PART NUMBERS (Including, but not inclusive)

RVP*A*-**	RVC*A*-**	RVV*S*
RVP*N*-**	RVC*N*-**	
RVP*S*-**	RVC*S*-**	
RVP*F*-**	RVC*F*-**	
RVP*W*-**	RVC*W*-**	

Figure 001: Guardian Valve with Weld Stub.

Figure 002: Guardian Valve with NPS base connection.

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5.0 Inspection and Testing
6.0 Disassembly and Rebuild Instructions
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1.0 General Maintenance Manual Guidelines

1.1. It is strongly recommended that this entire manual be read prior to any operation, disassembly, or assembly of this equipment.

1.2. Betts Industries, Inc. provides this manual as a guideline for reference only and assumes no responsibility for personal injury or property damage that may occur in conjunction with this manual. Betts Industries, Inc. cannot be held responsible for incorrect installation, operation or maintenance of this equipment.

1.3. Use only genuine Betts replacement parts. Substitute parts will void all warranties and could impair the proper function making this equipment unsafe. Product warranty shall be void if equipment is subject to misapplication, misuse, neglect, alteration, or damage.

1.4. Betts Industries, Inc. recommends all equipment be placed on a regular maintenance schedule that includes the routine replacement of seals and visual inspection for leaks and corrosion. The end user must make their own determination and set their own schedule based upon specific use and severity of the application and environment. At a minimum, yearly preventive maintenance including replacement of wear items and seals is recommended. In some cases, regulations may dictate the minimum testing frequency of items. Make sure operators are aware of all applicable codes.

1.5. Only trained and qualified personnel should perform maintenance on this equipment.

1.6. As with any maintenance work, proper safety gear must be utilized and approved procedures must be followed at all times. Examples of safety gear may include but are not limited to gloves, safety goggles, face shields, protective suits and respirators. It is the responsibility of the person/company working on this equipment to identify the hazardous products that the equipment has been exposed to and designate specific and appropriate protective gear and safety procedures.

1.7. Safety alert symbols are used to alert operators to potential personal injury hazards. These symbols are per ANSI Z535.5 and are listed below. Operators MUST obey all instructions that follow a safety symbol. Alerts will be used to indicate known safety concerns.

⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, **will result** in death or serious injury.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, **could result** in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, **may result** in minor or moderate injury. It may also be used to alert against unsafe practices.

1.8. A list of hazards may include but are not limited to fall hazards, pressure hazards, loaded springs, corrosive material, flammable product and pinch points. Additional concerns are possible and should be identified and avoided by the operator.

1.9. Specific details described in this document are for reference only and are subject to change without notice. See Betts webpage for the most recent revision to this document. www.bettsind.com

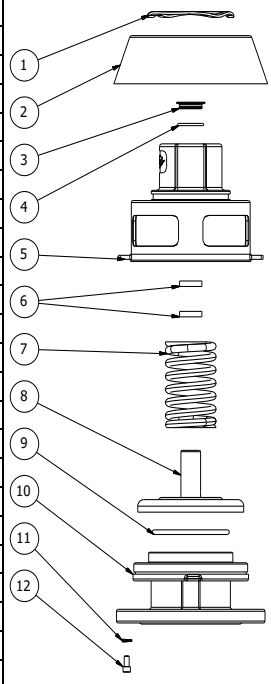
1.10. ⚠ **WARNING:** This product can expose you to chemicals including Chromium (hexavalent compounds) for stainless steel valves or Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to: www.P65Warnings.ca.gov

1.11. For additional questions or more detailed technical assistance, contact Betts, Customer Service, Sales or Engineering Department at (814) 723-1250.

