



# QUAD-PORT RELIEF VALVE MANIFOLD INSTRUCTION MANUAL

## !WARNING!

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion and/or fire causing property damage and personal injury or death.

Install, operate and maintain Marshall Excelsior Co. equipment in accordance with federal, state, and local codes and these instructions. The installation in most states must also comply with NFPA standards 58 and 59, and ANSI/CGA 6.2.1.

For installation in the European Union, the equipment must also comply with PED/TPED and EN ISO standards. Periodic inspections, intermediate inspections and exceptional checks of transportable pressure equipment should be carried out in accordance with the Annexes of Directive 2008/68/EC and with 2010/35/EU Directive (TPED) to ensure continued compliance with their safety requirements.

Only personnel trained in the proper procedures, codes, standards and regulations of the LP-Gas and NH<sub>3</sub> industries should install, maintain and service this equipment.

Be sure all instructions are read and understood before installation, operation and maintenance. These instructions must be passed along to the end user of the product.

## !GENERAL WARNING!

Marshall Excelsior products are mechanical devices that are subject to wear, contaminants, corrosion, and aging of components made of materials such as rubber and metal. Over time these devices will eventually become inoperative. The safe service life of these products will reflect the environment and conditions of use that they are subjected to. Regular inspection and maintenance is essential. Marshall Excelsior products have a long record of quality and service, so LP-Gas dealers may forget hazards that can arise from using aging devices that have outlived their safe service life.

## APPLICATION:

For use with LPG & NH<sub>3</sub> stationary storage containers with flanged connections. These Relief Manifolds have an additional relief valve excluded from the flow rating, which allows for service and/or exchange of any one relief valve without evacuating the tank. Our large port selection handle allows for each specific valve port to be closed off so that the relief valve may be removed while the remaining valves remain under pressure protecting the tank and contents. Each manifold model is rated based on the flow through the relief valves with one valve removed from service.



## FEATURES:

- Ductile Iron Body
- All Stainless Steel Internal Components
- Durable Teflon V-Pack Stem Seals
- Large Diameter Port Selection Handle and Port Indicator
- Molded Rubber Weather Guard for Manifold Rotary Gear
- Available with 250 PSIG and 265 PSIG Relief Valve Set Pressures
- Integral Break-Away Feature leaves seal and seat intact
- Supplied with Weep Hole Deflector and Hex Socket Plugs
- 3-1/2" – 8 Outlet Thread accepts 3" MPT Pipeways

## 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 are designed to protect the container 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.

## NOTE

Consult NFPA #58 for LP-Gas and ANSI/CGA 6.2.1 for anhydrous ammonia, and/or any applicable local and state regulations governing the application and use of pressure relief valves.

## Marshall Excelsior Company

1506 George Brown Drive Marshall, MI 49068  
Phone (269) 789-6700 Fax (269) 781-8340  
[www.marshallexcelsior.com](http://www.marshallexcelsior.com)

## MEC Europe AsP

Alsvej 21  
8940 Randers SV  
Denmark

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## QUAD-PORT RELIEF VALVE MANIFOLD

P/N	Relief Valve STD PSIG	Application		Flange Size (300# Flange Geometry)	Relief Valve		*** Flow Rating SCFM Air @ 120% Set PSI	
		LPG	NH <sub>3</sub>		# of Valves	Valve P/N	UL Rating	ASME
ME903S-3F/250VM	250	YES	NO	3"	3	MEV250VM/250	20,400 (2)	(2)
ME903S-3F/250CN*	250	YES	YES	3"	3	MEV250CN/250	20,400 (2)	(2)
ME903S-4F/250VM	250	YES	NO	4"	3	MEV250VM/250	20,400 (2)	(2)
ME903S-4F/250CN*	250	YES	YES	4"	3	MEV250CN/250	20,400 (2)	(2)
ME904S-3F/250VM	250	YES	NO	3"	4	MEV250VM/250	27,740 (3)	(3)
ME904S-3F/250CN*	250	YES	YES	3"	4	MEV250CN/250	27,740 (3)	(3)
ME904S-4F/250VM	250	YES	NO	4"	4	MEV250VM/250	27,740 (3)	(3)
ME904S-4F/250CN*	250	YES	YES	4"	4	MEV250CN/250	27,740 (3)	(3)
ME903S-3F/265VM	265	YES	NO	3"	3	MEV250VM/265	20,555 (2)	(2)
ME903S-3F/265CN*	265	YES	YES	3"	3	MEV250CN/265	20,555 (2)	(2)
ME903S-4F/265VM	265	YES	NO	4"	3	MEV250VM/265	20,555 (2)	(2)
ME903S-4F/265CN*	265	YES	YES	4"	3	MEV250CN/265	20,555 (2)	(2)
ME904S-3F/265VM	265	YES	NO	3"	4	MEV250VM/265	28,550 (3)	(3)
ME904S-3F/265CN*	265	YES	YES	3"	4	MEV250CN/265	28,550 (3)	(3)
ME903S-4F/265VM	265	YES	NO	4"	4	MEV250VM/265	28,550 (3)	(3)
ME903S-4F/265CN*	265	YES	YES	4"	4	MEV250CN/265	28,550 (3)	(3)

