Safeguarding People and the Environment. Enhancing Performance.

Hazardous Materials Training Seminar – August 2018

MIDLAND
PART OF OPW a DOVER company

DEFINING | WHAT'S NEXT

Pressure Car Valves Overview

Angle Valves

Pressure Car – Angle Valves

1”, 2”, and 3” High-Flow Angle Valves

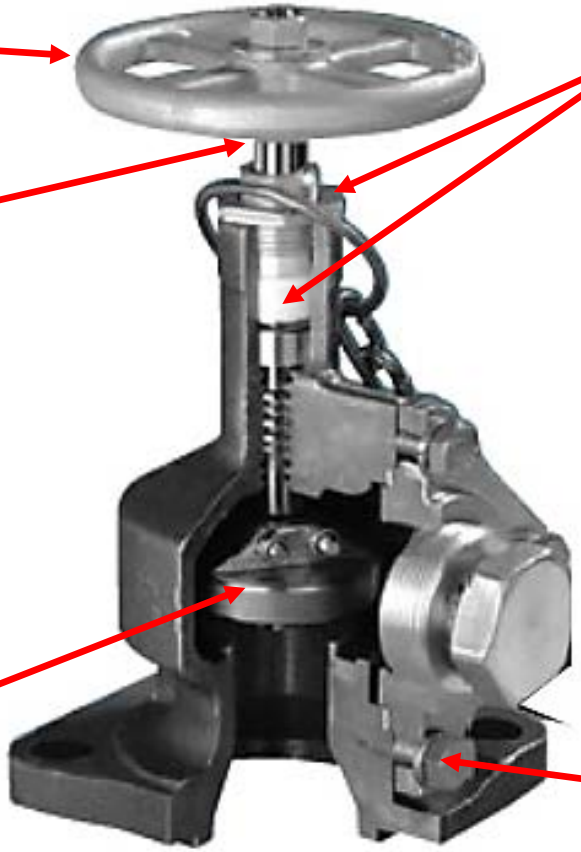
Applications include:

Liquefied Petroleum Gases 2”
Anhydrous Ammonia 2”
Chlorine 1”
Ethylene Oxide 2”
Hydrogen Flouride 1” and 2”

Midland Angle Valves

Handle
85 pound-foot of torque

Stem
SS Nickel Plated ¾”



Adjustable, Live Loaded Packing

Swivel Plug

Easily Replaceable Outlet Flange

Available Materials: Ductile Iron, Carbon Steel, 304 SS, 316 SS

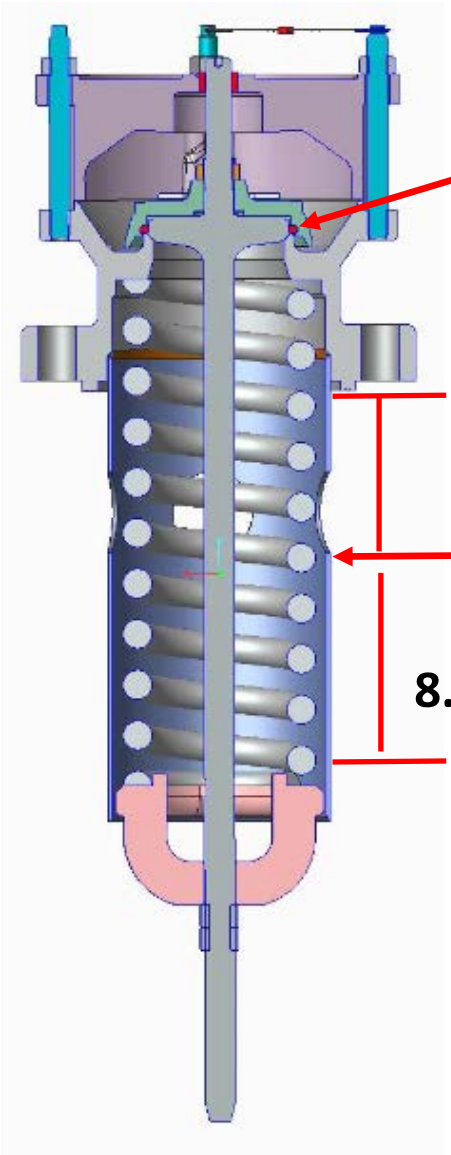
Midland Angle Valves

Features & Benefits Recap

- **Adjustable Stem Packing:** Designed to quickly and easily stop leaks in the field – eliminates need for car to be shopped and offloaded for valve repair.
- **Hand Wheel – 85 pound-foot torque:** Designed to snap off in case of overtightening, preventing expensive damage to stem.
- **One Piece Body for 2 inch and 3 inch:** Allows for expansion and contraction during flashing (hot weather outside, cold product inside), and fewer leak paths vs. competitor's two piece body.
- **Robust Outlet Flange:** Designed with four 9/16th bolts on faceplate for durability and ease of maintenance compared to competitor (eight 1/8th bolts, which are easier to strip and/or break)
- **Swivel Plug:** Reduces wear on seal/potential seat damage from overtightening of hand wheel. Fewer potential leak paths.

Pressure Relief Valves

Midland Internal Pressure Relief Valve



Field Replaceable O-rings

Guided Stem and Spring

8.5”

Minimal Spring Extension into Tank Car

Midland Internal Pressure Relief Valve

Features & Benefits Recap

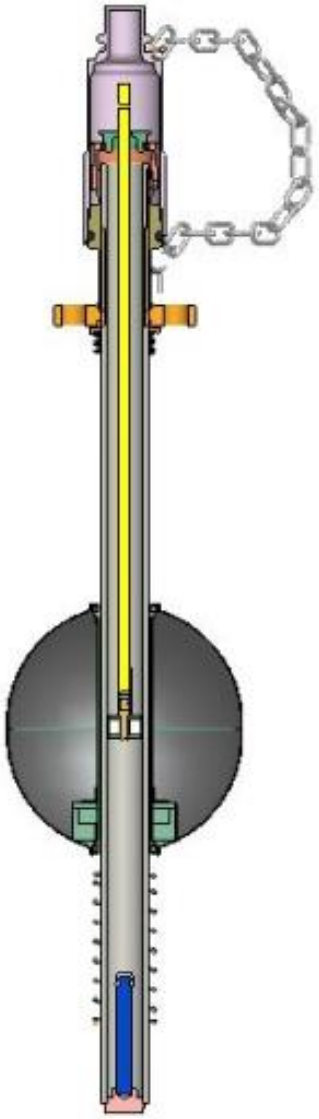
- **Field Replaceable O-Rings:** Can be done with car under pressure if necessary. Saves time by allowing to stop leak, and move to shop without waiting for one-time-approval, capping, etc.
- **Guided Stem and Spring:** Prevents stem/spring from bowing, ensuring repeatable start to discharge in closed setting.
- **Minimal Extension into Car:** Less movement of valve, less instances of commodity exposure to valve/springs, leading to longer life, consistent performance, etc.

External Pressure Relief Valves

- External style valves are used for corrosive commodities
- Springs are external to the tank
- 225 – 495 psig
- 4,629 – 8,616 scfm
- Tongue & Groove
- Stainless Steel & Hasteloy or Stainless Steel & Monel

Magnetic Gauging Device

Midland B-612 Magnetic Gauging Device



Purpose of Gauging Device

- Overfill protection
- Load more precisely for custody transfer

Operating Principles

- Magnet on the rod engages with magnet on the float
- Float rises and lifts the rod
- Specific gravity dictates the scale on the rod
- Custom designed for each car and commodity

Midland B-612 Magnetic Gauging Device

Features & Benefits Recap

- **Welded Adjustment Nut:** Locked in place, ensuring “0” (outage) stays accurate with repeated use
- **Material:** 304 SS common, also available in 316 SS (food grade)
- **Flexibility of Use:** Up to three scales (commodities) per rod, versus only two on competing product. One scale can include metric and imperial.
- **Vented Cap:** Holes towards bottom provide visual/audible notification of potential leak to avoid injury, etc.

