Anderson Greenwood™ Type 4040H Pressure and Vacuum Relief Valve

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⚠ WARNING

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

Anderson Greenwood Pressure and Vacuum Relief Valve must be installed, operated and maintained in accordance with federal, state and local codes, rules and regulations and Emerson Pressure Management.

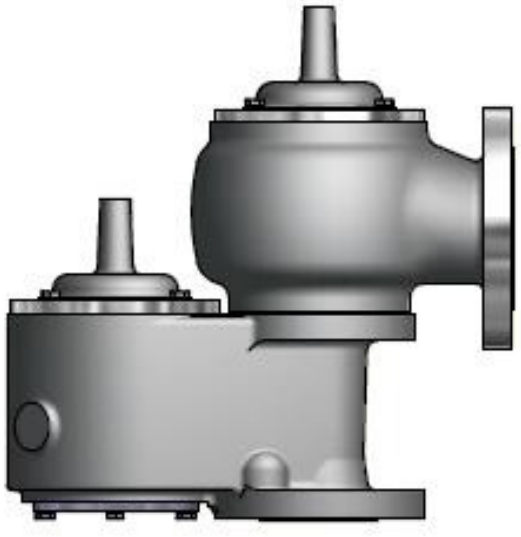

Figure 1. *Type 4040H Pressure and Vacuum Relief Valve*

The relief valve must be isolated from tank pressure before servicing. All gas/vapour must be blocked and pressure safely vented. Wear appropriate protective clothing and breathing apparatus if hazardous gas/vapours are present. Use appropriate lifting equipment where required.

Introduction

Scope of the Manual

This manual provides instructions for installation, operation, maintenance and parts ordering of the Type 4040H Pressure and Vacuum Relief Valve (PVRV).

Specifications

This section lists the specifications for the Type 4040H PVRV. Factory specification is stamped on the nameplate fastened on the Type 4040H PVRV at the factory.

Valve Sizes

2, 3, 4, 6, 8, 10 and 12 in. / DN 50, 80, 100, 150, 200, 250 and 300

Pallet Designs

VLP: For very low pressure
LP: For low pressures or vacuum
HP: For high pressure or vacuum

Pressure and Vacuum Pallet Ranges

See Tables 5 and 6

Approximate Weights

See Table 7

1. The pressure/temperature limits in this Instruction Manual and any applicable standard or code limitation should not be exceeded.

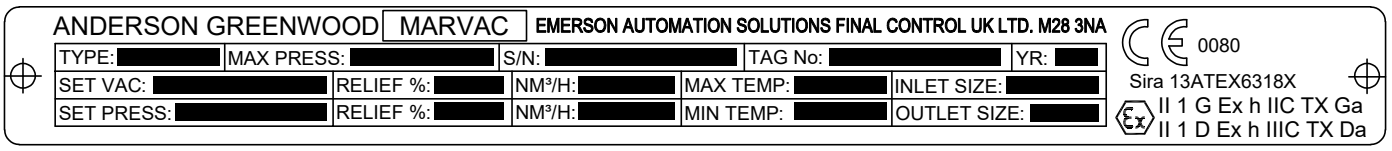

Figure 2. *Type 4040H ATEX Nameplate*

Product Description

The Anderson Greenwood™ Type 4040H PVRV is employed in gas/vapour service applications for low pressure storage tanks, vessels or applications requiring combined low pressure and vacuum protection with high capacity flow requirements. This product helps to prevent damage to the tank and also prevents the tank's contents from escaping, ensuring the safety of personnel and the surrounding environment.

Pressure/Vacuum valves are designed to limit the maximum pressure or vacuum that can exist in a tank due to inflow or outflow of the tank contents or due to changes in temperature as a result of environmental conditions.

The Anderson Greenwood Type 4040H PVRV consists of a common inlet connection with two separate seats, pressure and vacuum. The vacuum seat draws atmospheric pressure into the tank being protected and the pressure seat discharges via a flanged discharge line.

- For ease of maintenance, both pressure and vacuum seats are removable.
- PTFE coated internals are supplied as an all-weather option.

