			1/2"	2-19/32"	1-1/8"	3129-40P	3129-10*
SS8001J		Stainless Steel	1/4"	7/8"	11/16"	-	-
SS8002J			1/2"		7/8"		-
SS8021J			1/4"		11/16"		1/4" NPSM Thrds
SS8022J	1/2"		7/8"	3/8" NPT Thrds			
3127K	375	Brass	1/4"	1-31/32"	7/8"	9103-54	-
3129K			1/2"	2-19/32"	1-1/8"	3129-40P	3129-10*
3125L			1/4"	1-9/16"	5/8"	3125-40P	-
3127L				1-31/32"	7/8"	9103-54	-
3129L		1/2"	2-19/32"	1-1/8"	3129-40P	3129-10*	
SS8001L	400	Stainless Steel	1/4"	7/8"	11/16"	-	-
SS8002L			1/2"		7/8"		-
SS8021L			1/4"		11/16"		1/4" NPSM Thrds
SS8022L			1/2"	7/8"	3/8" NPT Thrds		
3127U		450	Brass	1/4"	1-31/32"	7/8"	9103-54
3129U	1/2"			2-19/32"	1-1/8"	3129-40P	3129-10*
SS8001U	Stainless Steel		1/4"	7/8"	11/16"	-	-
SS8002U			1/2"		7/8"		-
SS8021U			1/4"		11/16"		1/4" NPSM Thrds
SS8022U		1/2"	7/8"	3/8" NPT Thrds			

* 1/2" F. NPT outlet connection.



3125 Series (.161 Orifice)
3127 Series (.274 Orifice)
3129 Series (.386 Orifice)

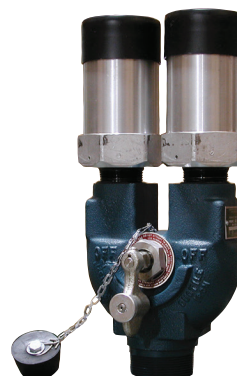


SS8022G

DuoPort® Pressure Relief Valve Manifolds for Small Storage Containers

8542 Series

Designed especially for use as a primary relief device on smaller stationary storage containers, with 2" NPT threaded couplings. These manifolds allow servicing or replacement of either of the two relief valves without evacuating the container or loss of service. The operating lever selectively closes off the entrance port to the relief valve being removed while the remaining valve provides protection for the container and its contents. The rating of each manifold is based on actual flow through the manifold and a single pressure relief valve, taking friction loss into account. It is not merely the rating of the relief valve alone.



8542

Ordering Information

Part #	Start to Discharge Setting PSIG	Application		Container Connection M. NPT	Relief Valve Included				Flow Capacity SCFM/Air** (at 120% of set pressure)	
		LP-Gas	NH3		Quantity	Part #	Inlet Connection M. NPT	Accessories	UL Rating (at 120% of set Pressure)	ASME Rating (at 120% of set Pressure)
								Pipeaway Adaptors		
8542G	250	Yes	No	2"	2	3135MG	1-1/4"	3135-10*	5250 (1)	NA
8542AG										
AA8542UA250	265	No	Yes			AA3135MUA250		AA3135-10*	6430 (1)	6341 (1)
AA8542UA265						AA3135MUA265			6615 (1)	6703 (1)

* 2" F. NPT outlet connection.

** Flow rating based on number of relief valves indicated in parenthesis (). Flow rates shown are for bare relief valves. Adapters and pipeaways will reduce flow rates as discussed in the Foreword section.

Delta Port Relief Valve Manifolds

8530/AA8530 Series

Designed especially for use as a primary relief device on large stationary pressurized storage containers, the base is supplied with a two-inch NPT threaded container connection. These manifolds incorporate an additional relief valve, not included in the flow rating, allowing for servicing or replacement of any one of the relief valves without evacuating the container. The hand-wheel on the manifold selectively closes off the entrance port to the relief valve being removed while the remaining relief valves provide protection for the container and its contents. All manifold flow ratings are based on flow through the relief valves after one has been removed for service or replacement.



8533AG

Ordering Information

Part #	Start to Discharge Setting PSIG	Application		Container Connection M.NPTF	Relief Valve				ASME Flow Rating SCFM (air) @ 120% of Set Pressure *
		LPG	NH3		Qty.	Part #	Inlet Connection M.NPT	Accessories	
								Pipe-away Adapter**	
8532AG	250	Yes	No	2"	2	3135MG	1-1/4"	3135-10	5,549 (1)
8533AG					3				11,098 (2)
AA8532MA250		No	Yes		2	AA3135MA250		AA3135-10	6,341 (1)
AA8533MA250					3				12,682 (2)
AA8532MA265	265				2	AA3135MA265			6,615 (1)
AA8533MA265					3				13,230 (2)

* Flow rating based on number of relief valves indicated in parentheses ().

