



## Maintenance Manual

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# 1½” Flanged Uniact Vacuum Relief Valve AAR Specification



**Part Number: 48/X00XXCX**

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### Maintenance Manual

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## Introduction

### Maintenance Manual - 1½” Flanged Uniact Relief Valve: AAR

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## IMPORTANT

Read all the information and instructions before you start the procedure. Keep this manual.

**WARNING:** A relief valve is a spring-loaded device which can cause serious injury to personnel. Obey all the maintenance and safety precautions.

## Overview

This maintenance manual contains instructions to do maintenance and testing on a 1½” flanged Uniact relief valve: AAR specification, part no. 48/X00XXCX.

## Maintenance Precautions

**WARNING:** It is not permitted to adapt a Uniact relief valve or its components. If you have a valve that has been adapted, please contact Fort Vale.

**CAUTION:** If you want to change the relief valve to a different setting, please contact Fort Vale. This is important because the valve setting is marked on the valve and is linked to the valve’s traceable serial number.

To prevent injury to personnel:

- be careful during maintenance.
- obey all warnings.
- use the recommended tools.
- use the applicable PPE.

To prevent damage to the valve:

- use the recommended tools to do the maintenance.
- use the recommended equipment to test the valve.
- obey the recommended Bolt Torque Guide and Step Loading Procedure, refer to Appendix E: OPIN39.
- read Client Responsibilities, refer to Appendix E: OPIN39.
- use genuine spare parts.

## Tools & Equipment

You will need general workshop equipment, hand tools and some special tools to do Uniact relief valve maintenance.

To find a full list of general and special tools, refer to Appendix A: Tools and Equipment.

You can buy all the special tools from Fort Vale.

## Replacement Parts

Please contact Fort Vale to order a new seal kit and replacement parts, if necessary. Install only genuine spare parts. Refer to Appendix B: Data Sheet USREL145.

**WARNING:** If you install a replacement part that is not a genuine Fort Vale part, there is a risk of:

- injury to personnel.
- valve malfunction.
- permanent damage to the valve or tank.

## Technical Support

If you have a problem that you cannot solve using this manual, please contact us.

## Disclaimer

Fort Vale reserves all rights to make technical modifications and improvements at any time. Fort Vale accepts no responsibility for any consequences arising from the use of the valve/ancillary and these instructions. Errors and omissions excepted.



## Important Safety Notice

**WARNING:** Vessels and systems operate under pressure and can contain dangerous cargo (liquid and vapour) that can cause death or serious injury to personnel.

### Precautions

Before you remove a valve from the vessel/system, you must:

- do a Hazard Identification and Risk Assessment.
- make sure the vessel/system is empty (liquid and vapour).
- make sure the vessel and valves have been cleaned correctly.
- make sure the vessel has been certified safe for human entry.
- make sure that the vessel/system pressure is at zero. When all the vessel/system pressure is released, use an approved method to release all residual pressure before you loosen the fasteners.
- read the SDS (Safety Data Sheet) for the last cargo and obey the recommended precautions.
- use the applicable PPE (Personal Protection Equipment) for the cargo and operating conditions.

### Approved Person

You must be an “approved person” to do valve maintenance and testing. An approved person:

- knows the function of the valve.
- knows how the valve is assembled, installed and operated.
- knows the operation limits of the valve.
- has experience and qualifications related to valve maintenance and testing.
- knows and obeys all the related in-company and regional/national regulations.

### After maintenance

When you have completed the maintenance, you must do an approved leak test to the valve before you install it onto the vessel.



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# CHAPTER 1

## Valve Disassembly

### 1½” Flanged Uniact Vacuum Relief Valve: AAR Specification

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This chapter contains instructions to fully disassemble the valve.







**Step 1.** Use this procedure to disassemble a 1½" flanged Uniact vacuum relief valve with cap, gauze filter and anti-tamper wire.

**WARNING:** This valve is under spring-load. Be careful during the procedure and use eye PPE.



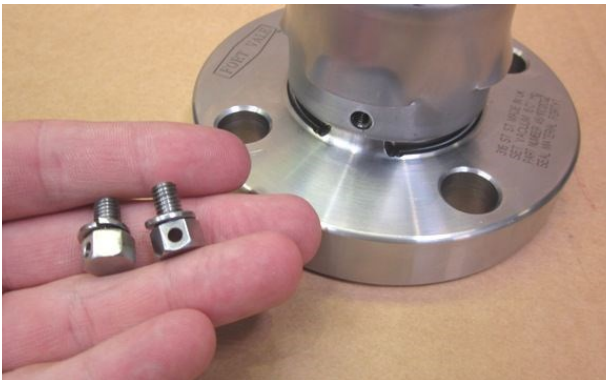
**Step 2.** Cut the wire using a pair of wire cutters.



**Step 3.** Remove the wire by pulling it through the nipples. Discard the wire.



**Step 4.** Loosen the nipples using a 3/8" (10mm) box-end wrench.



**Step 5.** Remove both nipples and washers.



**Step 6.** Remove the cap.



**Step 7.** Remove the gauze.



**Step 8.** Select the tools required to remove the poppet assembly:  
1. 1/2" (13mm) socket wrench.  
2. Spring pad locking tool, part no. 400/7495.



**Step 9.** Locate the locking tool in the spring pad.



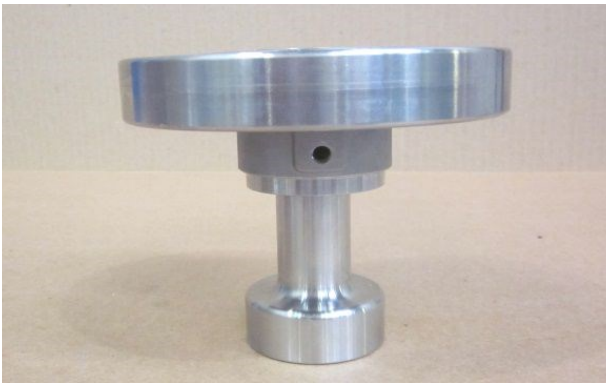
**Step 10.** Hold the locking tool to prevent the spring pad from turning. Unscrew the 5/16" UNF nut with the socket wrench.



**Step 11.** Remove the nut.



**Step 12.** Select the spring pad assembly tool, part no. 400/7492. The tool lets you disassemble the poppet, spring and spring pad from the valve body.



**Step 13.** Put the assembly tool on a level surface. Turn the valve and put the body on top of the assembly tool so that the spring pad engages with the slots in the assembly tool.

**CAUTION:** The body is under spring-load.



**Step 14.** Push down on the body to release the valve poppet.

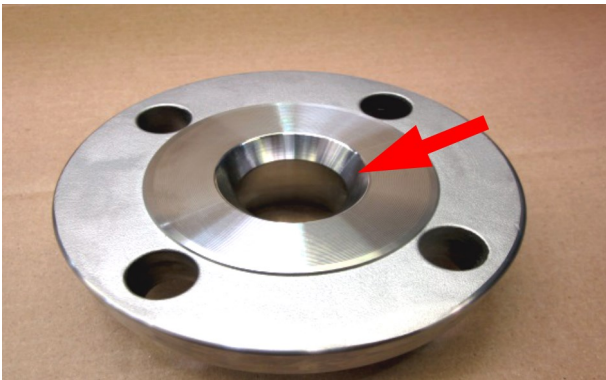


**Step 15.** Continue to hold down the body, then unscrew and remove the poppet.

**CAUTION:** The body is under spring-load.



**Step 16.** Slowly release the spring pressure and remove the body.



**Step 17.** Examine the valve seating area to make sure there is no damage or corrosion. If there is damage or corrosion, please contact Fort Vale.



**Step 18.** Remove the spring and examine it for damage or corrosion.

**NOTE:** We recommend that you also do a surface crack test to the spring. If the spring shows signs of pitting, cracking or other linear discontinuity, replace it. Please contact Fort Vale for a replacement spring.