Principle of Operation

The Anderson Greenwood Type 4040H PVRV is a direct acting vent valve based on the weight of the pallet to keep the valve closed. When tank pressure or vacuum acting on the seat sealing area equals the opposing force acting on the pallet, the valve is on the threshold of opening. Any further increase in pressure will cause the pressure pallet to lift allowing the contents of the tank to vent through the valve (out-breathing).

Any further increase in vacuum will cause the vacuum pallet to begin to lift thus breaking the vacuum by allowing atmospheric air to be drawn into the tank (in-breathing).

In order for the valve to open and achieve its design lift, an overpressure will be required. The Type 4040H PVRV has been designed to achieve this design lift and rated capacity within 10% overpressure. Since the weight on the pallet determines the set pressure/vacuum of the valve, the settings are changed by varying the weight on the pallets.

Set Pressure and Vacuum Verification

CAUTION

Whenever the cover is removed and re-fitted, ensure correct engagement of the pallet stem in the cover guide.

If the pressure or vacuum settings are to be verified prior to installation, it is recommended that a test rig with a suitable accumulator be used having the following general features:

- Connection to the accumulator tank should ensure a negligible pressure drop between the accumulator and the test valve.
- Observed pressure shall be measured in the accumulator tank.
- The flange on which the valve is mounted shall be level.
- The valve should be tested using clean air or nitrogen.

Remove valve from shipping container and remove all packaging. Check that the set pressure/vacuum, the rated capacities and other details on the nameplate are correct.

Set Pressure Verification

For set pressure verification, the test apparatus needs to limit the maximum flow rate into the accumulator such that a pressure drop measured in the accumulator can be observed when the valve set pressure is reached.

1. Ensure that the test rig is clean and fasten the valve securely to the test flange.
2. Check nameplate for required set pressure.
3. Increase the inlet pressure slowly until the pallet assembly can be seen to be gently lifting and reseating on the seat. The inlet pressure at this point is the adjusted set pressure and should coincide with the point at which no further rise in inlet pressure is observed. Repeat a further two times to ensure repeatability.

Set Pressure Adjustment (see Figure 5)

The valve has been factory set to the required setting, however, if it is necessary to make a set pressure adjustment this can be done as follows:

1. Remove hex set screws (key 7) and washers (key 5) then remove cover (key 2) and O-ring (key 8).
2. The set pressure can be increased or reduced by adding or removing lead weights which can be supplied in various settings.
3. Refit cover (key 2) ensuring O-ring (key 8) is correctly installed and secure using hex set screws (key 7) and washers (key 5).
4. Repeat set pressure verification and repeat set pressure adjustment if required.

If it is not possible to verify the set pressure on a test rig, the required setting can be verified by measuring the combined weight of the pallet and installed weights. Refer to Table 7 for combined weight and equivalent set pressures.

Table 1. *Inlet Flange Thread Forms*

VALVE SIZE, In. / DN	IMPERIAL, ANSI 125, 150	METRIC PN10	METRIC PN16
2 / 50	5/8 – 11 UNC	M16 x 2	M16 x 2
3 / 80	5/8 – 11 UNC	M16 x 2	M16 x 2
4 / 100	5/8 – 11 UNC	M16 x 2	M16 x 2
6 / 150	3/4 – 10 UNC	M20 x 2.5	M20 x 2.5
8 / 200	3/4 – 10 UNC	M20 x 2.5	M20 x 2.5
10 / 250	7/8 – 9 UNC	M20 x 2.5	M24 x 3
12 / 300	7/8 – 9 UNC	M20 x 2.5	M24 x 3

Set Vacuum Verification

For verification of the vacuum setting, the flow rate out of the accumulator should be limited such that when the vacuum setting is reached, the point at which atmospheric pressure is admitted to the accumulator can be observed.

1. Ensure that the test rig is clean and fasten the valve securely to the test flange.
2. Check nameplate for required vacuum setting.
3. Increase the inlet vacuum slowly until the pallet assembly can be seen to be gently lifting and reseating on the seat. The inlet vacuum at this point is the adjusted setting and should coincide with the point at which no further increase in inlet vacuum is observed. Repeat a further two times to ensure repeatability.