2.0 Parts List

Pressure Style

Pressure Style Parts List					
No.	Description	Size	Req.	Material	Part Number
1	WSW-400 Spiral Retaining Ring	3” & 4”	1	17-7 Stainless Steel	9Q5059
2	Shroud	3” & 4”	1	316 Stainless Steel	28832SS
3	Cap	3” & 4”	1	316 Stainless Steel	75818SS
4	O-Ring #112	3” & 4”	1	Teflon Encapsulated Silicone	3357TS
				Fluorosilicone	3357FS
				Kalrez	3357KA
				FKM “GFLT-s”	3357VF
5	Body	3” & 4”	1	316 Stainless Steel	28795SS
6	Bearing Ring	3” & 4”	2	Graphite Filled PTFE	75639TR3.15
7a	Spring 25 MAWP	3” & 4”	1	PTFE Coated Stainless Steel	75809SSTF-25
7b	Spring 30 MAWP	3” & 4”	1	PTFE Coated Stainless Steel	75809SSTF-30
7c	Spring 35 MAWP	3” & 4”	1	PTFE Coated Stainless Steel	75809SSTF-35
7d	Spring 40 MAWP	3” & 4”	1	PTFE Coated Stainless Steel	75809SSTF-40
8	Disk	3” & 4”	1	316 Stainless Steel	28797SS
9	Seat O-Ring	3” & 4”	1	Teflon Encapsulated Silicone	75553TS/PFA
				Fluorosilicone	75553FS
				Kalrez	75553KA
				FKM “GFLT-s”	75553VF
10a	TTMA Flange Base	3”	1	316 Stainless Steel	29189SS
		4”		316 Stainless Steel	28874SS
*10b	NPS Threaded Base	3”	1	316 Stainless Steel	28793SS
		4”		316 Stainless Steel	28791SS
10c	ASNI Flange Base	3”	1	316 Stainless Steel	28877SS
		4”		316 Stainless Steel	28868SS
10d	Weld Stub Base	3”	1	316 Stainless Steel	28872SS
		4”		316 Stainless Steel	28870SS
*10e	NPS Threaded Swivel Base	3”	1	316 Stainless Steel	28984SS
		4”		316 Stainless Steel	28985SS
11	¼” Lock Washer	3” & 4”	1	316 Stainless Steel	9Q5844
12	Hex Head Socket Cap Screw	3” & 4”	1	316 Stainless Steel	9Q5993



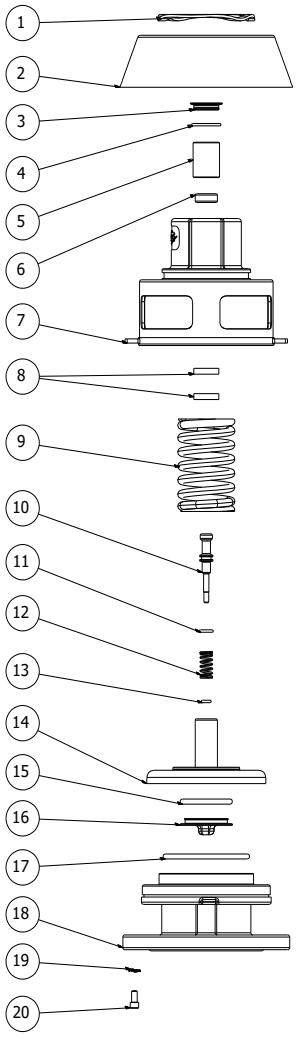
*P/N 75800TF-3 / 75800TF-4 is used when this base is specified

Figure 003: Exploded View and BOM for the Pressure Style Guardian vent.

NOTE: The Guardian Pressure Style vent comes with 5 different base variations. 2 of which have a Teflon Gasket that is used in conjunction with the base. The Gasket comes in 3” and 4” to fit the base and is noted above.