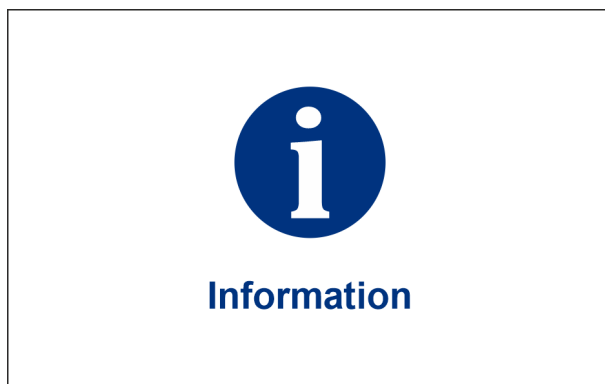
**Step 19.** Remove the spring pad and examine it for damage or corrosion.  
If there is damage or corrosion, please contact Fort Vale.



**Step 20.** Use a small flat-head screwdriver or a pick to remove the poppet O ring. Be careful not to cause damage to the O ring groove or poppet face. Discard the O ring.



**Step 21.** Examine the poppet for damage or corrosion.  
Look carefully at the O ring groove .  
If there is damage or corrosion, please contact Fort Vale.



**Step 22.** This procedure is complete. Go to Chapter 2 - Valve Assembly.



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# CHAPTER 2

## Valve Assembly

### 1½” Flanged Uniact Vacuum Relief Valve: AAR Specification

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This chapter contains instructions to assemble the valve.





### Examine the parts

Make sure they are clean and there is no damage

**CAUTION:** Do not install a dirty or damaged part

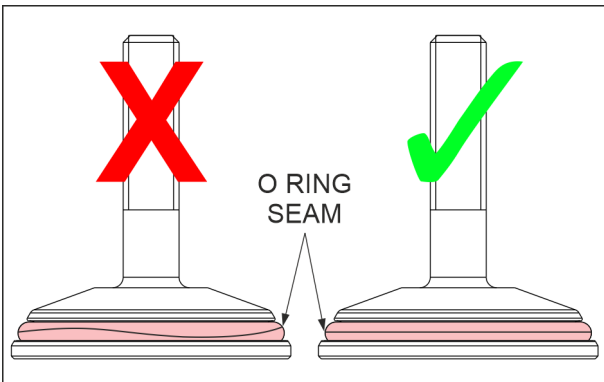


**Step 23.** Use this procedure to assemble a 1½" flanged Uniact vacuum relief valve.  
Select all the valve components and the new vacuum O ring.

Make sure all parts are clean and that there is no damage.

**WARNING:** This valve is under spring-load. Be careful during the procedure and use eye PPE.

**Step 24.** Install the poppet O ring.  
ELASTOMER O RING: Roll the O ring over the poppet into the groove.  
FORTYT O RING: Push the O ring over the poppet into the groove.



**Step 25.** NOTE: Elastomer O rings have a seam around the circumference.

**CAUTION:** It is important that the O ring seam is parallel when it is installed. If the O ring is twisted, the valve can malfunction.



**Step 26.** Make sure that the O ring is fully located around the circumference and that it is not twisted.



**Step 27.** Select the tools:

1. Spring pad assembly tool, part no. 400/7492
2. Thread adhesive, e.g. Loctite 243
3. Spring pad locking tool, part no. 400/7495
4. Ratchet with ½" (13mm) socket



**Step 28.** Select the valve body, spring, spring pad and vacuum poppet with O ring.

NOTE: We recommend that you also do a surface crack test to the spring. If the spring shows signs of pitting, cracking or other linear discontinuity, replace it. Please contact Fort Vale for a replacement spring.



**Step 29.** Put the assembly tool on a level surface. Put the spring pad onto the assembly tool. Make sure that the groove of the spring pad faces up.



**Step 30.** Put the spring on top of the spring pad. Make sure that the spring is engaged in the groove on the spring pad.



**Step 31.** Put the body over the spring.



**Step 32.** Use your hands to push down on the valve body to compress the spring. Engage the poppet into the spring pad.  
**CAUTION:** The body is under spring-load.



**Step 33.** Continue to hold down the valve body and screw the poppet into the spring pad until it is fully engaged. Remove the valve from the assembly tool.



**Step 34.** This procedure is complete. You must now test the valve and set the vacuum. Go to Chapter 3 - Test and Set the Vacuum.





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# CHAPTER 3

## Test and Set the Vacuum

### 1½” Flanged Uniact Vacuum Relief Valve: AAR Specification

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This chapter contains instructions to test and set the vacuum.





## Information

**Step 35.** Use this procedure to test and set the vacuum. You can use this procedure for valves with an elastomer or a Fortyt O ring.  
NOTE: The PRESSURE VALIDATION TEST is different for an elastomer O ring and a Fortyt O ring.



**Step 37.** Use adaptor flange part no. FIX/H/0017 to install the valve to the test rig.



**Step 36.** Use a test rig to test the valve. A test rig and instructions are available from Fort Vale: e.g. part no. 400/8000 (digital gauges) or part no. 400/8200 (analogue gauges).  
**CAUTION:** You must be a "qualified person" to test and set valves.



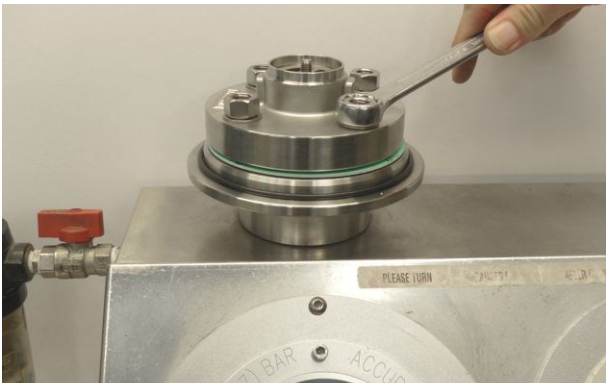
**Step 38.** Examine the adaptor socket to make sure it is clean and there is no debris. Lubricate the socket O rings with water.



**Step 39.** Set the test rig supply gauge at 2"Hg higher than the target vacuum setting.



**Step 40.** Install the adaptor flange onto the socket, hand-tight.

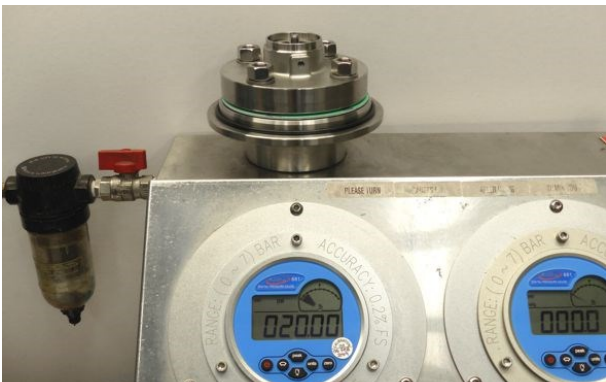


**Step 41.** Install the valve onto the adaptor. Install 4x 1/2" washers and 1/2" full nuts. Tighten the nuts in a diametrically opposite sequence using a 3/4" (19mm) box-end wrench.



**Information**

**Step 42.** Do a PRESSURE VALIDATION TEST:  
ELASTOMER O RING: Go to Step 43.  
FORTYT O RING: Go to Step 46.



**Step 43.** PRESSURE VALIDATION TEST: ELASTOMER O RING

Set the test rig to Pressure mode. Apply 20 PSI pressure. Lock the pressure supply to keep the pressure stable. Look at the pressure reading and monitor the pressure gauge for 30 seconds. To be accepted, the pressure reading must not decrease for 30 seconds.