Vacuum Setting Adjustment (see Figure 5)

The valve has been factory set to the required setting, however, if it is necessary to make a set pressure adjustment this can be done as follows:

1. Remove cover bolts (key 7) and washers (key 5) then remove cover (key 2) and O-ring (key 8).
2. The vacuum setting can be increased or reduced by adding or removing lead weights which can be supplied in various settings.
3. Refit cover (key 2) ensuring O-ring (key 8) is correctly installed and secure using bolts (key 7) and washers (key 5).
4. Repeat set vacuum verification and repeat vacuum setting adjustment if required.

If it is not possible to verify the set vacuum on a test rig, the required setting can be verified by measuring the combined weight of the pallet and installed weights. Refer to Table 7 for combined weight and equivalent set vacuums.

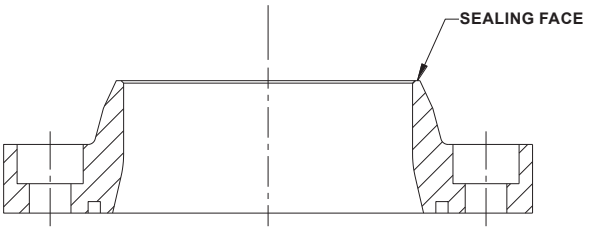

Figure 3. *Sealing Face of Valve Seat*

Table 2. *Seat Lap Band Widths*

VALVE SIZE, in. / DN	NOMINAL WIDTH, in. / mm	MAXIMUM WIDTH, in. / mm
2 / 50	0.039 / 1	0.059 / 1.5
3 / 80	0.039 / 1	0.059 / 1.5
4 / 100	0.047 / 1.2	0.071 / 1.8
6 / 150	0.059 / 1.5	0.071 / 1.8
8 / 200	0.059 / 1.5	0.087 / 2.2
10 / 250	0.079 / 2	0.12 / 3
12 / 300	0.079 / 2	0.12 / 3

Installation

WARNING

Personal injury, property damage, equipment damage or leakage due to escaping steam or bursting of pressure containing parts may result if this equipment is over pressured or is installed where service conditions could exceed the limits given in the specifications or where conditions exceed any ratings of the adjacent piping or piping connections.

To avoid such injury or damage, provide pressure-relieving or pressure-limiting device.

The mating connection to the tank should be flat machined horizontal flange and should be thoroughly cleaned to remove all foreign matter which could lead to valve leakage if trapped between the valve seat and the pallet. The bore diameter of the tank connection nozzle should be at least equal to the inlet bore of the valve connection.

Fit an inlet gasket to the mating flange ensuring it does not obstruct the flow path and install the valve. Ensure that the main axis of the valve is perpendicular. Flange bolting should be tightened uniformly to ensure a good seal.

Note

The valve connection flange will have a combination of plain through holes, tapped through holes and blind tapped holes. The thread form of the tapped holes can be found from Table 1.

For valves of aluminium construction, appropriate flat face flanges should be used and a full face gasket fitted.

Note

Storage tank inlet piping configurations should conform to recognised standards. Different configurations will develop different inlet pressure losses when the valve is flowing. This should be taken into consideration when sizing the valve for the application.

It is recommended that the external surfaces of carbon steel valves are painted immediately after installation.

Discharge pipework must be at least equal in size to the valve outlet and any built up back pressure in the discharge line should be limited to 10% of the valve set pressure. Discharge lines should be positioned so as to allow safe disposal of tank contents under relief conditions.

Valve Refurbishment

With valve in component parts thoroughly clean all surfaces with a suitable solvent and check for wear, corrosion or other forms of damage. Particular attention should be given to the sealing face of the valve seat.

Slight damage can be removed by lapping the seat face (removing guide or vacuum posts); however, care should be taken not to increase the width of the seat face beyond those given in Table 2. If successive refurbishments or severe damage requires the seat to be re-machined, consult the factory for approved dimensions.

Discard and replace any damaged parts plus all soft goods including:

- O-rings
- Diaphragms
- Backing Discs
- Spacer Discs
- Gasket

Also discard and replace the pallet disc. See Table 8 for replacement parts.