Pressure and Vacuum Combination Style

Combination Style Parts List					
No.	Description	Size	Req.	Material	Part Number
1	WSW-400 Spiral Retaining	3" & 4"	1	17-7 Stainless Steel	9Q5059
2	Shroud	3" & 4"	1	316 Stainless Steel	28832SS
3	Cap	3" & 4"	1	316 Stainless Steel	75818SS
4	O-Ring #112	3" & 4"	1	Teflon Encapsulated	3357TS
				Fluorosilicone	3357FS
				Kalrez	3357KA
				FKM "GFLT-s"	3357VF
5	Magnet Sleeve	3" & 4"	1	Fiberglass	75824FG
6	Magnet	3" & 4"	1	Grade N42SH	9Z6209
7	Body	3" & 4"	1	316 Stainless Steel	28795SS
8	Bearing Ring	3" & 4"	2	Graphite Filled PTFE	75639TR3.15
9a	Spring 25 MAWP	3" & 4"	1	PTFE Coated Stainless	75809SSTF-25
9b	Spring 30 MAWP	3" & 4"	1	PTFE Coated Stainless	75809SSTF-30
9c	Spring 35 MAWP	3" & 4"	1	PTFE Coated Stainless	75809SSTF-35
9d	Spring 40 MAWP	3" & 4"	1	PTFE Coated Stainless	75809SSTF-40
10	Vacuum Stem	3" & 4"	1	Stainless Steel Type 630	75823SS
11	O-Ring #111	3" & 4"	1	PTFE	18141TF
12	Vacuum Spring	3" & 4"	1	316 Stainless Steel	75810SS
13	O-Ring #108	3" & 4"	1	PTFE	19505TF
14	Disk	3" & 4"	1	316 Stainless Steel	28831SS
15	Vacuum Seat O-Ring	3" & 4"	1	Teflon Encapsulated	75811TS
				Fluorosilicone	75811FS
				Kalrez	75811KA
				FKM "GFLT-s"	75811VF
16	Vacuum O-Ring Holder	3" & 4"	1	316 Stainless Steel	28799SS
17	Seat O-Ring	3" & 4"	1	Teflon Encapsulated	75553TS/PFA
				Fluorosilicone	75553FS
				Kalrez	75553KA
				FKM "GFLT-s"	75553VF
18a	TTMA Flange Base	3"	1	316 Stainless Steel	29189SS
		4"		316 Stainless Steel	28874SS
*18b	NPS Threaded Base	3"	1	316 Stainless Steel	28793SS
		4"		316 Stainless Steel	28791SS
18c	ASNI Flange Base	3"	1	316 Stainless Steel	28877SS
		4"		316 Stainless Steel	28868SS
18d	Weld Stub Base	3"	1	316 Stainless Steel	28872SS
		4"		316 Stainless Steel	28870SS
*18e	NPS Threaded Swivel Base	3"	1	316 Stainless Steel	28984SS
		4"		316 Stainless Steel	28985SS
19	¼" Lock Washer	3" & 4"	1	316 Stainless Steel	9Q5844
20	Hex Head Socket Cap	3" & 4"	1	316 Stainless Steel	9Q5993



*P/N 75800TF-3 / 75800TF-4 is used when this base is specified

Figure 004: Exploded View and BOM for the Guardian Pressure and Vacuum Combination Style Guardian vent.

NOTE: The Guardian Pressure and Vacuum Combination Style vent comes with 5 different base variations. 2 of which have a Teflon Gasket that is used in conjunction with the base. The Gasket comes in 3" and 4" to fit the base and is noted above.

Vacuum Style

Vacuum Style Parts List					
No.	Description	Size	Req.	Material	Part Number
1	Screw ¼-20 x ¾ Hex Head	3" & 4"	2	316 Stainless Steel	9Q5822A
2	Shroud	3" & 4"	1	316 Stainless Steel	28833SS
3	Magnet – High Temp	3" & 4"	1	Grade N42SH	9Z6209
4	Stem	3" & 4"	1	316 Stainless Steel	75807SS
5	O-Ring #111	3" & 4"	1	PTFE	18141TF
6	Spring	3" & 4"	1	316 Stainless Steel	75810SS
7	O-Ring #108	3" & 4"	1	PTFE	19505TF
8a	TTMA Master body	3"	1	316 Stainless Steel	29578SS
		4"	1	316 Stainless Steel	29579SS
*8b	Swivel Master body	3"	1	316 Stainless Steel	28974SS
		4"	1	316 Stainless Steel	28975SS
8c	ANSI Master body	3"	1	316 Stainless Steel	29449SS
9	O-Ring #328	3" & 4"	1	Teflon Encapsulated Silicone	75811TS
				Fluorosilicone	75811FS
				Kalrez	75811KA
				FKM "GFLT-s"	75811VF
10	Vacuum O-Ring Holder	3" & 4"	1	316 Stainless Steel	28799SS

*P/N 75800TF-3 / 75800TF-4 is used when this body is specified.

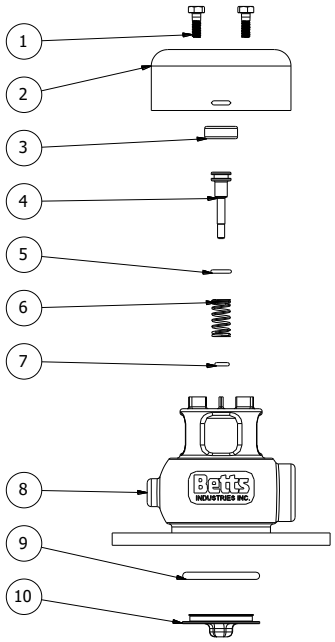


Figure 005: Exploded View and BOM for the Vacuum Style Guardian vent.