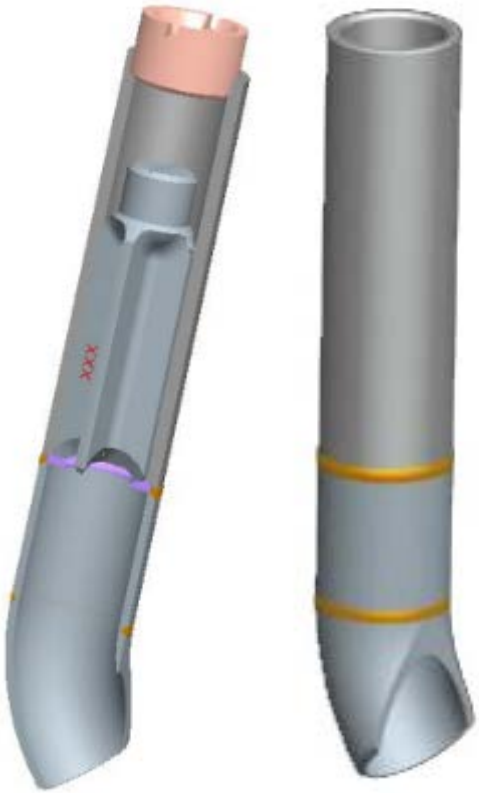
Excess Flow Valves

Excess Flow Valve Liquid Lines

For Liquid Lines

- Notched plug allows reset of check valve
- Weld Mounted to eduction pipe
- Max Flow: 1,477 lbs Propane per minute
- High flow rate with high-flow disturbance sensitivity to help operators achieve safe operation and faster unloading times
- Materials: Iron and Steel (Model A-167 with Stainless Steel)

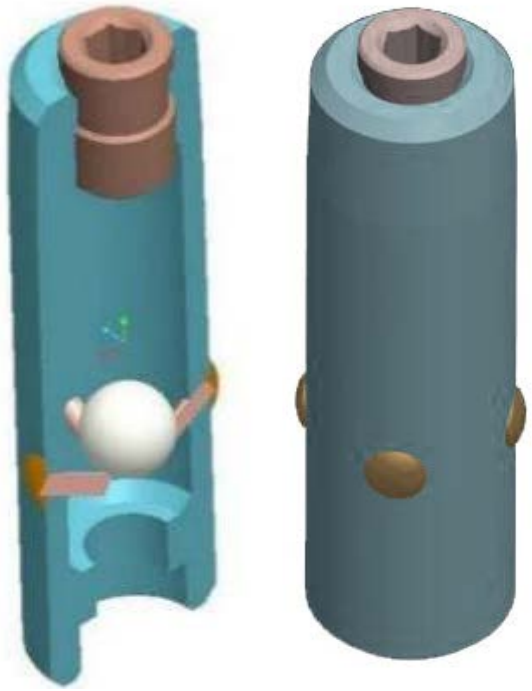
Excess Flow Valve Vapor Line



For Vapor Lines

- Weld mounted
- Surge Shield directs flow away from Gauging Device
- Non-galling assembly keeps the valve sliding easily without binding
- Plug Style Float
- Materials: Iron and Steel

Excess Flow Valve for Needle Valve



For Needle Valves

- Weld Mounted under fittings plate
- Non-galling assembly keeps the valve sliding easily without binding
- Ball Style Float
- Stainless Steel Components
- Max Flow: 106.3 lbs Propane per minute

Excess Flow - Backflow

Loading/Unloading point

- Attached to external line used to load/unload car
- Closes when the flow becomes excessive due to line failure, or other reasons but does not stop flow completely.
- Prevents release of hazardous or flammable products

Accessories

Accessories

B-290 Thermowell

- Non-contact access to lading for temperature measurement, using thermometer or thermocouple probe
- Vented cap to indicate broken weld in thermowell tube to allow product into tube.

A-257 Sample Valve

- Keep pressure-car operators safe by allowing sampling of the lading without opening a larger transfer valve
- Materials: Stainless Steel

Next Generation Fittings

Enhanced Valve System

The Complete Package

- NEW Low Profile Internal Pressure Relief Valve
- 2” Angle Valve with Spring Loaded Check Valve

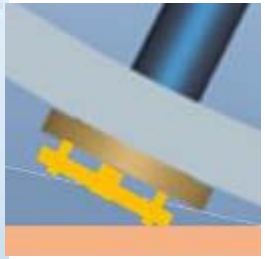
Low Profile PRV for Flammable Gases and EO
A-1281 and A-1076

NEW A-1281 Low Profile PRV

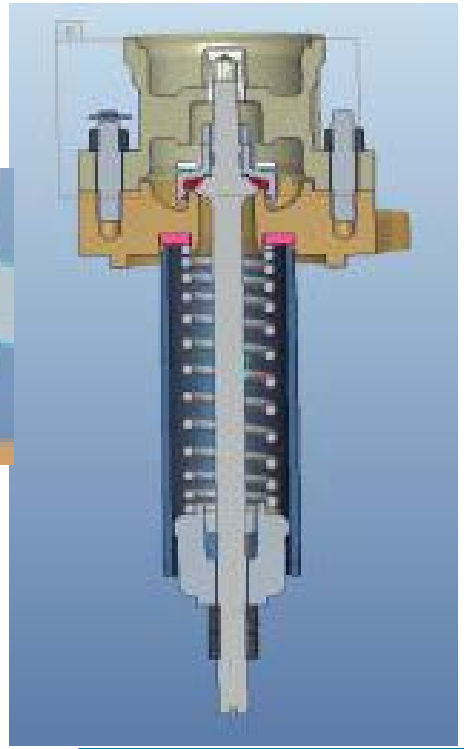
40% Lower than Traditional Internal PRV
70% Lower than External PRV

A-1281 and A-1076

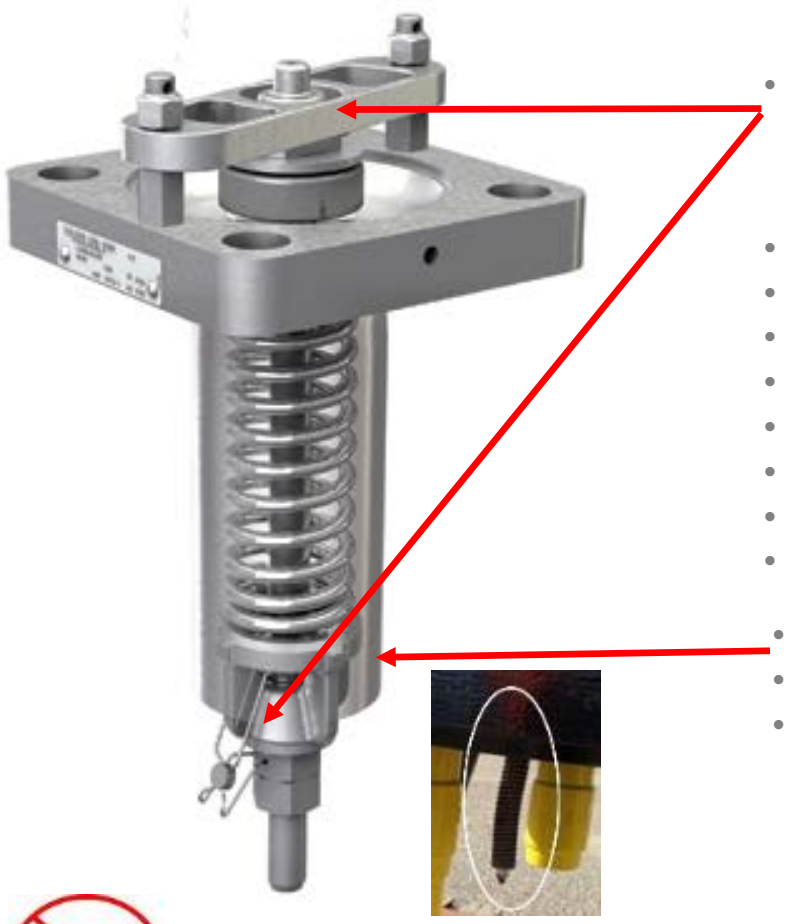
Less Chance to Sheer in the Event of a Rollover