Testing Set Pressure and Vacuum

The pressure and vacuum settings should be checked and if necessary adjusted as described.

Maintenance

⚠ WARNING

The relief valve must be isolated from tank pressure before servicing or removing. All gas/vapour must be blocked and pressure safely vented. Wear appropriate protective clothing and breathing apparatus if hazardous gas/vapours are present.

Regular inspection should be carried out to ensure that the pressure and vacuum ports are free from debris and that nothing preventing the correct operation of the valve is present. Maintenance should be performed at regular intervals and should be carried out by suitably qualified personnel in an appropriately equipped workshop. Alternatively; the valve should be returned to the manufacturer or suitably authorised agent for service/repair. During transport to the workshop the valve should be kept vertical to prevent damage to the internals.

Valve Disassembly (see Figure 5)

CAUTION

During disassembly it is important to identify the pressure and vacuum pallets and weight assemblies so that on re-assembly they are returned to the correct seat.

Before the valve is disassembled it should be thoroughly cleaned to remove potential hazards from process contamination.

Pressure Side

1. Remove hex set screws (key 7), washers (key 5), cover (key 2) and O-ring (key 8). Remove shroud (key 13.4) and lift out pressure pallet assembly (key 15) complete with pressure setting weights (for higher set valves, remove some of the lead before lifting out the pallet assembly).
2. Remove seat (key 13.1) complete with guide posts (key 13.2) by removing capscrews (key12). This will separate the upper body (key 11) from the lower body (key 1). Remove gasket (key 14) and O-ring (key 13.3). Identify pallet assembly, weights and seat as pressure side parts.

Vacuum Side

1. Remove hex set screws (key 7), washers (key 5), cover (key 2) and O-ring (key 8).
2. Remove shroud (key 3.4) and lift out vacuum pallet assembly (key 16) complete with vacuum setting weights (for higher set valves, remove some of the lead before lifting out the pallet assembly).
3. Remove seat (key 3.1) complete with vacuum posts (key 3.2) by removing capscrews (key 4).
4. Remove O-ring (key 3.3). Identify pallet assembly, weights and seat as vacuum side parts.
5. To remove vacuum mesh, unscrew hex set screws (key 6), remove mesh plate (key 10) and recover vacuum mesh (key 9).

Pallet Assembly (see Figure 6)

VLP/LP Pallet assembly for 2, 3, 4 in. / DN 50, 80, 100

1. Remove nut (key 4) and washer (key 5) where used, to release stem (key 3) from assembly.
2. Separate pallet disc (key 2), diaphragm (key 6), pallet (key 1) and any weights taking care to identify weights removed to help re-assembly.

VLP/LP Pallet assembly for 6, 8, 10, 12 in. / DN 150, 200, 250, 300

1. Remove nut (key 4) and washer (key 5) to release stem (key 3) from assembly.
2. Separate pallet disc (key 2), diaphragm (key 6), backing disc (key 7), spacer disc (key 8), pallet (key 1) and any weights taking care to identify weights removed to help re-assembly.

HP Pallet assembly for 2, 3, 4, 6 in. / DN 50, 80, 100, 150

1. Remove nut (key 4) and washer (key 5) to release stem (key 3) from assembly.
2. Separate pallet disc (key 2), diaphragm (key 6), backing disc (key 7), spacer disc (key 8), disc (key 9), pallet (key 1) and any weights taking care to identify weights removed to help re-assembly.

HP Pallet assembly for 8, 10, 12 in. / DN 200, 250, 300

1. Remove nut (key 4) and washer (key 5) to release stem (key 3) from assembly.
2. Separate pallet disc (key 2), diaphragm (key 6), backing disc (key 7), spacer disc (key 8), disc (key 9), pallet (key 1), support plate (key 10) and any weights taking care to identify weights removed to help re-assembly.

Pallet Re-assembly (see Figure 6)

VLP/LP Pallet assembly for 2, 3, 4 in. / DN 50, 80, 100

Assemble pallet (key 1), diaphragm (key 6) and pallet disc (key 2), to stem (key 3) and secure using washer (key 5) where used and nut (key 4).