**Information**

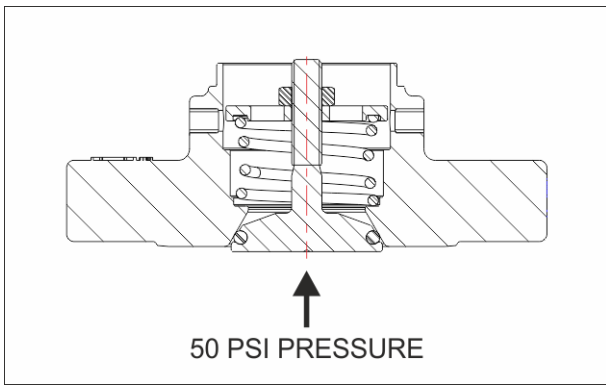
**Step 44.** If the pressure reading does not decrease, release all pressure. The valve performance is satisfactory.  
Go to Step 50 - VACUUM TEST



**Step 45.** If the pressure reading decreases, release all pressure. Check the adaptor socket/adaptor flange joint to make sure it is tight. Do the PRESSURE VALIDATION TEST again. If the pressure reading decreases again, find the cause of the leak. Disassemble the valve if necessary.



**Step 46.** PRESSURE VALIDATION TEST: FORTYT O RING  
Set the test rig to Pressure mode. Apply 50 PSI pressure. Lock the pressure supply to keep the pressure stable. Look at the pressure reading and monitor the pressure gauge for 30 seconds. To be accepted, the pressure reading must not decrease for 30 seconds.



**Step 47.** NOTE: This test also "forms" the shape of the new Forty O ring to the valve bore. This helps the O ring to seal correctly.



**Step 48.** If the pressure reading does not decrease, release all pressure. The valve performance is satisfactory.  
Go to Step 50 - VACUUM TEST



**Step 49.** If the pressure reading decreases, release all pressure. Check the adaptor socket/adaptor flange joint to make sure it is tight. Do the PRESSURE VALIDATION TEST again. If the pressure reading decreases again, find the cause of the leak. Disassemble the valve if necessary.



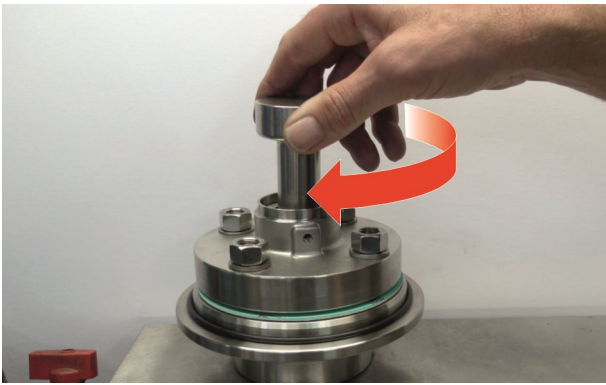
**Step 50.** VACUUM TEST: Set the test rig to Vacuum mode. Set the supply gauge at 2"Hg higher than the target vacuum. Open the pressure supply and note the vacuum performance result. Release all pressure. Refer to the Appendix and check that the result agrees with the Start-To-Open Pressure: Permitted Tolerances.



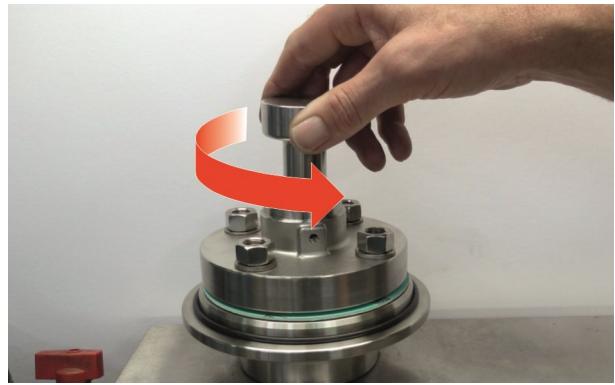
**Step 51.** If the valve performance is satisfactory, go to Step 56 - LOW PRESSURE LEAK TEST  
If the valve performance is unsatisfactory, go to Step 52 - ADJUST THE VACUUM SETTING



**Step 52.** ADJUST THE VACUUM SETTING:  
**CAUTION:** Make sure that the pressure supply is off when you adjust the vacuum setting.



**Step 53.** If the vacuum result was too low: Use the assembly tool 400/7492 to turn the spring pad clockwise. NOTE: ½ turn will adjust the setting by approx. 1"Hg. Remove the tool and do the Vacuum Test again - Step 50 to Step 51.



**Step 54.** If the vacuum result was too high: Use the assembly tool 400/7492 to turn the spring pad anti-clockwise. NOTE: ½ turn will adjust the setting by approx. 1"Hg. Remove the tool and do the Vacuum Test again - Step 50 to Step 51.



**Step 55.** NOTE: Test and adjust the vacuum setting until the result agrees with the permitted tolerances. When the vacuum setting is satisfactory, go to Step 56 - LOW PRESSURE LEAK TEST.



**Step 56.** LOW PRESSURE LEAK TEST: Set the test rig to Pressure mode. Apply 1 PSI pressure. Lock the pressure supply to keep the pressure stable. Look at the pressure reading and monitor the pressure gauge for 30 seconds. To be accepted, the pressure reading must not decrease for 30 seconds.



**Step 57.** If the valve performance is satisfactory, release all pressure. Go to Step 59 - VACUUM VALIDATION TEST



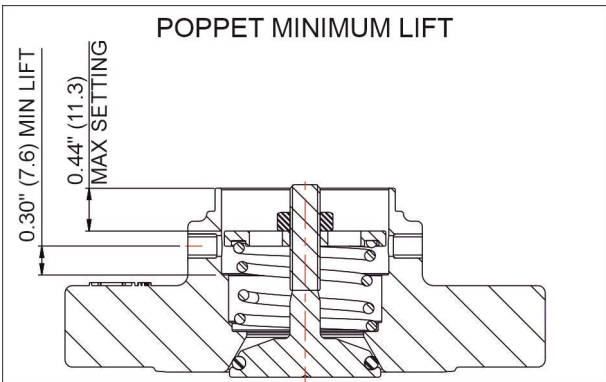
**Step 58.** If the pressure reading decreases, release all pressure. Check the adaptor socket/adaptor flange joint to make sure it is tight. Do the LOW PRESSURE LEAK TEST again. If the pressure reading decreases again, find the cause of the leak. Disassemble the valve if necessary.



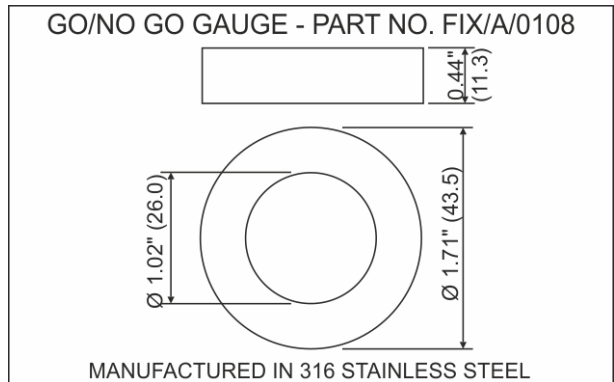
**Step 59. VACUUM VALIDATION TEST:** When the valve has been set and the LOW PRESSURE LEAK TEST result is satisfactory, do a Vacuum Test again (Step 50 to Step 51) to make sure that the valve continues to operate correctly at the set vacuum.



**Step 60.** If the valve performance is satisfactory, go to Step 61 - MEASURE THE POPPET LIFT  
If the valve performance is unsatisfactory, adjust the vacuum setting again. Then do the VACUUM TEST, LOW PRESSURE LEAK TEST and VACUUM VALIDATION TEST again.



**Step 61. MEASURE THE POPPET LIFT:**  
**IMPORTANT:** The poppet must have a minimum lift of 0.30" (7.6mm) when the valve is set correctly.  
**WARNING:** If the valve does not obey the minimum lift dimension, it cannot open sufficiently to flow the necessary volume of air. This can cause serious damage to the vessel.