Traditional



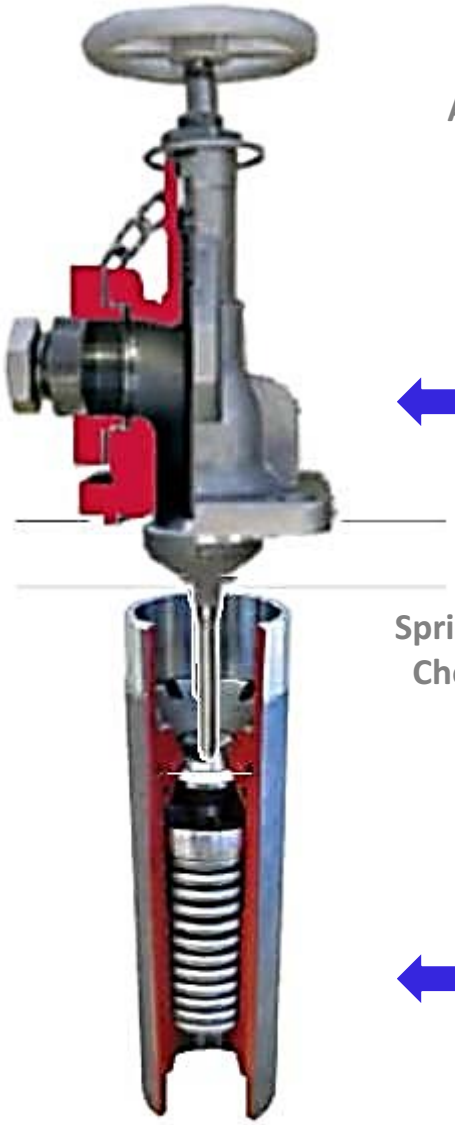
Low Profile PRV BENEFITS



- Low Profile, less likely to sheer off
- Stem guided at top and bottom, ensures precise stem alignment
- Top guide:
- - ensures that the stem can not
- surge in the event of a stem break
- - limits the valve opening
- when pressurized
- All Stainless Steel Construction
- Drain hole in flange to prevent water
- buildup around the seat
- Spring Guide Housing:
- - minimize spring fatigue, pitting
- - even tension on retainer, o-rings

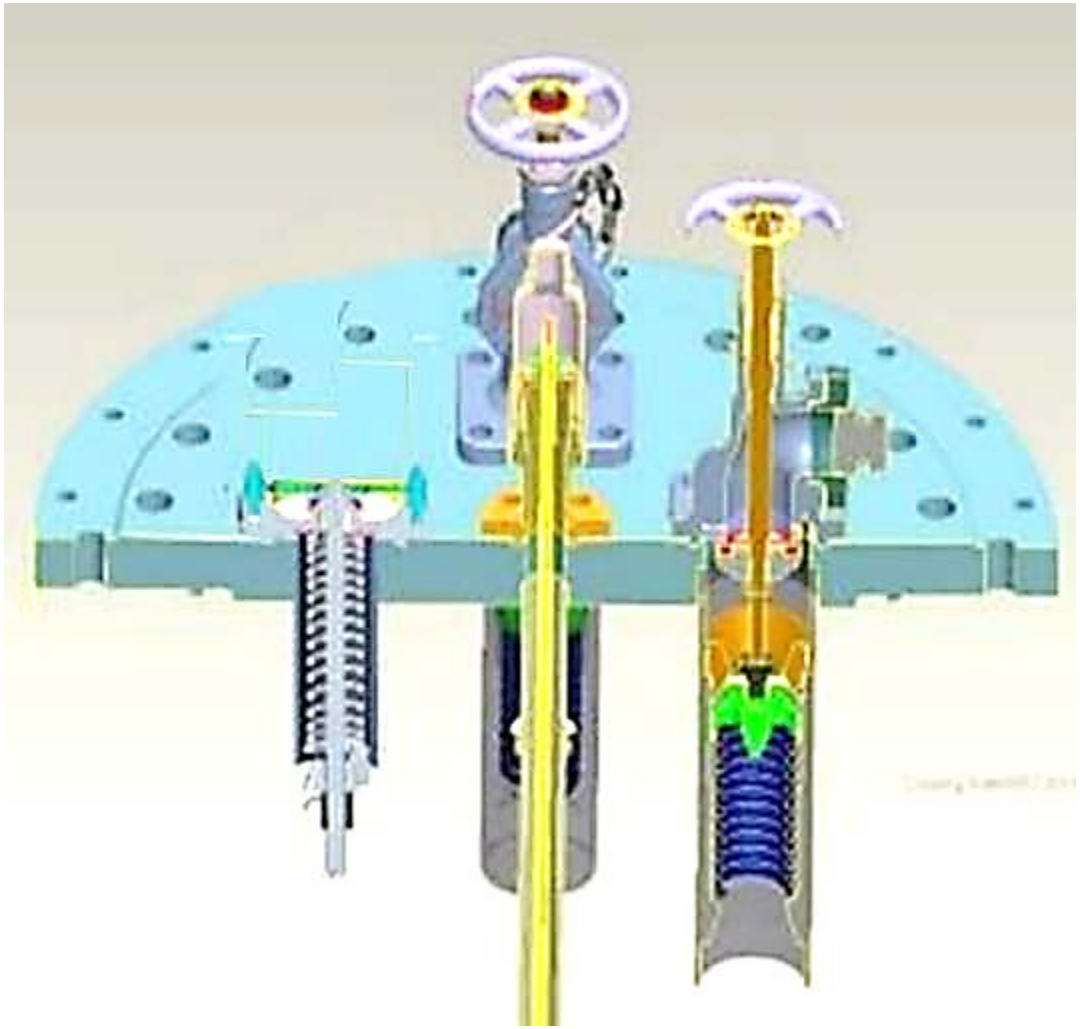
Spring guide eliminates this Condition (uneven spring tension)