\* Relief valve seal material not UL listed

\*\* For use with modified 300# ANSI Flange with 4" port

\*\*\* Flow Rating based on number of valves indicated in parenthesis ( ); flow rates shown are for bare relief valves, pipeaways will reduce flow rates

Note: Complies with EN 14071

Note: Custom set pressure data (i.e. 165 set psi) not included in this chart; available through MEC representative

Note: CE approved variants available upon request

Accessories	
Accessory P/N	Description
ME904SK	8 Stud/Nut Universal Mounting Kit for ME903S and ME904S Series Manifolds – Hardened Steel
MEV250-015	Replacement Stainless Steel Weep Hole Deflector for MEV250 Series Relief Valves
MEV250-013	Replacement Vinyl Cap w/Lanyard for MEV250 Series Relief Valves

### INSTALLATION

#### !CAUTION!

Contact or inhalation of liquid propane, ammonia and their vapors can cause serious injury or death! NH<sub>3</sub> and LP-gas must be released outdoors in air currents that will insure dispersion to prevent exposure to people and livestock. LP-Gas must be kept far enough from any open flame or other source of ignition to prevent fire or explosion! LP-Gas is heavier than air and will not disperse or evaporate rapidly if released in still air.

Consult NFPA Codes 58 and 59 /ANSI/CGA 6.2.1 and/or any applicable regulations governing the application and use of pressure relief valves and relief valve manifolds. Make sure you are thoroughly trained before you attempt to install, inspector maintain this equipment.



**WARNING:** These products contain a chemical known to the state of California to cause cancer and birth defects or reproductive harm

**\*Proper installation is essential to the safe operation of the relief valve manifold and pressure relief valves.** Install the MEC relief valve manifold using the following steps:

1. Verify that the start-to-discharge setting and manifold flow rate capacity is correct for the application.
2. Install studs from MEC Stud Kit (ME904SK) into flange port on container opening.
3. Install spiral coil flange gasket between studs onto flange port on container opening.

4. Remove nuts retaining the manifold assembly to its packaging crate.
5. Attach manifold lifting chain to hoist or crane.
6. Carefully hoist manifold assembly off shipping crate studs.
7. Check that the relief valves are clean and free of foreign material in the relief valve outlets.
8. Inspect the manifold inlet and flange seat to ensure no damage or foreign material is present.
9. Install manifold assembly by hoisting into position over the container flange port opening.
10. Slowly lower and align the manifold over the flange studs until fully seated on the flange gasket.
11. Install flange nuts from MEC Stud Kit onto each stud and hand tighten.
12. Use appropriate wrench to tighten the flange nuts in an alternating pattern until flange connection is tight. Approximately 130 ft-lb / 176 N-m
13. Check for damage and proper operation after manifold assembly installation.
14. Rotate the valve selection handle to the home position to ensure all reliefs are active.
15. After the container is charged with product, check joints for leakage using "Marshall Excelsior" leak detector.
16. After installation is complete, ensure protective caps are installed onto all relief valves.

# QUAD-PORT RELIEF VALVE MANIFOLD

## MANIFOLD REMOVAL

### **!WARNING!**

Evacuate all system pressure before manifold removal!

1. Loosen and remove flange nuts from studs.
2. Remove manifold from studs using lift chain.
3. Remove studs and spiral coil flange gasket. Discard spiral gasket.

## INSPECTION AND MAINTENANCE

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.**

### **!WARNING!**

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 small mirror are suggested to assist when making visual inspections.

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

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

## MANIFOLD INSPECTION / MAINTENANCE CHECKLIST: (MINIMUM ONCE PER MONTH)

### 1. Cap:

Check that the protective cap is in place over each relief valve or pipeaway stack outlet and has a snug fit. The protective cap helps 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. Weep Holes:

Inspect and clear debris from the relief valve 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 RELIEF VALVE.**

### 3. Gear Set Weather Boot:

Check that the gear set weather boot is in place and in good condition. This prevents water and contaminants from entering the manifold valve gears.