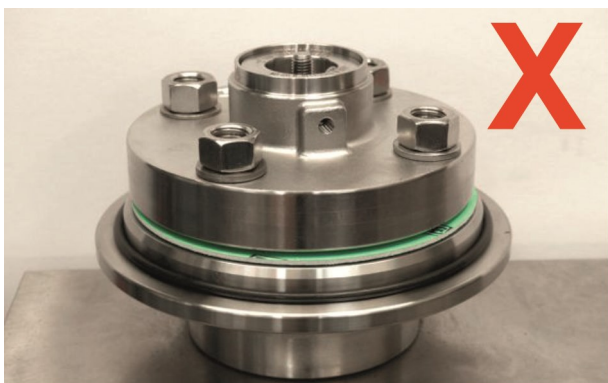
**Step 62.** To check that the poppet lift dimension is satisfactory, use a go/no-go gauge, part no. FIX/A/0108. Put the gauge on the spring pad.



**Step 63.** The gauge is level with the top of the body = Satisfactory



**Step 64.** The gauge can be seen above the top of the body = Satisfactory



**Step 65.** The gauge is below the top of the body = Unsatisfactory  
If the poppet lift is unsatisfactory, replace the spring. See Chapter 1 - Disassembly and Chapter 2 - Assembly.



**Step 66.** When the vacuum performance and poppet lift are correct, apply thread adhesive, e.g. Loctite 243 to the thread of the poppet.



**Step 67.** Install the lock nut.



**Step 68.** Engage the spring pad locking tool into the spring pad. Hold the locking tool to prevent the spring pad from turning. Tighten the lock nut with a ½" (13mm) socket wrench.

**CAUTION:** Release all pressure from the test rig.



**Step 69.** Unscrew the nuts with a ¾" (19mm) box-end wrench. Remove the valve from the test rig.



**Step 70.** Go to Chapter 4 for instructions on how to fit the gauge, cap and anti-tamper wire.





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# CHAPTER 4

## Valve Finishing Gauze, cap & anti-tamper wire installation

1½” Flanged Uniact Vacuum Relief Valve: AAR Specification

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This chapter contains instructions to install a gauze, cap and anti-tamper wire.





**Step 71.** Use this procedure to install the gauze filter, cap and anti-tamper wire.

Select the components: cap, gauze (optional), valve, 10" length sealing wire, 2x cable nipples, 2x spring washers, lead seal.

**NOTE:** The valve must be set and tested before you install the cap and gauze. See Chapter 3.



**Step 72.** Select the tools:

1. Seal press tool
2. 3/8" (10mm) box-end wrench
3. Wire cutters



**Step 73.** Install the gauze ring if it is specified. Make sure that the gauze ring is fully located into the groove on the body.



**Step 74.** Align the holes in the cap with the holes in the valve body and install the cap.



**Step 75.** Install the spring washers onto the cable nipples and install the nipples into the holes.



**Step 76.** Tighten the nipples with a 3/8" (10mm) box-end wrench. When tight, make sure that the holes through the nipples are in the horizontal position, i.e. parallel to the flange, so that you can put the wire through.



**Step 77.** Put the wire through the hole in both nipples.  
**CAUTION:** The ends of the wire can be sharp. Wear gloves if necessary.



**Step 78.** Put the two ends of the wire together and put both ends of the wire through the lead seal.



**Step 79.** Push the lead seal up the wire until it is close to the valve body.



**Step 80.** Firmly compress the lead seal with the seal press tool.



**Step 81.** Remove unwanted wire using wire cutters.



**Step 82.** Twist the lead seal to tighten the wire.  
Put the valve in a clean plastic bag in a clean area until you install it onto the vessel. Always install a new gasket, e.g. part no. 5005-734 when you install the valve onto the vessel.  
The procedure is complete



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# APPENDIX

## 1½” Flanged Uniact Relief Valve - AAR

### Maintenance Manual

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## Tools & Equipment

### Maintenance Manual - 1½" Flanged Uniact Relief Valve - AAR

## General Tools & Equipment

You will need the tools shown in Table 1 to do maintenance on a 1½" flanged Uniact relief valve.

**Table 1 - General Tools**

|                                     |
|-------------------------------------|
| ⅜" (10mm) box end wrench            |
| ½" (13mm) box end wrench            |
| ½" (13mm) socket wrench             |
| ¾" (19mm) box end wrench            |
| Wire cutters                        |
| Small pick                          |
| Thread adhesive (e.g. Loctite® 243) |

## Special Tools

You will need the special tools in Table 2 to do maintenance on a 1½" flanged Uniact relief valve. You can buy the tools from Fort Vale.

**Table 2 - Special Tools**

| Description              | Part No.   |
|--------------------------|------------|
| Spring pad locking tool  | 400/7495   |
| Spring pad assembly tool | 400/7492   |
| Test rig adaptor flange  | FIX/H/0017 |
| Go/No Go gauge           | FIX/A/0108 |

## Special Equipment

You will need a test rig to test and set a 1½" flanged Uniact relief valve. We recommend that you use a Fort Vale test rig, part no. 400/8000 (digital gauges) or 400/8200 (analogue gauges), please contact us for more information. But if you have a different test rig, we recommend that you obey these precautions:

### Test Rig Precautions

#### Compressed air supply conditions:

- The compressed air must be clean, dry and filtered.
- Regularly clean and do the servicing of the filters, downstream pipework and compressor.
- The compressed air supply pipes must have a minimum internal diameter of 0.16" (4mm).
- The compressed air supply pressure must be a minimum of 15 PSI (1 Bar) higher than the test pressure of the valve.

#### Test rig pressure/vacuum gauges:

- Calibrate the gauges every 12 months using a certified authority.
- Obey the maximum permitted pressure on the gauge(s) and do not apply more than the permitted pressure.
- Do not apply pressure to a vacuum gauge.
- The pressure and vacuum gauges and the valve test port must not be more than (10") 250mm away from each other.



# 1½” Flanged Uniact Vacuum Relief Valve: AAR

Part No: 48/X00XXCX



## Specification

### Nominal size

1½” (DN40)

### Tank connection

Flanged: 1½” ASA 150

### Set vacuum range

From 0.5”Hg to 26”Hg (0.02 Bar to 0.88 Bar)

### Optional accessories

Cap with anti-tamper wire, gauze ring

### Materials

Contact parts: 316 stainless steel

Vacuum O ring: refer to Seal Options table (next page)

## Design Conditions

Weight: 5 Lb (2.3 Kg)  
 Design Pressure (MAWP): 165 PSIG (11.4 Bar)  
 Test Pressure: 327.8 PSIG (22.6 Bar)  
 Design Temperature Min: Refer to Seal Options Table  
 Design Temperature Max: Refer to Seal Options Table  
 Net Flow Area: 0.71 inch<sup>2</sup> (458 mm<sup>2</sup>)  
 AAR No: E139513