NOTE: The Guardian Vacuum Style vent comes with 3 different body variations. 1 of them comes in a 3" or 4" NPS and has a Teflon Gasket that is used in conjunction with the body. The body shown above (Number 8) is the TTMA style.

3.0 Description and Intended Use

3.1 The Betts' Guardian™ vent is a spring-loaded reclosing pressure relief device/valve for use as a 407/412 cargo tank's primary pressure relief system. The valves are made from 316 Stainless Steel for compatibility with a wide range of products. The Guardian Valves are equipped with a safety screw to help prevent accidental unthreading of the housing.

3.2 There are 3 distinct Guardian Vent styles.

3.2.1 Pressure Style- This vent allows the outflow of air to maintain proper tank pressure.

3.2.2 Vacuum Style- This vent allows the inflow of air to maintain proper tank pressure.

3.2.3 Combination Style- This vent controls both inflow and outflow to maintain proper tank pressure.

4.0 Installation

4.1 Installation of NPS threaded vents.

4.1.1 Vent mounting surface must be clean and free of damage. Pipe nipple outlet must be flat and smooth. PTFE tape or pipe sealant is not necessary.

4.1.2 Thread vent onto pipe nipple until gasket contacts top of pipe nipple.

4.1.3 Use Assembly wrench (Betts P/N 75825EY) to tighten vent onto nipple.

4.1.4 Test connection by pressurizing tank to 1-2 psig under set pressure of vent, and spraying vent connection with soapy water.

4.1.5 If leaks are found, further tighten vent and test again. If this does not remedy issue, remove vent and inspect pipe nipple and mounting gasket for damage.

4.2 Installation of NPS swivel vents.

4.2.1 Vent mounting surface must be clean and free of damage. Pipe nipple outlet must be flat and smooth. PTFE tape or pipe sealant is not necessary.

4.2.2 Determine desired orientation of vent and position as such before tightening.

4.2.3 Use Assembly wrench (Betts P/N 75825EY) to tighten vent onto nipple.

4.2.4 Test connection by pressurizing tank to 1-2 psig under set pressure of vent, and spraying vent connection with soapy water.

4.2.5 If leaks are found, further tighten vent and test again. If this does not remedy issue, remove vent and inspect pipe nipple and mounting gasket for damage.

4.3 Installation of ANSI flanged vents.

4.3.1 Gasketing surface must be clean and free of damage.

4.3.2 Select appropriate bolts and gaskets for tank spec and lading.

4.3.3 Mount vent and gasket to flange, and install bolts, tightening in a star pattern.

4.3.4 Test connection by pressurizing tank to 1-2 psig under set pressure of vent, and spraying vent connection with soapy water.

4.3.5 If leaks are found, further tighten bolts and test again. If this does not remedy issue, remove vent and inspect mounting flanges and gasket for damage.

4.4 Installation of TTMA flanged vents.

4.4.1 Gasketing surface must be clean and free of damage. Bolts install from inside of tank.

4.4.2 Select appropriate bolts and gaskets for tank spec and lading.

4.4.3 Mount vent and gasket to flange, and install bolts, tightening in a star pattern.

4.4.4 Test connection by pressurizing tank to 1-2 psig under set pressure of vent, and spraying vent connection with soapy water.

4.4.5 If leaks are found, further tighten bolts and test again. If this does not remedy issue, remove vent and inspect mounting flanges and gasket for damage.

4.5 Installation of weld stub style vents.

4.5.1 Valve must be disassembled and main seat o-ring removed. See Section 6.0 for disassembly instructions.

4.5.2 Weld stub mount onto tank, ensuring that o-ring seats and threads are protected from weld spatter.

4.5.3 Reassemble vent. See Section 6.0 for reassembly instructions.

4.5.4 Test weld by pressurizing tank to 1-2 psig under set pressure of vent, and spraying vent connection with soapy water.

4.5.5 If leaks are found, disassemble vent again and repair welds.

5.0 Inspection and Testing – All vents should be inspected and tested annually

5.1 Pressure vent inspection and test procedure.

5.1.1 Remove vent from tank.

5.1.2 Inspect vent for any damage, excessive corrosion, or pitting. If damaged parts are found, disassemble (Section 6.0) and replace damaged components.