2” Dual Angle Valve / Check Valve

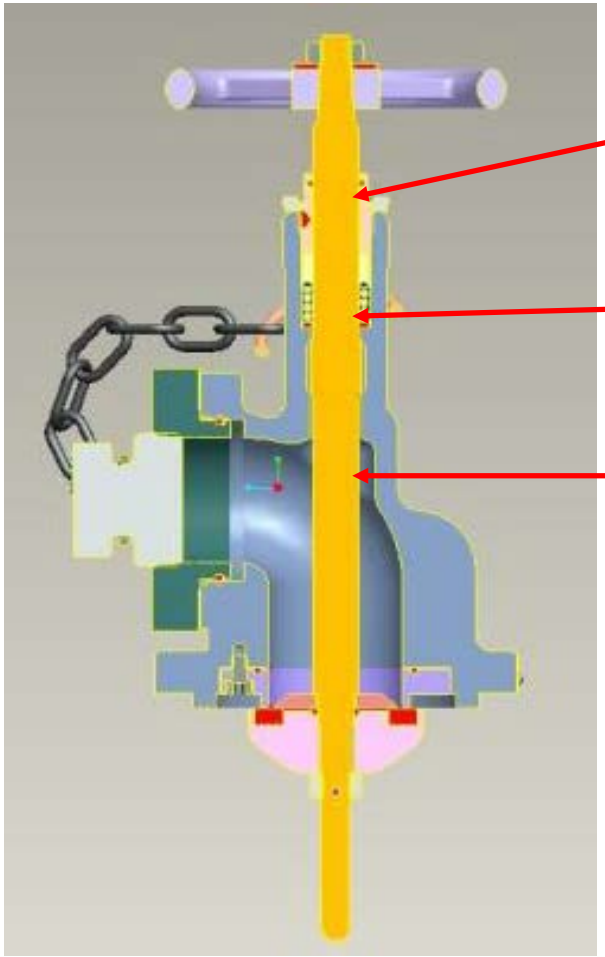


Angle Valve

Spring Loaded
Check Valve

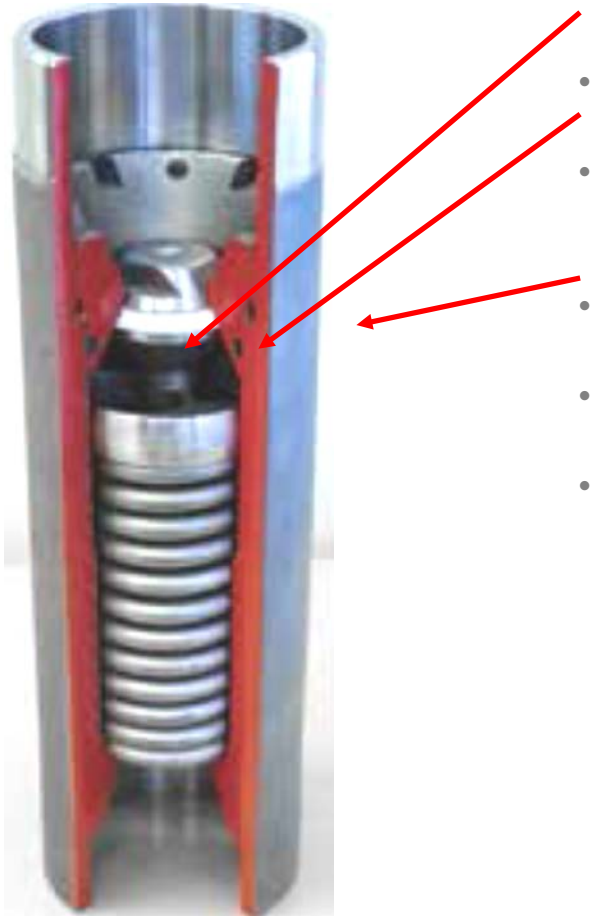


Angle Valve Benefits



- One-piece body, no leak paths
- Adjustable packing. Stop leaks in the field
- Spring loaded packing. Self adjusts during flashing conditions.
- Robust one piece stem. Easier to service and eliminates potential issues with tolerance stackups.
- Only (4) outlet flange bolts 9/16”. Easy to service in the field

Check Valve Benefits



- Soft seat, positive shutoff
- Guided seat retainer, ensures a positive seal every time
- Spring enclosed in guide tube, ensures even spring tension for seal integrity
- Spring loaded, easy to open and close, no flow path impediments
- Removable components, ease of maintenance
- Robust guided spring designed for high un/loading rates

General Purpose Car Products

Pressure Relief Valves

- Internal and External designs
- Pressure ratings 75 PSIG to 165 PSIG
- Flow rates up to 35,000 SCFM
- Recloses after operation to minimize potential release of product to atmosphere
- Engineered to quickly and safely evacuate tank contents in the event of a over-pressure event such as a derailment and or fire

Vacuum Relief Valves

- Low-cost assurance that normal vacuum conditions will not collapse or otherwise damage the tank car or tank car fittings
- 100% tested to assure correct operating pressures and sealing under both vacuum and positive pressure conditions
- Corrosion-resistant, stainless steel construction on sealing surfaces extends service life
- Quad seals provide positive sealing at vacuum and positive pressure
- Weather cap prevents elements from getting into the valve

Bottom Outlet Valves

- Engineered for extended service life and to improve unloading times without sacrificing operator safety
- Multiple designs available
- Plug Valves
- Butterfly Valves
- Ball Valves
- SS construction
- Optional Steam Jackets

Bottom Outlet Valves

- Quarter turn operation
- Universally compatible seat
- DuraSteel (SS/Teflon)
- Adjustable packing
- Highest flow capacity ball valve on the market
- (2500 SCFM)
- Well-accepted by shippers
- Operator familiarity
- Midland field service and support

Other GP Car Products

- Rupture Discs
  - Engineered to operate at pressures from 75 to 165 PSIG
  - Reliable, fail-safe operation
  - Heavy-duty construction to withstand common abuse of day-to-day operation
- Lift Assisters
  - Spring-loaded device for manway and protective housing covers
  - Powder-coated springs for harsh, chemical environments

Emergency Response Kits (ERKs) for Pressure Cars

FOR STOPPING OR CONTAINING LEAKS FROM VALVES AND FITTINGS

New Sealable Hard Plastic ERK Carrying Cases

Proper procedures for using the Midland B-240/B-243 Emergency Response Kit for mitigating leaking valves and fittings on pressurized rail tank cars.

The purpose of the Emergency Response Kit

- Stop the leak on any of the various valves and fittings
- Contain a leak they may find on a variety of tank railcars

Always wear the appropriate Personal Protective Equipment (PPE)

- Follow your company's procedures and the manufacturer's safety requirements for protective equipment

The Midland Emergency Response Kit

The Midland Emergency Response Kit contains tools to allow:

- The repair of leaking valves and fittings to stop leaks
- Capping cans to contain leaks that cannot be stopped

The Midland Emergency Response Kit

Midland Emergency Response Kit contents

- Two large carrying cases
- A toolbox containing a broad range of tools and replacement parts
- Five different cover cans with respective gaskets which can be used to cap a leaking valve or fitting
- A bridge, used to secure cover cans to the manway cover plate

ERKs help stop leaks in all of the following

- Angle Valves
- Pressure Relief Valves (PRVs)
- Gauging Devices
- Sample Valves
- Thermowells

Stopping leaks in:

- **Angle Valves**
- Pressure Relief Valves (PRVs)
- Gauging Devices
- Sample Valves
- Thermowells

Angle Valves

Leak in the packing gland

Leak at the outlet flange due to damaged o-ring or gasket

If leak is through the side port, make sure the valve is closed

Tighten the flange nuts that are nearest to the leak to gasket manufactures requirements