Flow rates shown are for bare relief valves. Adapters and pipe-always will reduce flow rates as discussed in forwarding information in L-500 catalog. ** 2" F. NPT outlet connection

Multiport™ Pressure Relief Valve Manifold Assemblies for Large Storage Containers

A8560, A8570 and AA8570 Series

Designed especially for use as a primary relief device on large stationary pressurized storage containers with flanged openings. These manifolds incorporate an additional relief valve, not included in the flow rating, allowing for servicing or replacement of any one of the relief valves without evacuating the container. The handwheel on the manifold selectively closes off the entrance port to the relief valve being removed while the remaining relief valves provide protection for the container and its contents. All manifold flow ratings are based on flow through the relief valves after one has been removed for service or replacement.



**A8560
A8570**

Bolt Stud and Nut Assemblies

Part Number	Consists of	For Use With:	For Connection To:	Number Required
7560-55	1-Bolt Stud and Nut	All RegO Multiports™	Modified 3" - 300# and 4"-ANSI 300# Welding Neck Flange	8
7560-56			Manhold Cover Plate	

Ordering Information

Part #	Start To Discharge Setting PSIG	Application		Container Flange Connection	Relief Valve				Flow Capacity SCFM/Air*** At 120% of Set Pressure	
		LP-Gas	NH ₃		Quantity	Part #	Inlet Connection M. NPT	Accessories	UL Rating	ASME Rating
								Pipeaway Adapters		
A8563G	250	Yes	Yes	3"-300#*	3	A3149MG	2-1/2"	****	18,500 (2)	Not Applicable
A8564G					4				27,750 (3)	
A8573G				4"-300#	3				18,500 (2)	
A8574G					4				27,750 (3)	
A8563AG				3"-300#*	3	A3149G			Not Applicable	18,300 (2)
A8564AG					4					27,400 (3)
A8573AG				4"-300#	3					18,300 (2)
A8574AG					4					27,400 (3)

* For use with modified 300# ANSI flange with 4" port.

** Flow rating based on number of relief valves indicated in parentheses (). Flow rates shown are for bare relief valves. Adapters and pipeaways will reduce flow rates as discussed in the Foreword section.


*** 2" F. NPT outlet connection.

**** Outlet 3-1/2-8N (F) thread, will accept 3" M. NPT pipe thread.

Adhesive Warning Label

The following warning information, Part Number 8545-500, is included with each shipment of pressure relief valves and relief valve manifolds to the first purchaser of the product from the factory.

This information is intended to be forwarded throughout the product distribution chain. Additional copies are available from RegO and Authorized Product Distributors.

DANGER	READ THIS FIRST	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.		
Make sure you are thoroughly trained before you attempt any pressure relief installation or maintenance. Improper conditions or procedures can cause accidents resulting in property damage and personal injury.		
Become thoroughly familiar with NFPA Safety Pamphlet 306 "LP-Gas Regulator and Valve Inspections & Maintenance" and RegO Safety Warning "Pressure Relief Valves" found in the relief valve section of the L-500 & L-102 Catalogs. Follow its recommendations.		
Know and understand NFPA Pamphlet 58 "Liquefied Petroleum Gas Code", which is the law in many states. This publication is available from NFPA, Batterymarch Park, Quincy, MA 02269. Following its requirements is essential in the safe use of LP-Gas. Section 4.4 states: "Persons who transfer liquid LP-Gas, who are employed to transport LP-Gas, or whose primary duties fall within the scope of this code shall be trained in proper handling procedures. Refresher training shall be provided at least every three years and shall be documented."		
Make sure this valve is the proper one for this installation. Avoid misusing LP-Gas equipment. Flow rates in the charts are for bare relief valves found in the relief valve section of the L-500 & L-102 Catalogs. The addition of deflection, pipeway adapters and piping will restrict the flow. To properly protect any container, the total system flow must be sufficient to relieve pressure at the pressure setting of the relief valve in accordance with all applicable codes.		
Use only RegO adapters on RegO relief valves. Adapters not designed specifically for piping away RegO relief valves, such as those with 90° turns or reduced internal diameters, will decrease flow dramatically. These should never be used as they can cause the relief valve to chatter and eventually destroy itself.		
Apply thread joint compound compatible with LP-Gas on valve external threads only. Make sure compound never comes into contact with other parts of the valve.		
Install valves by applying force to wrenching flats only.		
Tighten pipe threads approximately 1 to 1½ turns beyond the hand-tight insertion point using a wrench which avoids damage to other valve parts.		
Check for damage after valve installation. Check that the pressure relief valve is clean and free of foreign material. Make sure protective cap is properly in place.		
Check that there are no leaks with a non-corrosive leak detection solution before filling with LP-Gas.		
Purge container before filling with LP-Gas (refer to the RegO LP-Gas Serviceman's Manual for recommended procedure.)		
In selecting a label for posting at the installation site, consider RegO part number 901-400 along with your own, NPGAs and others.		
Remember to instruct the owner/user/customer in safety matters concerning LP-Gas and this equipment. See RegO Safety Warning "Pressure Relief Valves" found in the relief valve section of the L-500 & L-102 Catalogs.		
RegO requests that this information be forwarded to your customers. Additional copies are available from RegO and your authorized RegO Distributor.		
		
Printed in USA 07A-0910-0386		
Part number 8545-500		
Elon, N.C. 27244 U.S.A. Phone (336) 449-7707 Fax (336) 449-6594 www.regoproducts.com		

8545-500