5.1.3 Mount vent to test stand, and install pressure gauge. Pressure gauge should not be rated higher than 100 psig. Check for leaks around mounting ring.

5.1.4 Increase pressure slowly until leakage is heard from main seat. This is the set pressure. See table below for set pressures.

5.1.5 Decrease pressure slowly until leakage from main seat stops. This is the reseal pressure. See table below for reseal pressures.

Vent model	Set pressure range	Minimum Reseal Pressure
RVP___-25	30 – 33 PSIG	27 PSIG
RVP___-30	36 – 39.6 PSIG	32.4 PSIG
RVP___-35	42 – 46.2 PSIG	37.8 PSIG

5.1.7 If set pressure or minimum reseal pressure are not with required ranges, proceed to Section 6.0 – Disassembly and rebuild.

5.2 Vacuum vent inspection and test procedure.

5.2.1 Remove vent from tank

5.2.2 Inspect vent for any damage, excessive corrosion, or pitting. If damaged parts are found, disassemble (Section 6.0) and replace damaged components.

5.2.3 Mount vent to inside of test stand and cover vacuum seat in water. Install pressure gauge. Pressure gauge should not be rater higher than 15 psig.

5.2.4 Increase pressure slowly from 0 to 1.0 psig. No leakage is permissible from main seat.

5.2.5 Increase pressure slowly from 1.0 psig until bubbles are seen from main seat. Set pressure must fall between 1.0 and 2.0 psig.

5.2.6 Decrease pressure slowly. Vent must reclose before reaching .05 psig.

5.2.7 If vent leaks before or after set pressure range or does not reclose before reaching .05, proceed to Section 6.0 – Disassembly and rebuild.

5.3 Combination vent inspection and test procedure.

5.3.1 Remove vent from tank

5.3.2 Inspect vent for any damage, excessive corrosion, or pitting. If damaged parts are found, disassemble (Section 6.0) and replace damaged components.

5.3.3 Install combo vent on outside of the test tank, and install gauge. Gauge should not be rated higher than 100 psig.

5.3.4 Increase pressure slowly until leakage is heard from main seat. This is the pressure vent set pressure. See table below for set pressures.

5.3.5 Decrease pressure slowly until leakage from main seat stops. This is the reseal pressure. See table below for reseal pressures.

5.3.6 If vent leaks before or after set pressure range, or reseals below required pressure, proceed to Section 6.0 – Disassembly and rebuild.

5.3.7 Install vent on inside of tank and cover vacuum seat with water, and install gauge. Gauge should not be rated higher than 15 psig.

5.3.8 Increase pressure slowly from 1.0 psig until bubbles are seen from main vacuum seat. This is the vacuum set pressure.

5.3.9 Decrease pressure slowly. Vacuum vent must reclose before reaching .05 psig.

5.3.10 If vent leaks before or after set pressure range, or does not reclose before reaching .05 psig, proceed to Section 6.0 – Disassembly and rebuild.

Vent model	Set pressure range	Minimum Reseal Pressure
RVC___-25	30 – 33 PSIG	27 PSIG
RVC___-30	36 – 39.6 PSIG	32.4 PSIG
RVC___-35	42 – 46.2 PSIG	37.8 PSIG

5.4 Vent testing for styles not equipped to mount on test stand (weld stub version) require special fixturing for testing. Consult Betts Engineering for information.

6.0 Disassembly and Rebuild Instructions

Pressure and Combination Vents

6.1 Prior to disassembly always wear protective gear appropriate for the product being transported. Examples may include gloves, safety goggles, face shields, protective suits and respirators. It is the responsibility of the operator to know the product being hauled.

⚠ WARNING		**Pressure Hazard** – Cargo tank or piping may contain residual pressure and failure to safely relieve could result in sudden loss of pressure causing death or serious injury.
⚠ WARNING		**Flammable Product** – Cargo tank or piping may contain product that could present risk of fire, explosion, asphyxiation or other hazards resulting in death or serious injury.
⚠ WARNING		**Corrosive Material** – Cargo tank or piping may contain corrosive material. Protective clothing including gloves and face shield shall be worn.

6.2 Ensure the primary outlet (emergency valve) is closed and the piping and Guardian Vent does not contain pressure, vacuum, or product.

6.3 Remove the shroud to start the disassembly process. This is accomplished by removing the wave ring (Item No. 1 on Figure 004). After the wave ring is removed, the shroud will lift straight off the vent.