VLP/LP Pallet assembly for 6, 8, 10, 12 in. / DN 150, 200, 250, 300

Assemble pallet (key 1), spacer disc (key 8), backing disc (key 7), diaphragm (key 6) and pallet disc (key 2), to stem (key 3) and secure using washer (key 5) and nut (key 4).

HP Pallet assembly for 2, 3, 4, 6 in. / DN 50, 80, 100, 150

Assemble pallet (key 1), disc (key 9), spacer disc (key 8), backing disc (key 7), diaphragm (key 6) and pallet disc (key 2), to stem (key 3) and secure using washer (key 5) and nut (key 4).

HP Pallet assembly for 8, 10, 12 in. / DN 200, 250, 300

Assemble support plate (key 10), pallet (key 1), disc (key 9), spacer disc (key 8), backing disc (key 7), diaphragm (key 6) and pallet disc (key 2), to stem (key 3) and secure using washer (key 5) and nut (key 4).

If required, PTFE tape can be applied to stem threads and locking compound used to secure the nut.

Valve Re-assembly (see Figure 5)

CAUTION

Whenever the cover is removed and re-fitted, ensure correct engagement of the pallet stem.

Pressure Side

1. Assemble guide posts (key 13.2), if removed, and O-ring (key 13.3) to seat (key 13.1).
2. Fit gasket (key 14) between upper body (key 11) and lower body (key 1).
3. Secure seat (key 13.1) and upper body (key 11) to lower body (key 1) using capscrews (key 12) ensuring that O-ring is not dislodged during assembly.
4. Re-install pressure pallet as identified during valve disassembly ensuring the pallet slides easily between the guide posts.
5. Return pressure setting weights again as identified during disassembly.
6. The pressure side has a shroud (key 13.4) which should be installed over the guide posts (key 13.2) before the cover is assembled.
7. Assemble O-ring (key 8) to cover (key 2), assemble cover to body (key 11) ensuring that O-ring is not dislodged during assembly. Secure using washers (key 5) and hex set screws (key 7).

Vacuum Side

1. Assemble vacuum posts (key 3.2) if removed and O-ring (key 3.3) to seat (key 3.1).
2. Secure seat to body (key 1) using capscrews (key 4) ensuring that O-ring is not dislodged during assembly.
3. Re-install vacuum pallet as identified during valve disassembly ensuring the pallet slides easily between the vacuum posts.
4. Return vacuum setting weights again as identified during disassembly. The vacuum side has a shroud (key 3.4) which should be installed over the vacuum posts (key 3.2) before the cover is assembled.
5. Assemble O-ring (key 8) to cover (key 2), assemble cover to body (key 1) ensuring that O-ring is not dislodged during assembly. Secure using washers (key 5) and hex set screws (key 7).
6. Assemble vacuum mesh (key 9), mesh plate (key 10) and secure using hex set screws (key 6).