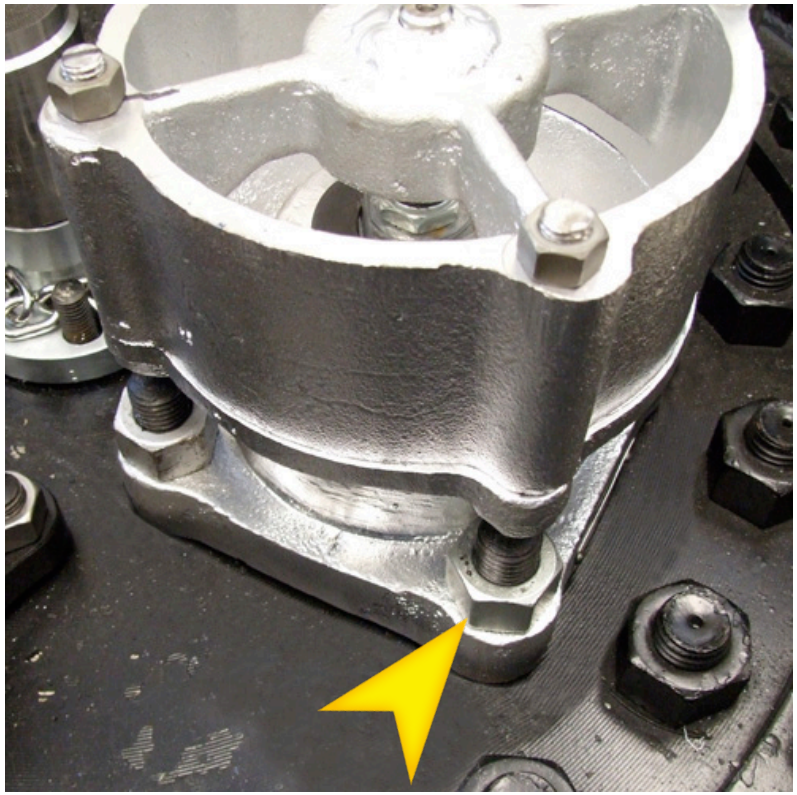
Angle Valves

- If there is a side-port leak, and the initial valve closure does not stop the leak, reinstall the plug and cycle the valve to clean the seats. This may allow the valve to seal.
- Remember that the valve cavity will be full of product, so care must be taken when removing the plug
- Outlet flange and packing leaks will stop if a valve-seat leak is corrected
- Check all flange bolts to ensure they are all tight, not just the ones nearest the leak point. Torque to gasket manufacture requirements
- Stem packing torque to 65 foot pounds
- Outlet flange bolts torque to 45 foot pounds

Stopping leaks in:

- Angle Valves
- **Pressure Relief Valves (PRVs)**
- Gauging Devices
- Sample Valves
- Thermowells

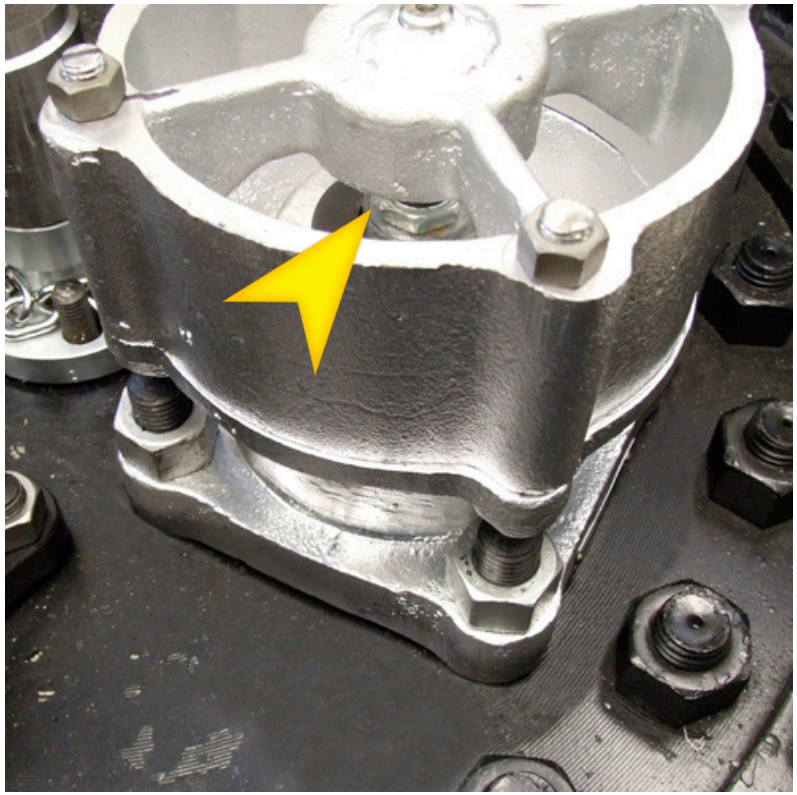
Pressure Relief Valves (PRVs)



If the leak is between the valve and the mounting plate:

- Tighten the flange nuts that are nearest the leak in an alternating 1-3-2-4 pattern
- If capping hood is placed over the prv. The pressure must be continuously monitored, if possible. Contact the shipper before capping the prv to ensure that the car pressure is as expected

Pressure Relief Valves (PRVs)



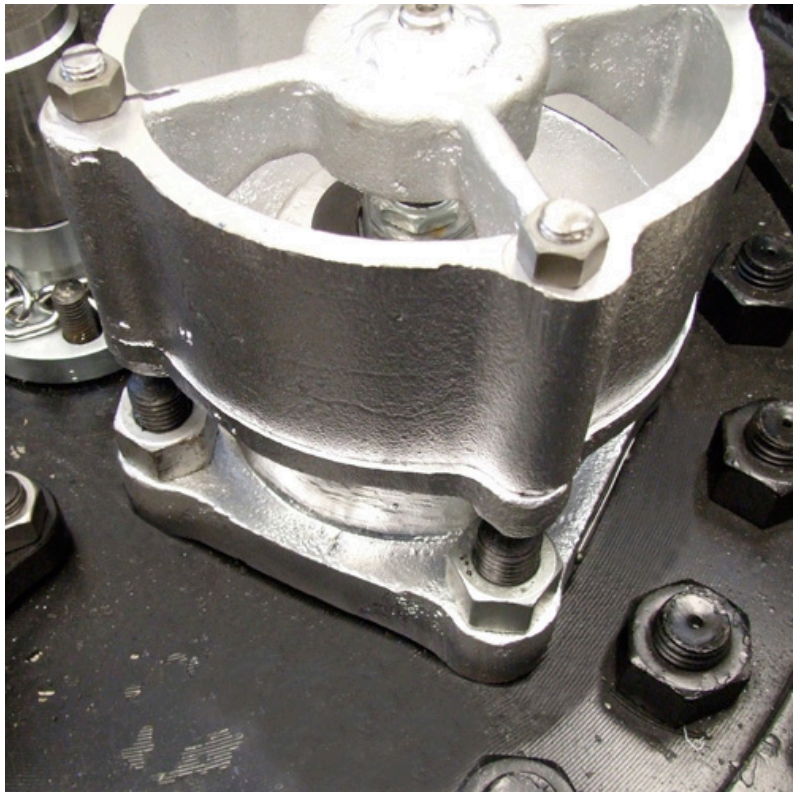
If the liquid is leaking through the discharge orifice:

- The car is liquid full and some liquid must be removed or transferred
- The leak may be due to PRV malfunction, as well, which may require the replacement of the PRV's O-rings

WARNING

Conducting PRV O–ring replacement may be hazardous.
O-ring replacement should only be done by trained personnel using proper replacement O-rings.

Pressure Relief Valves (PRVs)



Proper procedure for replacing PRV O-ring Seals:

- Remove the top seal wire
- Mark the top guide and body with a vertical line to allow the top guide to be reinstalled in the same orientation
- Pry up and remove the top guide
- Remove the O-ring retainer
- Clean and confirm that the valve seat area is clean and free of defects
- Install an O-ring retainer with epoxied O-rings
- Install the top guide and secure it with the four (4) guide nuts

Stopping leaks in:

- Angle Valves
- Pressure Relief Valves (PRVs)
- **Gauging Devices**
- Sample Valves
- Thermowells

WARNING

DO NOT remove the protective cap from a leaking magnetic gauging device under any circumstances.

Doing so may cause the device to be ejected from the railcar under extreme force.