6.4 Remove any external components that may be attached to the vent including the cap (Item No. 3 on Figure 004). The cap can be popped out with a flathead screwdriver.

6.4.1 If the vent is a combination style, the magnet and magnet sleeve will have to be removed before continuing to the next step. The magnet and magnet sleeve are directly under the cap. (Item No. 5 & 6 on Figure 004) Use extreme caution when handling the magnet. The magnetic forces can lead to flying parts and fracturing debris.

6.5 Use the dis-assembly wrench (P/N: 75819ZC), compress the spring. When compressing the spring ensure the spring is not rotating with the disc.

⚠ WARNING	**Pressure Hazard –** When decompressing the internal spring, it can build up pressure causing parts to eject, resulting in death or serious injury.

6.5.1 Note: The base of the vent can stay on the mounting surface during dis-assembly if the Teflon Seat Gasket does not need replaced. If just the Teflon Seat Gasket needs replaced, remove the vent from the tank and see section 6.12.

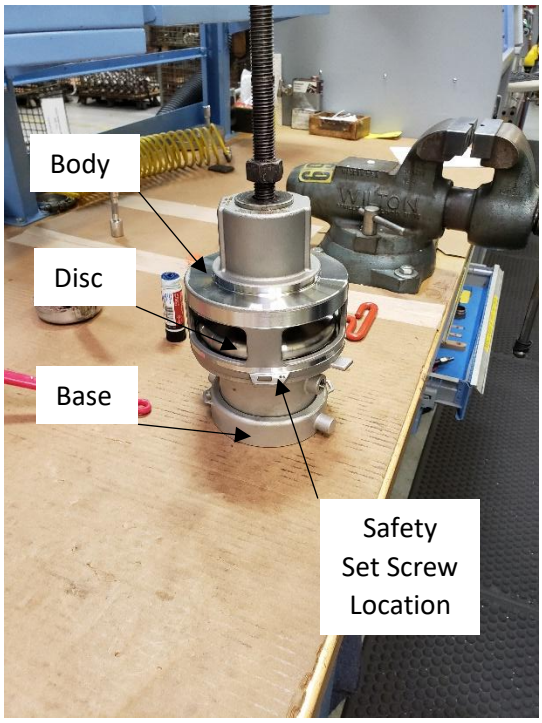


Figure 006: dis-assembly wrench in use

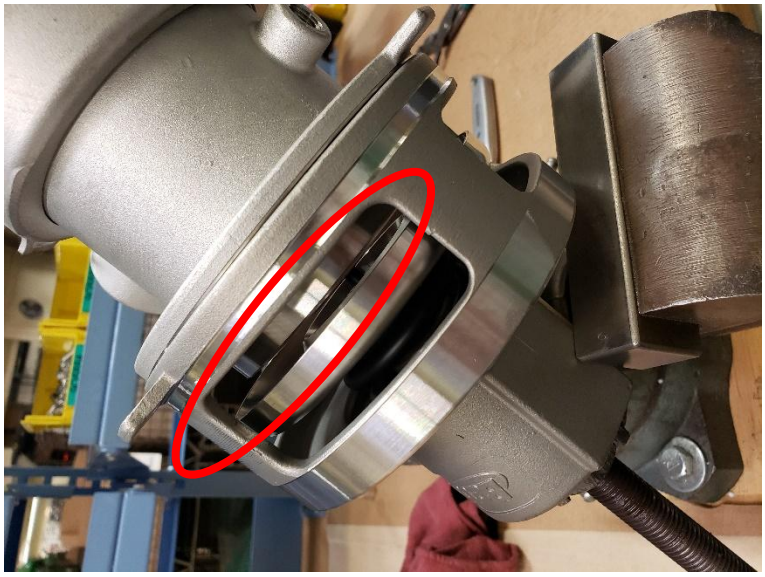


Figure 007: Spring compressed with visible gap

⚠ WARNING	**Pressure Hazard –** When decompressing the internal spring, it can build up pressure causing parts to eject, resulting in death or serious injury.

6.6 Remove the safety screw (See Figure 006 for approximate location) from the body and unscrew the body from the base. Carefully remove the disc from the dis-assembly wrench, paying close attention to the compressed spring.