**NOTE:** The Design Conditions and Section View dimensions are for the specified part number only.

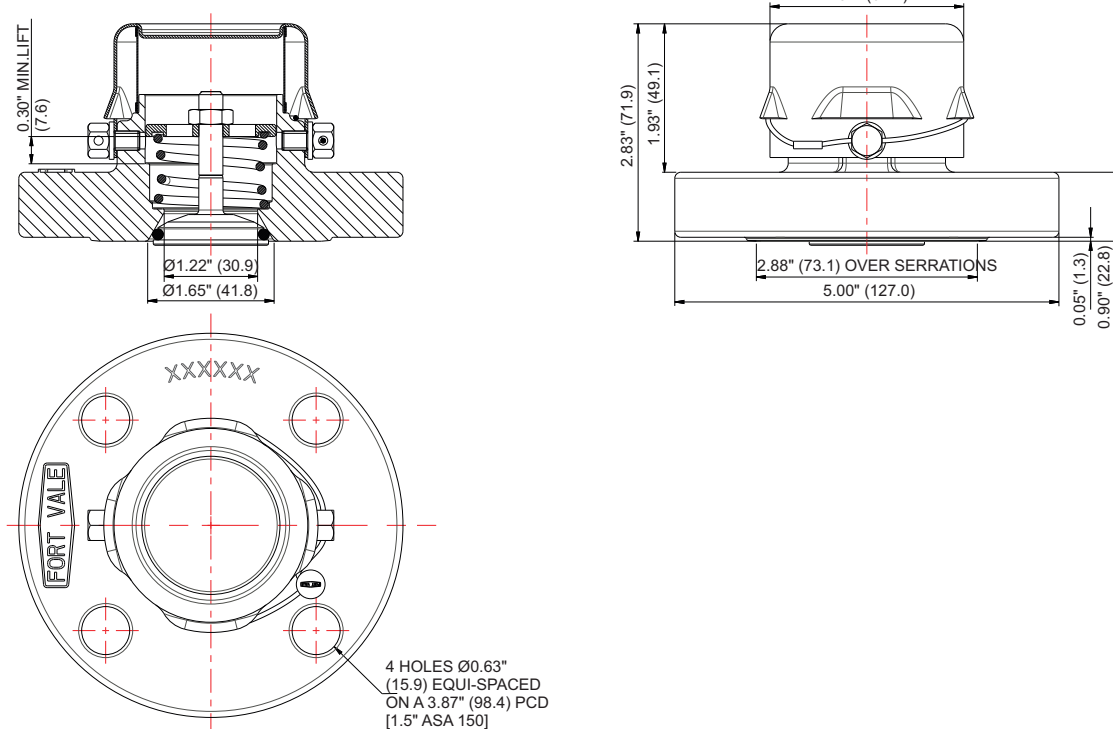
## Range

| Description                       | Part No.    |
|-----------------------------------|-------------|
| Standard valve with cap and gauze | 48/X00XXCGZ |
| Standard valve with cap           | 48/X00XXCC  |
| Standard valve, no cap or gauze   | 48/X00XXC   |

## Related Parts

| Description            | Part No. |
|------------------------|----------|
| PTFE/CNAF inlet gasket | 5005-734 |

## Section View

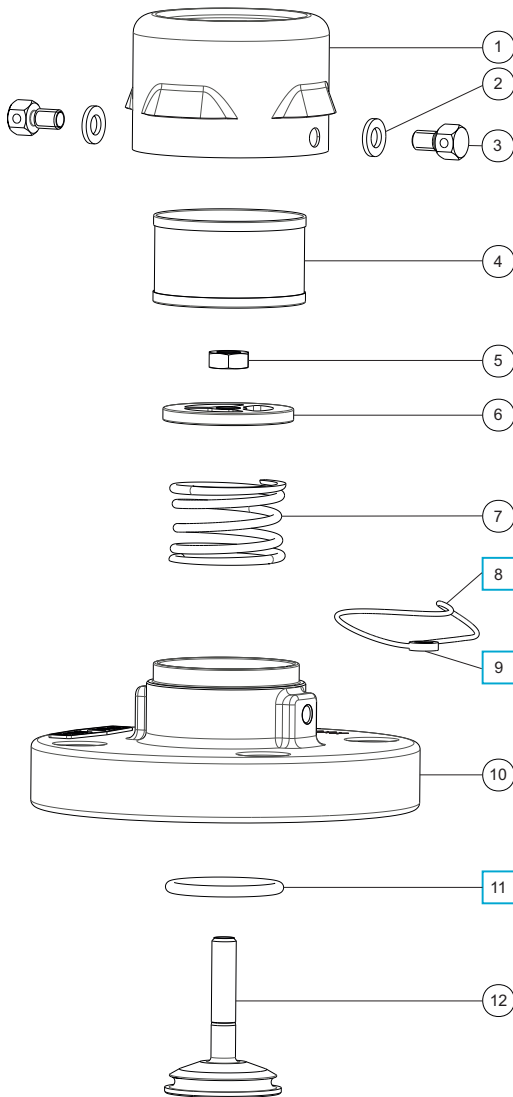




# 1½” Flanged Uniact Vacuum Relief Valve: AAR

Part No: 48/X00XXCX

## Parts Drawing



## Parts List

| Item | Description                   | Part No.                           |
|------|-------------------------------|------------------------------------|
| 1    | Stainless steel cap           | 10217/1                            |
| 2    | Spring washer (2)             | 5123-036                           |
| 3    | Cable nipple (2)              | 10299                              |
| 4    | Gauze ring                    | 10204                              |
| 5    | Half nut                      | 5122-181                           |
| 6    | Spring pad                    | 10215/1                            |
| 7    | Spring * <b>Note 1</b>        | 5104-XXX                           |
| 8    | Stainless steel wire          | 5128-174W <input type="checkbox"/> |
| 9    | Lead wire seal                | 5128-174 <input type="checkbox"/>  |
| 10   | Flanged body                  | S0114/20                           |
| 11   | Vacuum O ring * <b>Note 1</b> | 5005-XXX <input type="checkbox"/>  |
| 12   | Vacuum poppet                 | 10983V/4                           |

**NOTE 1:** The valve specification changes the Part No.

## Seal Kit

| Description   | Part No.                |
|---|-------------------------|
| All parts marked <input type="checkbox"/> in the Parts List | 48/XVSK * <b>Note 2</b> |

**NOTE 2:** The seal material changes the Part No.

## Seal Options

| Code | Description                   | Temperature Range |              |
|------|-------------------------------|-------------------|--------------|
|      |                               | Min/Max °F        | Min/Max °C   |
| 0    | Viton A®                      | -4° to 399°       | -20° to 204° |
| 1    | Fortyt (FEP/silicone)         | -67° to 392°      | -55° to 200° |
| 7    | Perfluoroelastomer            | +5° to 500°       | -15° to 260° |
| 9    | EPDM                          | -58° to 302°      | -50° to 150° |
| B    | Viton B®                      | +5° to 392°       | -15° to 200° |
| T    | Hi-temp Fortyt (PFA/silicone) | -67° to 500°      | -55° to 260° |

The Seal Options table shows the standard materials. Other materials are available, please contact Fort Vale.





# Part Number Breakdown - 48/X00XXCX

## Data Sheet

### 1½” Flanged Uniact Relief Valve: AAR Specification

**Example:**

**48/ 1 00 12 C GZ**

**Valve Type** \_\_\_\_\_

48/ 1½ flanged Uniact relief valve

**Seal Type** \_\_\_\_\_

All materials are proprietary brand, where applicable

- 0** Viton A ®
- 1** Fortyt (FEP outer/silicone core)
- 3** Kalrez 6375 ®
- 4** HNBR
- 7** Perfluoroelastomer
- 9** EPDM
- A** Aflas ®
- B** Viton B ®
- C** Chemraz 505 ®
- D** White EPDM
- E** Viton GF-S ® (Trelleborg CS5350)
- F** Black Neoprene
- G** Viton GFLT ®
- H** Black EPDM (Trelleborg EP787)
- K** Kalrez 1050LF ®
- M** Viton A ® (Trelleborg 4560)
- N** White Neoprene (Food grade)
- Q** Black Neoprene
- S** Viton GF-S ® (Peroxide cured)
- T** Hi-temp. Fortyt (PFA outer/silicone core)
- W** White Buna N (Food grade)
- Y** White Neoprene

**Pressure Setting** \_\_\_\_\_

00 No pressure - vacuum only

**Vacuum Setting (PSI/”Hg)** \_\_\_\_\_

- 03** 0.75 PSI 1.5”Hg
- 04** 1.0 PSI 2.0”Hg
- 12** 3.0 PSI 6.0”Hg
- 16** 4.0 PSI 8.0”Hg
- 20** 5.0 PSI 10.0”Hg

**Flange Type** \_\_\_\_\_

C 1.5" ASA 150

**Ancillary Items** \_\_\_\_\_

- C** Cowl
- GZ** Cowl and gauze



## Start-To-Open Pressure: Permitted Tolerances

### Maintenance Manual - 1½” Flanged Uniact Relief Valve: AAR

The data in Table 1 is applicable to 1½” Flanged Uniact Relief Valves: AAR Specification, part no. series 48/X00XXCX.