Gauging Devices

If the leak occurs under the protective cap, tighten the top cover bolt

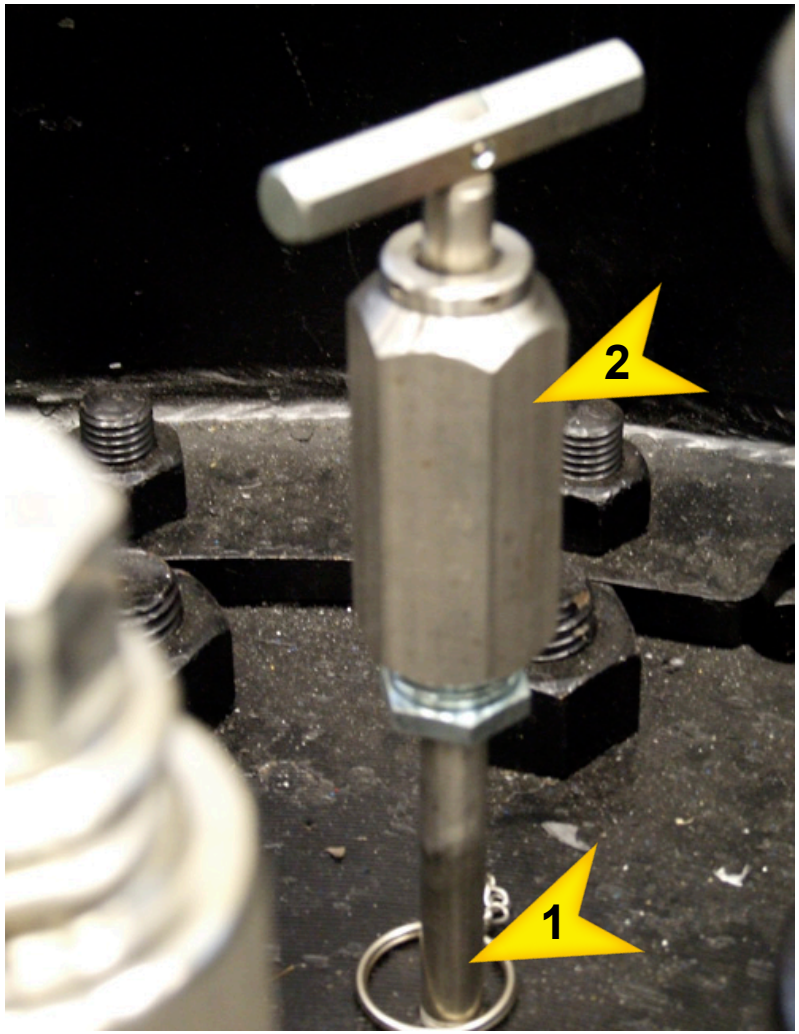
If a leak occurs it could indicate the weld has cracked on the pressure plate to the tube.

Tighten the stud nuts in an alternating 1-3-2-4 pattern

Stopping leaks in:

- Angle Valves
- Pressure Relief Valves (PRVs)
- Gauging Devices
- **Sample Valves**
- Thermowells

Sample Valves



The sample valve, which is located above the cover plate, usually consists of a:

1. Nipple – tighten nipple with a pipe wrench or channel lock pliers
2. Needle valve thread leak – tighten the hex body of the valve on the nipple

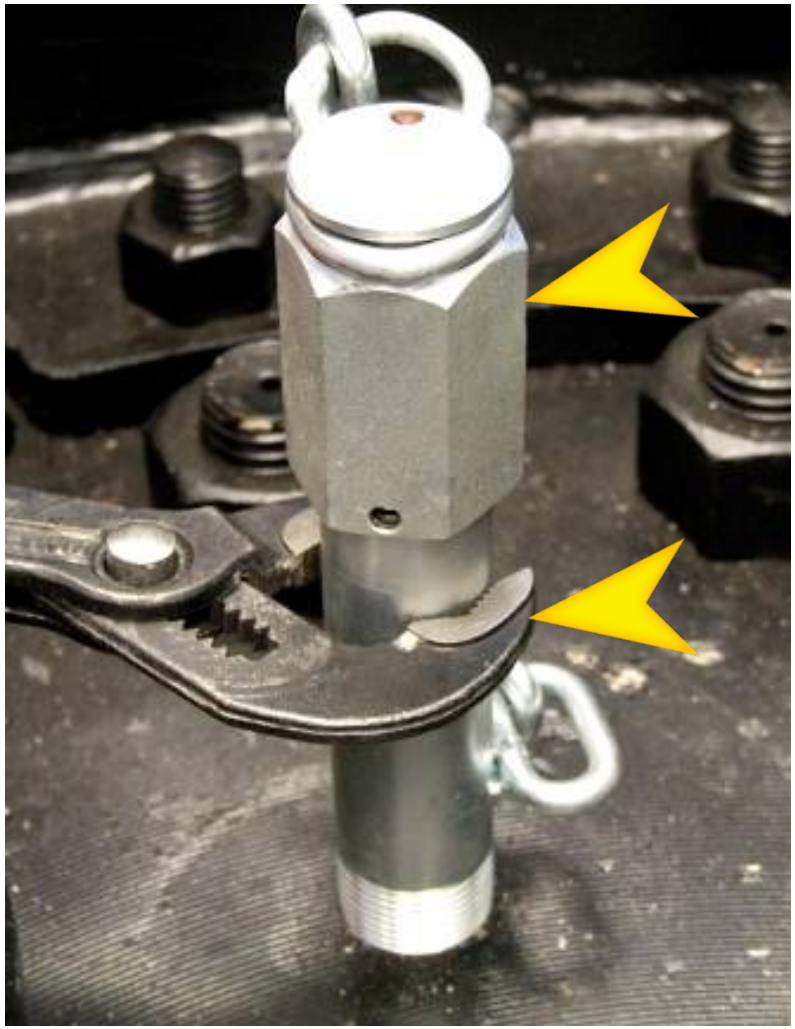
Stopping leaks in:

- Angle Valves
- Pressure Relief Valves (PRVs)
- Gauging Devices
- Sample Valves
- **Thermowells**

CAUTION

A leak at the hex cap indicates an internal thermowell leak, so tightening the cap will stop the external leak, but the device will still need to be replaced due to its failure.

Thermowells



Tighten the hex cap, but do not remove it! The cap's removal could escalate the incident.

If the thermowell is leaking at the ¾-inch pipe thread connection:

- Use a pipe wrench or channel lock pliers to tighten the connection

The Purpose of Capping Kits

Stop leaks on any of the various valves and fittings

Contain leaks found in a variety of pressure railcars

CAUTION

Response personnel should be aware that use of a capping kit may prevent response personnel from pursuing alternative response options.

Two Versions of Capping Kits

Midland Emergency Response Kit (ERK)

- Caps multiple hazardous commodities, including chlorine
- Has more parts

C-Kit

- Caps Chlorine and SO2 leaks only
- Has fewer parts

Midland Emergency Response Kit (ERK) contents

- Two (2) large carrying cases
- A toolbox containing a broad range of tools and replacement parts
- Five (5) different cover cans with respective gaskets that can be used to cap a leaking valve or fitting
- A bridge that is used to secure cover cans to the manway cover plate