6.6.1 If the vent is a combination style, unscrew the vacuum stem from the vacuum O-Ring holder (Item 10 and 16 in Figure 004) and remove items 10,11,12,13,15 and 16. Check the O-rings and replace them as necessary. See Figure 008 for Stem location.

6.6.2 Inspect the face of the disc for any surface imperfections, and if a combination or vacuum style vent; also check the vacuum seat for any surface imperfections. Re-install the above items if they are in working condition or after replacing them. Reference Figure 004 to assist in assembly.

Figure 008: Disassembled Combination Style Vent

6.7 Wipe down all the parts and inspect them for damage. Replace as necessary.

6.8 Inspect all O-Rings and replace them with new ones if they are compromised. Be careful not to damage the new O-Rings.

6.9 Reassemble the spring and disc into the body, using the caging wrench.

6.9.1 Note: Before compressing the spring fully, check to make sure that it is seated properly on the disk and on the upper internal surface of the body.

6.10 With the spring compressed, apply anti-seize to the threads and thread the body onto the base.

6.11 After the body is threaded back together, install the cap into the top of the body and thread the safety screw into the body. The shroud and wave ring can be reinstalled.

6.11.1 If this is a combination vent, the magnet and magnet sleeve will have to be re-installed prior to installing the cap. Install the magnet sleeve first, then drop the magnet in. Ensure the magnet is flat before continuing.

6.12 To replace the Teflon Seat Seal (Swivel and NPS Threaded Bodies Only):

6.12.1 Using the Spanner Wrench (P/N: 75819ZC), Remove the body from the mounting surface.

6.12.2 Remove the Teflon Seat Seal and inspect it for any scratches or tears. Replace the seal if needed.

6.12.3 Thread the base of the vent back onto the tank.

Vacuum Vent

6.13 Prior to disassembly always wear protective gear appropriate for the product being transported. Examples may include gloves, safety goggles, face shields, protective suits and respirators. It is the responsibility of the operator to know the product being hauled.

6.14 Ensure the primary outlet (emergency valve) is closed and the piping/Guardian Vent does not contain pressure, vacuum, or product.

6.15 Remove the vent from the mounting surface.

6.15.1 The vacuum style vent has a TTMA flange or NPS threaded connection. If the vent is equipped with an NPS connection, the spanner wrench 75825EY should be used to remove the vent.

6.16 Once the vent is removed, the next step is to remove the shroud. This is as simple as removing the (2) ¼-20 cap screws. This allows the shroud to be lifted off the vent.

Figure 009: Shroud removed on Vacuum Style Vent

6.17 Remove the magnet. Use extreme caution when handling the magnet. The magnetic forces can lead to flying parts and fracturing debris.

6.18 The stem (Item 4 in Figure 005) can now be removed from the O-ring holder (Item 10 in Figure 005). They are threaded together. There is some slight spring pressure that gets released when fully unthreaded. Inspect the O-ring (Item 9 in Figure 005) for scratches and tears. Replace if necessary

6.18.1 Note: Teflon O-rings (Numbers 5 and 7 in Figure 005) are split before assembly.

Figure 010: O-Ring holder removed showing split O-ring on stem

6.19 Wipe down all sealing surfaces. If the base is leaking, inspect the seat gasket for scratches or tears. Replace as necessary.

7.0 Trouble Shooting Guide

Problem	Potential Cause	Potential Solution
Vent not reaching set pressure/holding pressure	Seat O-Ring dirty	Clean and inspect O-ring
	Seat O-Ring damaged	Replace O-ring
	Main seat O-ring groove damaged	Repair damage if possible/replace base
Air leaking around the base	Base is not properly secured to mounting surface	Tighten vent to mounting surface
	Lower Gasket compromised	Replace gasket
Vent does not relieve at the correct set pressure	Bad spring	Replace spring
	Main Seat O-ring damaged	Replace main seat O-ring
	Main Seat O-ring dirty	Clean main seat O-ring
Will not reach vacuum set/hold vacuum	Vacuum O-ring dirty	Clean and inspect O-ring
	Vacuum O-ring damaged	Replace O-ring
	O-ring holder seat damaged	Repair damage if possible/replace O-ring holder
	Magnet missing or damaged	Inspect or replace magnet
Vent Sticking/Set pressure too high	Wear rings damaged	Replace wear rings in body
	Corrosion of main disc	Replace main disc
	Vent jammed by mechanical means	Consult Betts Engineering department