**Note:** PSI units are rounded to the nearest 0.25 PSI.

**Table 1 - Start-To-Open Pressure: Permitted Tolerances**

| 48/X0050CX         | 5104-778   | 12,50           | 25,0 | 11,50          | 23,0           | 13,5 | 27,0 |
|--------------------|------------|-----------------|------|----------------|----------------|------|------|
| 48/X0048CX         | 5104-778   | 12,00           | 24,0 | 11,00          | 22,0           | 13,0 | 26,0 |
| 48/X0044CX         | 5104-778   | 11,00           | 22,0 | 10,00          | 20,0           | 12,0 | 24,0 |
| 48/X0040CX         | 5104-612   | 10,00           | 20,0 | 9,00           | 18,0           | 11,0 | 22,0 |
| 48/X0036CX         | 5104-610   | 9,00            | 18,0 | 8,00           | 16,0           | 10,0 | 20,0 |
| 48/X0030CX         | 5104-610   | 7,50            | 15,0 | 6,50           | 13,0           | 8,5  | 17,0 |
| 48/X0028CX         | 5104-610   | 7,00            | 14,0 | 6,00           | 12,0           | 8,0  | 16,0 |
| 48/X0027CX         | 5104-606   | 6,75            | 13,5 | 5,75           | 11,5           | 7,8  | 15,5 |
| 48/X0024CX         | 5104-606   | 6,00            | 12,0 | 5,00           | 10,0           | 7,0  | 14,0 |
| 48/X0020CX         | 5104-777   | 5,00            | 10,0 | 4,50           | 9,0            | 5,5  | 11,0 |
| 48/X0018CX         | 5104-777   | 4,50            | 9,0  | 4,00           | 8,0            | 5,0  | 10,0 |
| 48/X0016CX         | 5104-777   | 4,00            | 8,0  | 3,50           | 7,0            | 4,5  | 9,0  |
| 48/X0014CX         | 5104-605   | 3,50            | 7,0  | 3,00           | 6,0            | 4,0  | 8,0  |
| 48/X0013CX         | 5104-605   | 3,25            | 6,5  | 2,75           | 5,5            | 3,8  | 7,5  |
| 48/X0012CX         | 5104-605   | 3,00            | 6,0  | 2,50           | 5,0            | 3,5  | 7,0  |
| 48/X0011CX         | 5104-605   | 2,75            | 5,5  | 2,25           | 4,5            | 3,3  | 6,5  |
| 48/X0010CX         | 5104-776   | 2,50            | 5,0  | 2,00           | 4,0            | 3,0  | 6,0  |
| 48/X0008CX         | 5104-603   | 2,00            | 4,0  | 1,50           | 3,0            | 2,5  | 5,0  |
| 48/X0006CX         | 5104-775   | 1,50            | 3,0  | 1,00           | 2,0            | 2,0  | 4,0  |
| 48/X0005CX         | 5104-602/1 | 1,25            | 2,5  | 1,25           | 1,5            | 1,8  | 3,5  |
| 48/X0004CX         | 5104-602/1 | 1,00            | 2,0  | 1,00           | 2,0            | 1,8  | 4,0  |
| 48/X0003CX         | 5104-602/1 | 0,75            | 1,5  | 0,75           | 1,5            | 1,5  | 3,0  |
| 48/X0002CX         | 5104-601/1 | 0,50            | 1,0  | 0,50           | 1,0            | 1,0  | 2,0  |
| 48/X0001CX         | 5104-600/1 | 0,25            | 0,5  | 0,25           | 0,5            | 0,5  | 1,0  |
| ASSEMBLY<br>NUMBER | SPRING     | PSI             | "HG  | PSI            | "HG            | PSI  | "HG  |
|                    |            | NOMINAL         |      | LOWER<br>LIMIT | UPPER<br>LIMIT |      |      |
|                    |            | VACUUM SETTINGS |      |                |                |      |      |
| TABLE 1            |            |                 |      |                |                |      |      |



# 1½" Flanged Uniact Vacuum Relief Valve AAR Specification

Part Number Series: 48/X00XXCX

## Installation & Operating Instructions

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General Installation Precautions - Relief Valves

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Installation Instructions

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Appendix

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Bolt Torque Guide & Step Loading Procedure (US)

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Client Responsibilities - Valves & Accessories for AAR

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Troubleshooting

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# General Installation Precautions - Relief Valves

## Installation, Operation & Maintenance Instructions

### Important

Read all the information and instructions before you start the procedure. Keep this manual.

**WARNING:** Vessels and systems operate under pressure and can contain dangerous cargo (liquid and vapour) that can cause death or serious injury to personnel. If you do not obey the installation precautions, you can cause damage to the valve. Damage will cause the valve to malfunction. If the valve malfunctions, a catastrophic failure of the vessel/system can occur.

### General Installation Precautions

- Make sure that the vessel is empty (liquid and vapour).
- Make sure that the vessel has been correctly cleaned and is safe for human entry.
- Make sure that the vessel/system pressure is at zero and that all residual pressure has been released.
- You must have experience and qualifications related to valve installation on pressure vessels and systems.
- Calculate to make sure that the air flow capacity of the relief valve is sufficient to protect your vessel/system. Relief valve flow calculations are available from Fort Vale.

**WARNING:** If you install an approved relief valve accessory item, such as a flame arrester, cowl, burst disc or baffle, it will decrease the air flow capacity of the relief valve. Thus, you must calculate again to make sure that the decreased air flow capacity of the relief valve with accessory will give sufficient protection to your vessel/system. Contact Fort Vale for more information.

- The opening in the vessel wall, and through all pipes and fittings, must be equal to the area of the relief valve inlet as a minimum. If the relief valve is connected to outlet pipework, the pipework must be of a sufficient size so that it does not cause back-pressure or a decrease in the air flow capacity of the relief valve.
- We recommend that you install a compatible Fort Vale weld-in flange/socket and gasket (where necessary). These have been designed with the necessary clearance for the relief valve in the open position.
- Do not install an accessory item that will cause an increased load on the relief valve: i.e. mechanical, static, dynamic, thermal.
- There must be no object, stop valve or accessory equipment installed upstream or downstream of the relief valve that could prevent the relief valve from operating correctly.
- Make sure that the internal surface of the vessel is clean and that there is no debris before you install the relief valve. If the vessel is repaired after you have installed the valve, make sure that there is no debris remaining in the vessel.
- Keep the relief valve in a clean area until you install it.
- Examine the relief valve for signs of damage. Do not install a damaged valve.
- Make sure personnel know that there can be a sudden discharge of pressure from the relief valve.
- Install a compatible roll-over protection device to prevent damage to the relief valve.
- Obey all applicable in-company, regional and national regulations.
- Obey the design conditions and limits of the relief valve.
- Use the applicable PPE (Personal Protective Equipment).
- Use the correct tools.
- Obey the bolting sequence, bolt torque and step loading procedure when you install or remove a flanged relief valve. Read **Bolt Torque Guide & Step Loading Procedure** (See Appendix if applicable or refer to Fort Vale).
- Read **Client Responsibilities - Valves & Accessories** (See Appendix if applicable or refer to Fort Vale).



## **General Installation Precautions - Relief Valves**

### **Installation, Operation & Maintenance Instructions**

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### **Tools**

**Threaded Valves:** You will need a C-spanner, part number 400/3000.

**Flanged Valves:** You will need torque spanners that are compatible with the stud kits and bolting kits.

### **Technical Support**

If you have a problem that you cannot solve using these instructions, please contact Fort Vale.

### **Disclaimer**

Fort Vale reserve all rights to make technical modifications and improvements at any time. Fort Vale assume no responsibility for any consequences arising from the use of the valve and these instructions. Errors & omissions excepted.