Emergency Response Kit

1. Viton® gaskets
2. Cover cans
3. Bridge
4. Tie bars
5. Jackscrew assembly

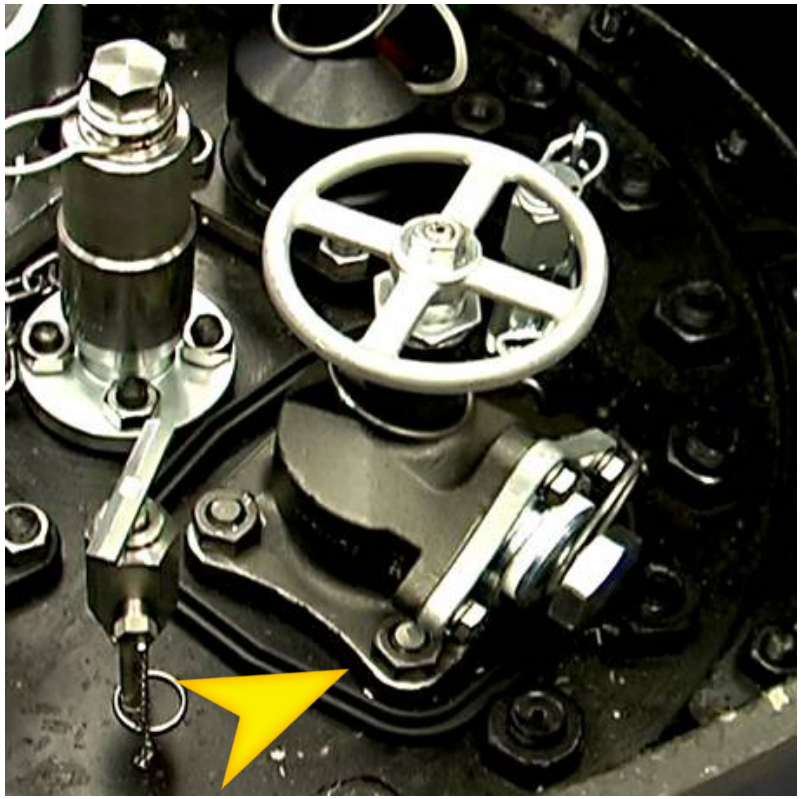
Installing the Viton® gasket

Step 1

Prepare the sealing surface of the cover plate to receive the gasket.

- The pressure plate seal surface is the most critical factor in allowing a proper capping-can seal

Installing the Viton® gasket

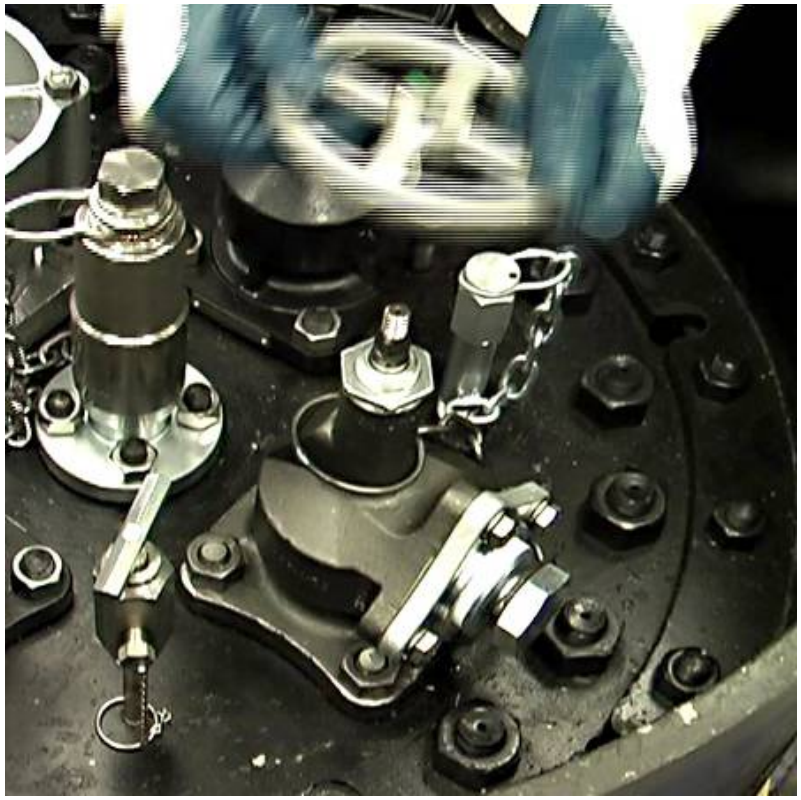


Step 2

Lay cover-can gasket around the valve to determine fit and select correct can size.

(once the size has been determined, remove the gasket)

Installing the Viton® gasket



Step 3

If necessary remove the valve handwheel or ball valve handle to allow can-cover installation.

Installing a Cover Can Over an Angle Valve

Step 1

Place the gasket on the cover can

- You may need to reduce the size of the capping-can outlet to a smaller pipe size if room inside the housing is constricted.

Installing a Cover Can Over an Angle Valve

Step 2

Install the following in the side port of the cover can:

1. Ninety-degree elbow
2. 2-inch nipple
3. Ball valve

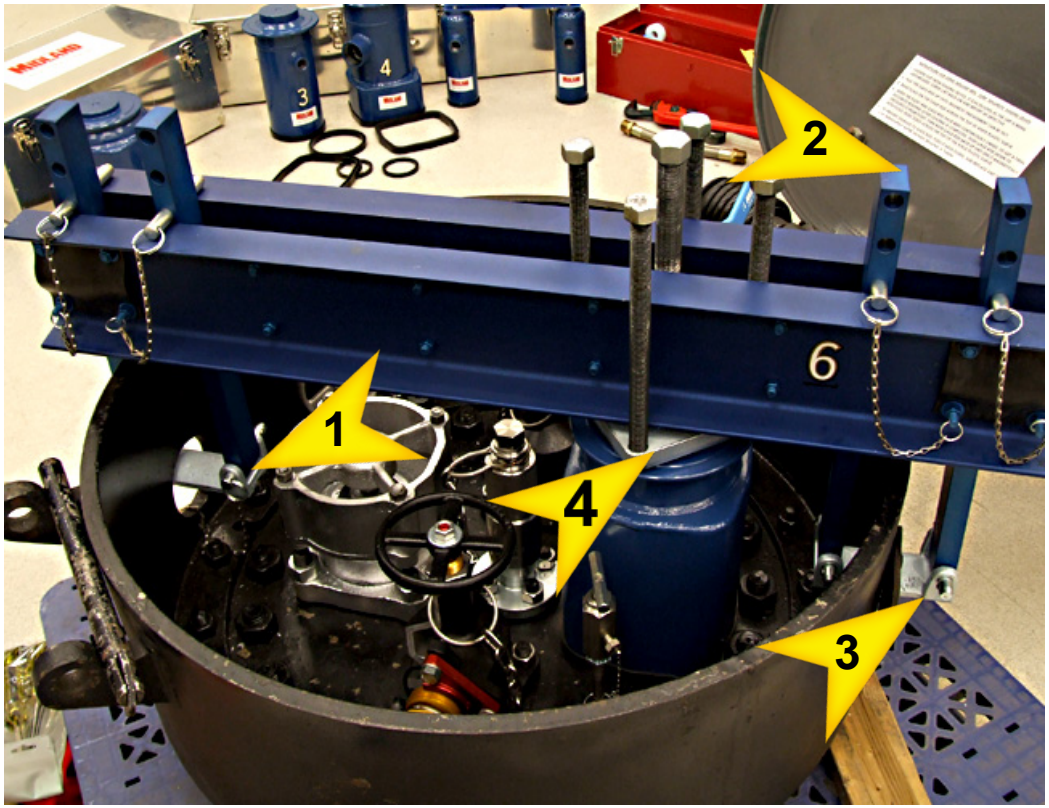
(Be sure to locate the can outlet valve where it will be accessible after the bridge has been installed.)