## MANIFOLD INSPECTION / MAINTENANCE CHECKLIST: (MINIMUM ONCE PER YEAR)

### 1. Valve Port Selection Handle:

Slowly rotate the valve selection handle through each port position. This helps keep the gear set and manifold valve components lubricated and working properly. Return the valve selection handle to the home position to ensure all reliefs are active.

### 2. Relief Valve Spring:

Exposure to high concentrations of water, salt, industrial pollutants, chemicals and contaminants could cause metal parts to fail including the relief valve spring.

### 3. Physical Damage:

Ice accumulations and improper installation could cause mechanical damage.

**IF THERE ARE ANY INDICATIONS OF DAMAGE, REPLACE THE VALVE.**

### 4. Tampering or Readjustment:

Pressure relief valves are factory set to discharge at specified pressures.

**IF THERE ARE ANY INDICATIONS OF TAMPERING OR READJUSTING, REPLACE THE VALVE.**

### 5. Seat / Coupler Fitting Leakage:

Check for leaks in the seating area using a noncorrosive leak detection solution.

**IF THERE IS ANY INDICATION OF LEAKAGE REPLACE THE VALVE.**

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.

### 6. Corrosion: REPLACE THE VALVE IF THERE ARE ANY SIGNS OF CORROSION OR CONTAMINATION.

### 7. 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.**

### 8. Corrosion or Leakage at Container Connection:

Check container to manifold connection with Marshall Excelsior leak detection solution.

**REPLACE THE MANIFOLD IF THERE IS ANY INDICATION OF CORROSION OR LEAKAGE AT THE CONNECTION BETWEEN THE MANIFOLD 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 over pressurized container can cause severe consequences.

# QUAD-PORT RELIEF VALVE MANIFOLD

## REPLACEMENT OF PRESSURE RELIEF VALVES

### **!WARNING!**

Under normal conditions, the useful safe service life of a pressure relief valve with LPG application is 10 years from the original date of manufacture/NH<sub>3</sub> applications 5 years after specified installation date (see DOT regulations effective 7/01/2004). However, the safe useful life of the valve may be shortened and replacement required in less than 10 years for LPG/5 years for NH<sub>3</sub> 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, property damage or death.

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. The gas dealer must observe and determine the safe useful life of relief valves in his systems.

### For Additional Information Read:

1. NFPA # 58, "Storage and Handling of Liquefied Petroleum Gases".
2. NFPA # 59, "LP-Gases and Utility Gas Plants
3. ANSI/CGA 6.2.1, "American National Standard Safety Requirements for the Storage and Handling of anhydrous Ammonia"

Relief valves in service beyond their service life can exhibit the following degradation in function:

- They may leak at pressures below the set pressure.
- They may open and fail to properly reseal.
- They may open at higher than 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 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 resealing.

Corrosion is caused by water, corrosive atmospheres of salt and high industrial pollutants, chemicals, and 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 can be 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 failure to open. Paint and tar in relief valves also cause failure to function properly.

## NOTE

It is not necessary or desirable to lower tank vapor pressure when removing or installing a relief valve. Vapor pressure provides additional closing force to manifold port valve.

### TO REMOVE A SAFETY RELIEF VALVE:

1. Slowly turn valve selection handle until ID number of relief valve to be replaced is aligned with the "Port Closed" indicator on the manifold body.
2. Vent trapped vapor by opening the vent valve located below the relief valve to be removed.  
**\*Note:** It may be necessary to make slight adjustments to the position of the valve port selection handle to completely seal the internal pilot valve. If venting continues, close vent valve and unseat manifold valve by slowly moving valve port selection handle a quarter turn or more in either direction then return handle to close desired port.

3. **WARNING:** Wait for venting to stop before removing valve. After venting stops, remove relief valve.
4. Remove cap from relief valve.
5. Remove/Install relief valve from manifold using appropriate wrench.
6. Close vent valve and cover open port with weather cap attached to manifold gear boot.

**\*Note:** Relief valve must be replaced within a short period as the manifold port valve is not intended for primary seal for extended periods of time.

### TO INSTALL A SAFETY RELIEF VALVE:

1. Remove weather cap from closed manifold port.
2. Install MEC relief valve of proper size and rating according to instructions provided with the valve.  
**WARNING:** Valve must be installed with weep hole oriented away from operator, from all other valves, manifolds, and other pressure containing piping and systems, see figure 1.
3. Rotate the valve selection handle to a position between two port numbers to ensure all reliefs are active.
4. Check connection joints for leaks using "Marshall Excelsior" Leak Detector solution.
5. Install weep hole deflector into outermost port of relief valve, and ensure remaining ports are plugged.
6. Install cap onto relief valve outlet.

## PIPEAWAYS

Pipeaways and deflectors may be required by local codes, laws and regulations depending on the installation. The addition of pipeaway 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.