# 1½” Flanged Uniact Vacuum Relief Valve: AAR

## Installation & Operating Instructions

### Overview

|                                  |  |
|----------------------------------|--|
| <b>Part No:</b>                  | 48/X00XXCX   |
| <b>Type:</b>                     | Direct spring-loaded vacuum relief valve                                       |
| <b>Inlet connection:</b>         | Flanged: Raised face, 4x Ø0.63" holes equi-spaced on a 3.87" PCD (1.5" ASA150) |
| <b>Set vacuum range:</b>         | From 0.5"Hg to 26"Hg   |
| <b>Optional accessories:</b>     | Cap with anti-tamper wire, gauze ring  |
| <b>Material of construction:</b> | High-alloy steel   |
| <b>Seal type:</b>                | Refer to Seal type table   |
| <b>Design code:</b>              | ASME VIII Division 1 & AAR M 1002 Appendix A                                   |
| <b>Min./max. temperature:</b>    | -67°F to +500°F, refer to NOTE   |

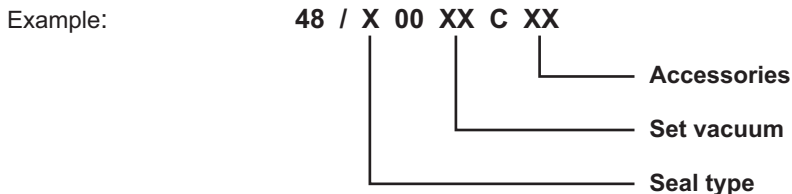
**NOTE:** The vacuum poppet O ring material can decrease the temperature range. Refer to the Seal type table below.

### Function

The 1½” Uniact vacuum relief valve is for use on DOT111 tank cars for compressible fluid service. It's function is to protect the vessel from implosion due to unwanted vacuum conditions. The valve will operate at the set vacuum that is marked on the valve.

### Identification

The digits in the part number identify the seal type, set vacuum and accessories.



**Accessories:**                    C= with cap and anti-tamper wire  
GZ = with cap, anti-tamper wire and gauze ring

**Set vacuum:**                    A value in "Hg multiplied by 2. E.g. 01 = 0.5"Hg

| Seal type: | Code | Description                   | Temperature Range |              |
|------------|------|-------------------------------|-------------------|--------------|
|            |      |                               | Min/Max °F        | Min/Max °C   |
|            | 0    | Viton A®                      | -4° to 399°       | -20° to 204° |
|            | 1    | Fortyt (FEP/silicone)         | -67° to 392°      | -55° to 200° |
|            | 7    | Perfluoroelastomer            | +5° to 500°       | -15° to 260° |
|            | 9    | EPDM                          | -58° to 302°      | -50° to 150° |
|            | B    | Viton B®                      | +5° to 392°       | -15° to 200° |
|            | T    | Hi-temp Fortyt (PFA/silicone) | -67° to 500°      | -55° to 260° |

### Installation

Install the valve vertically in the vapour space above any contained liquids or to piping connected to the vapour space in the vessel.

#### Flanged connection

Install compatible studs into a weld-in flange with a compatible drilling standard. The flange bore must not be smaller than Ø1.75" (44.5).

Install a compatible gasket between the valve and the flange. The gasket I/D must not be smaller than Ø1.75" (44.5).

Install the valve.

Install compatible washers and nuts. Tighten the nuts in a diametrically opposite sequence. Obey the Bolt Torque Guide and Step Loading Procedure (refer to the Appendix).



## 1½” Flanged Uniact Vacuum Relief Valve: AAR Installation & Operating Instructions

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### Flow Calculations

Refer to Fort Vale for flow calculation information: 47/FLCHT.

48/X00XXCX net flow area: 0.71 inch<sup>2</sup> (458 mm<sup>2</sup>)

**WARNING:** If you install an approved relief valve accessory item, such as a gauze, cowl, burst disc or baffle, it will decrease the air flow capacity of the relief valve. Thus, you must calculate again to make sure that the decreased air flow capacity of the relief valve and accessory will give sufficient protection to your vessel/system. Refer to Fort Vale for more information.



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# APPENDIX

## Installation & Operating Instructions

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|   |  |
|---|--|
| A | Bolt Torque Guide & Step Loading Procedure     |
| B | Client Responsibilities - Valves & Accessories |
| C | Troubleshooting                                |

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# Bolt Torque Guide & Step Loading Procedure (US)

## Installation & Operating Instructions

### Flange Bolting

**CAUTION:** Weld-distortion and too much tightening force will cause damage to a flange.

It is important not to cause damage to weld-in flanges and mating flanges. If a flange is damaged it will not give a satisfactory seal when a gasket and secondary mating flange is installed.

Bolt-stress can decrease after initial tightening. The cause can be deformation of the gasket material, particularly with soft materials such as a CNAF/PTFE envelope gasket.

Best procedure recommends that, after initial bolting, the flange joint is tightened again after a period of time. Most gasket manufacturers advise a period of 24 hours. ASME PCC-1-2000 GUIDELINES FOR PRESSURE BOUNDARY BOLTED FLANGE JOINT ASSEMBLY advises a minimum period of 4 hours.

Bolt torque calculations are based on a flat flange to within 0.006".

Recommended bolt torque values will be reduced if a lubrication is used.

### Bolt Torque

#### Bolt Torque Values

Fort Vale bolt torque values are given as a reference guide only and are based on:

- The use of a CNAF/PTFE gasket.
- Unlubricated fasteners.
- A flange flat to within 0.006".

**CAUTION:** If you use a different gasket material, a lubricant, a flange with distortion, you must re-calculate the torque value.

#### Bolt Torque Procedure

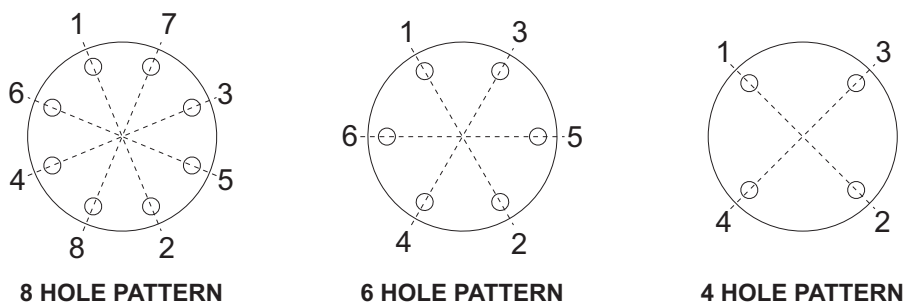
To install flanged parts correctly:

- Examine the mating flange of the part.
- If the flange is marked with a torque value, obey that torque value.
- If there is no torque value marked on the mating flange, obey the bolt torque values given in Table BT1.
- Tighten the bolts evenly in sequence. See Figure BT1.
- Obey the Step Loading Procedure (ASME PCC-1-2000). See next page.

Table BT1

| Thread | Torque Value |
|--------|--------------|
| 3/8"   | 22 lbf.ft    |
| 1/2"   | 48 lbf.ft    |
| 5/8"   | 60 lbf.ft    |

Figure BT1





# Bolt Torque Guide & Step Loading Procedure (US)

## Installation & Operating Instructions

---

### Step Loading Procedure

To install flanged parts correctly, obey the Step Loading Procedure extract from ASME PCC-1-2000:

#### Install

Hand tighten, then “snug up” to 10 lbf.ft to 20 lbf.ft (not to exceed 20% of Target Torque). Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

#### Round 1

Tighten to 20% to 30% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

#### Round 2

Tighten to 50% to 70% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

#### Round 3

Tighten to 100% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

#### Round 4

Continue tightening the bolts, but on a rotational clockwise pattern until no further nut rotation occurs at the Round 3 Target Torque value. For indicator bolting, tighten bolts until the indicator rod retraction readings for all bolts are within the specified range.

#### Round 5

Time permitting, wait a minimum of 4 hr and repeat Round 4; this will restore the short-term creep relaxation/embedment losses. If the flange is subjected to a subsequent test pressure higher than its rating, it may be desirable to repeat this round after the test is completed.