Installing a Cover Can Over an Angle Valve

Step 3

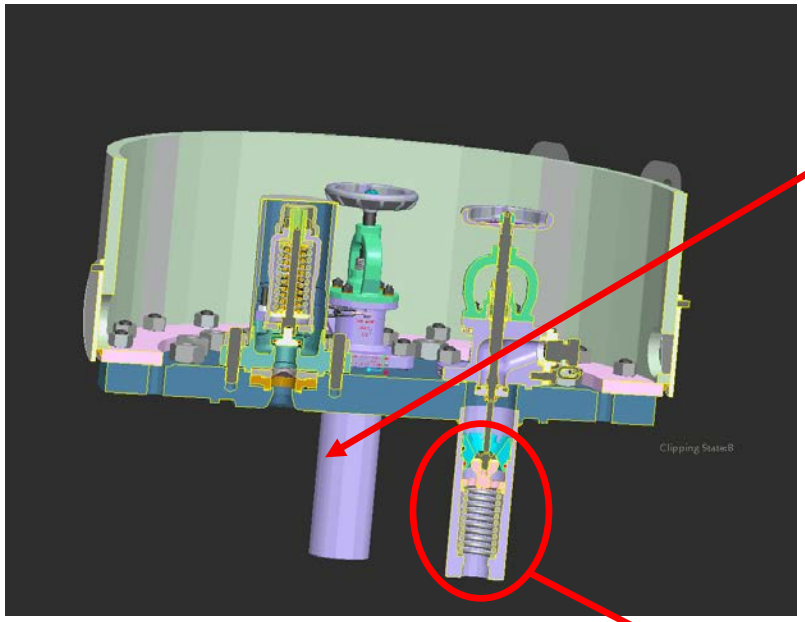
- Lower the cover can so that the side port of the can is at a 90-degree angle from the bridge to be installed
- Install the jackscrew assembly on the capping can. (Must be done prior to installing the bridge.)

Installing the Bridge



1. Two port hole brackets
2. Four tie bars
3. Insert the four (4) lower $^{5}/_{8}$-inch tie-bar pins through the two (2) side holes of the cover-plate skirt
4. Center jackscrew and 4 jackscrews in square plate

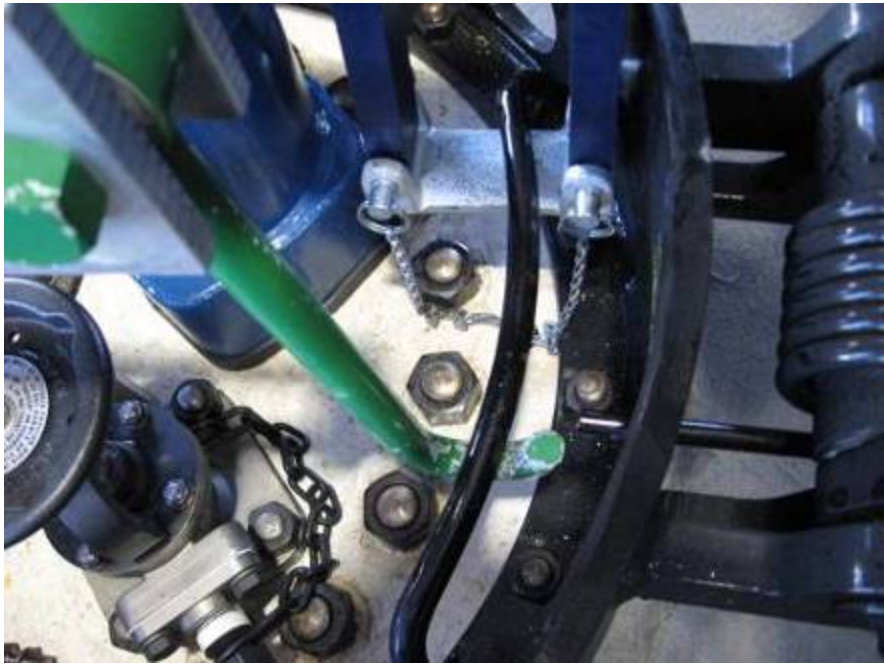
Side View of the NGRTC Assembly



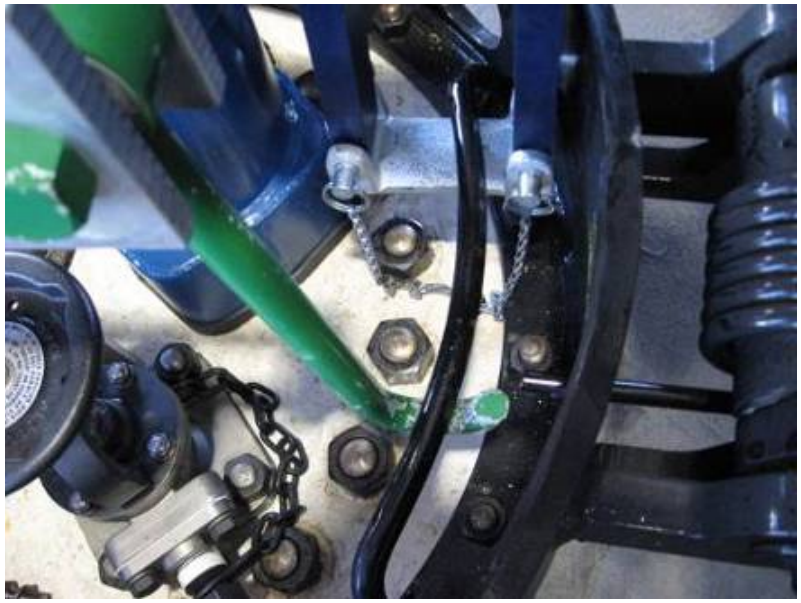
- Note: The PRV rupture disc is mounted in the pressure plate
- The check valve is mechanically operated by the angle valve
  - The check-valve spring maintains a positive seal on the valve until pushed open by the angle valve stem
- The primary seals are located below the pressure-plate surface

Midland Emergency Response Kit

Chlorine C-kit

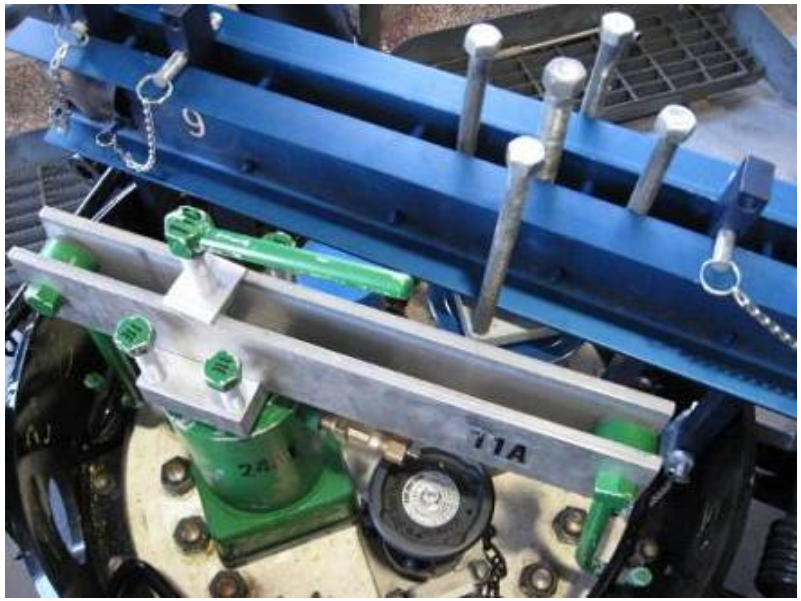


Mounting Options for Capping Kits



- With the four (4) interior bars, the “C” kit hooks and the ERK tie bars have room to “find” the right spot to create a good connection for sealing over the capping can
  - It is recommended to use the port holes for the ERK kit
- Ensure that the bar does not interfere with the valves or the side of the protective housing

Mounting Options for Capping Kits



The C kit will work in the port holes through the following:

- Unbolt one of the hooks
- Mount both hooks into port holes
- Reattach the hook and tighten normally
- FRA movement approval must be obtained prior to moving a car that has an ERK installed on it


Thank You