## Client Responsibilities - Valves & Accessories for AAR

### Installation, Operation & Maintenance Instructions

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### Compatibility

Make sure that the function and technical specification of the valve/accessory is compatible with the vessel service conditions and the cargo. This includes, but is not limited to:

- dimensions
- pressure/vacuum setting
- air/gas/liquid flow capacity
- maximum allowable working pressure
- test pressure
- minimum/maximum design temperatures
- materials of construction.

### Maintenance

Fort Vale valves and accessories have a long life if you use them correctly in compatible service conditions. It is not necessary to lubricate the parts, but we recommend that you obey the precautions that follow:

#### Visual checks at regular intervals:

1. Examine the valve to make sure there is no damage, wear or corrosion.
2. Examine the valve and adjacent area to make sure there is no leakage of cargo.
3. Examine the fasteners to make sure they are not loose.
4. Make sure the valve operates correctly.

**CAUTION:** If you operate the valve with very corrosive cargo, or near its temperature and/or pressure limit (very high or very low temperature and/or pressure), do the visual checks more frequently.

As well as the visual checks, schedule suitable maintenance intervals to AAR requirements.

### Replacement Parts

Do not adapt or change the valve. If you install a replacement part, it must be a genuine Fort Vale part.

**WARNING:** If you install a part that is not a genuine Fort Vale part, there is a risk of:

- injury to personnel
- permanent damage to the valve
- permanent damage to the vessel
- valve malfunction.

### External Fire

If the valve is installed in an area where there is a risk of external fire, you must install compatible accessories to prevent damage to the valve.

### Compatibility of Accessories

Accessory components must cause no interference with the valve function. Accessories must be made from compatible materials that will cause no damage to the valve materials. Do not install an accessory that will cause an increased load on the valve, i.e. mechanical, static, dynamic, thermal.

### Mis-use

Obey the instructions and recommended procedures in the installation and operating instructions. Obey the pressure and temperature markings on the valve and on the drawing. Use the valve/accessory for its correct function only. Fort Vale accept no liability or responsibility for incorrect use of the valve/accessory.



## Troubleshooting - Relief Valves

### Installation, Operation & Maintenance Instructions

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### Important Safety Notice

If you disassemble a valve from a vessel to solve a problem or a leak, do a risk assessment and obey the **Maintenance Safety Precautions** (OPIN41). You will need torque spanners that are compatible with the stud kits and bolting kits.

If you disassemble a flanged connection, always install a new gasket when you assemble the parts again.

Read **Client Responsibilities - Valves & Ancillaries**.

### If there is a leak from a flanged connection, check these possible causes:

- Check that the fasteners are tightened to the correct torque. If necessary, tighten the fasteners in a diametrically opposite sequence. Refer to **Bolt Torque Guide & Step Loading Procedure**.
- Examine the scrolled sealing faces of the flanges. Make sure they are clean and that there is no damage.
- Examine the flanges for distortion caused by welding, over-tightening or impact. Flanges must be flat to 0.15mm.
- Examine the gasket for signs of damage or wear. Always install a new gasket.

### If there is a leak from a threaded connection, check these possible causes:

- Check that the connection is tightened to the correct torque. Use the correct tightening tool.
- **WARNING:** If you need to tighten or loosen a relief valve, do not hold the cap to turn the valve. Only hold the valve body to turn the valve. The valve is spring-loaded and turning the cap is dangerous.
- Examine the seal area for signs of damage or debris. Install a new seal.
- Examine the male and female threads for signs of damage.

### If there is a leak from the pressure plate/vacuum poppet area, check these possible causes:

- Check that there is no debris or solid cargo in the pressure plate/vacuum poppet area.
- Examine the pressure/vacuum O ring for signs of damage.
- Examine the valve seating face for signs of damage or corrosion.
- If there is a composite pressure plate, make sure the nut/screws are tightened to the correct torque.

### If the valve does not open/close at the correct pressure, check these possible causes:

- Check that there is no debris or solid cargo in these areas: pressure plate/vacuum poppet area, body ports and bore, between the spring guide.
- Examine the spring for signs of damage.
- Make sure that there is no blockage in the mating flange/socket.
- Test the valve on a calibrated test rig and adjust the settings if necessary.

## Technical Support

If you have a problem that you cannot solve using these recommended checks, please contact us.



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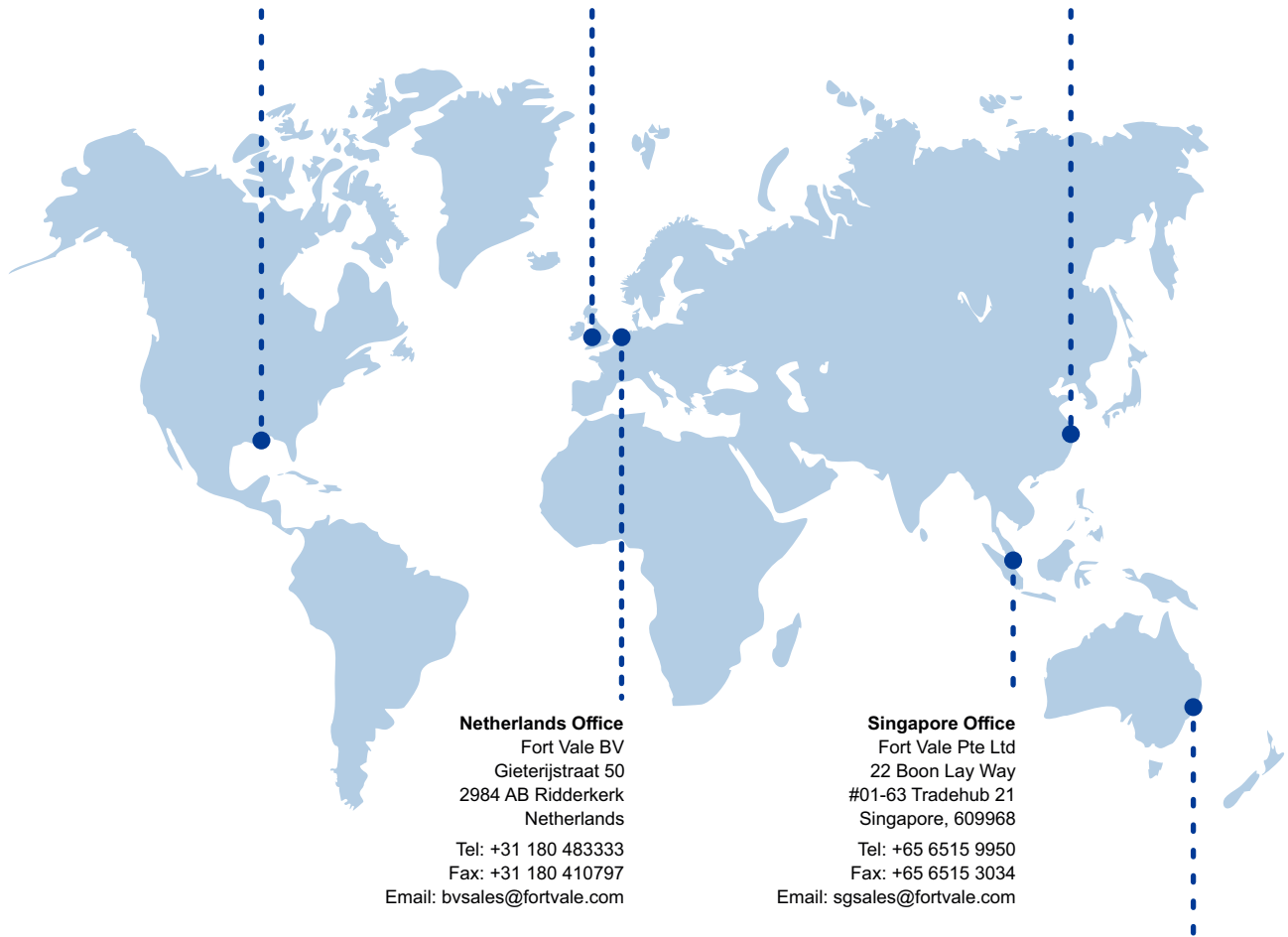
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