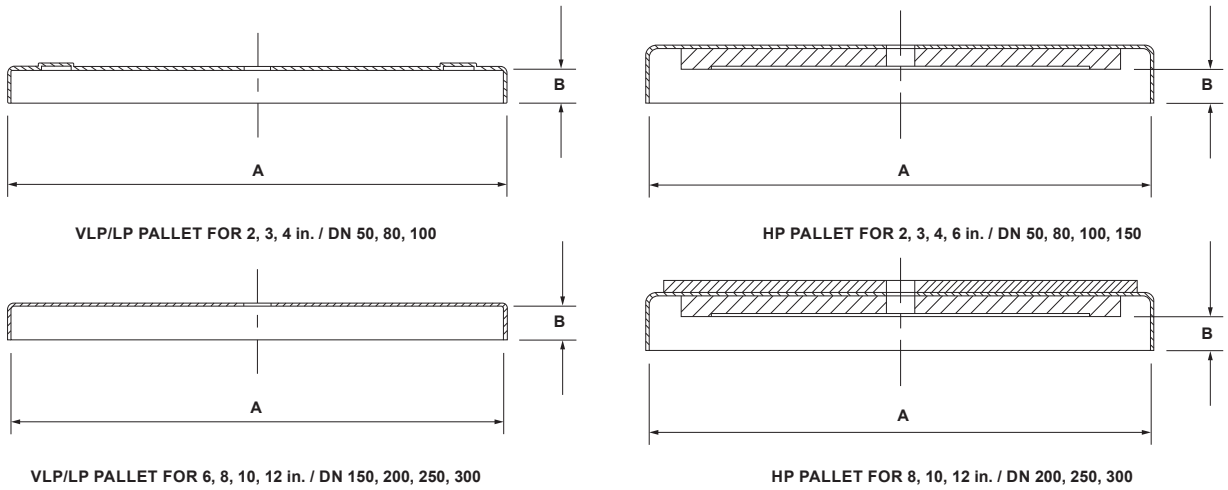

Figure 4. *Pallet Designs with Pressure Ranges*

Table 3. *Pallet Thickness*

PALLET	2 In. / DN 50	3 In. / DN 80	4 In. / DN 100	6 In. / DN 150	8 In. / DN 200	10 In. / DN 250	12 In. / DN 300
LP	0.039 / 1	0.039 / 1	0.039 / 1	0.059 / 1.5	0.059 / 1.5	0.059 / 1.5	0.059 / 1.5
VLP	0.024 / 0.6	0.024 / 0.6	0.024 / 0.6	0.024 / 0.6	0.024 / 0.6	0.024 / 0.6	0.024 / 0.6

Pallet Identification

Pressure/Vacuum Ranges

There are three pallet designs with the following designations which each cover the respective pressure or vacuum ranges given in Tables 5 and 6.

VLP - This is a plain spun pallet suitable for very low pressures or vacuums.

LP - This is similar to the VLP pallet apart from the material thickness and is suitable for slightly higher pressures or vacuums. See Table 3 for comparison of material thickness.

HP - This construction uses a substantial disc in combination with a spun pallet and is suitable for use up to the highest pressures or vacuums.

Note

2, 3 and 4 in. / DN 50, 80 and 100 VLP and LP designs contain a recess in the pallet to act as an air cushion to assist seat tightness.

8,10 and 12 in. / DN 200, 250 and 300 HP pallets also use a pallet support plate on the back face of the pallet.

Pressure or Vacuum

Each design of pallet can be used on pressure or vacuum however pallets for use on pressure will have a different skirt length (B) to the pallet used on Vacuum. Pallets for vacuum duty have longer skirts and can be identified by referring to Table 4.

If the valve contains two pallets of the same construction, use the skirt length to identify which is for pressure and which is for vacuum.

Table 4. *Pallet Lengths*

VALVE NOMINAL INLET SIZE, In. / DN	DIMENSIONS, In. / mm			
	Pressure Pallet		Vacuum Pallet	
	A	B	A	B
2 / 50	3.03 / 77	0.2 / 5	3.03 / 77	0.31 / 8
3 / 80	4.41 / 112	0.3 / 7.5	4.41 / 112	0.47 / 12
4 / 100	5.79 / 147	0.39 / 10	5.79 / 147	0.63 / 16
6 / 150	8.7 / 221	0.59 / 15	8.7 / 221	0.94 / 24
8 / 200	11.6 / 294	0.79 / 20	11.6 / 294	1.26 / 32
10 / 250	14.5 / 368	0.98 / 25	14.5 / 368	1.57 / 40
12 / 300	17.4 / 441	1.18 / 30	17.4 / 441	1.89 / 48

Table 5. *Pressure Pallet Ranges, in. w.c. / mbar*

NOMINAL SIZE, In. / DN	TRIM MATERIAL	VLP PALLET		LP PALLET		HP PALLET	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
2 / 50	Aluminium	0.48 / 1.2	0.96 / 2.4	0.96 / 2.4	2.8 / 7.0	2.8 / 7.0	40 / 100
	316 SST	1.0 / 2.5	2.3 / 5.6	2.3 / 5.6	5.6 / 14	5.6 / 14	40 / 100
3 / 80	Aluminium	0.44 / 1.1	0.64 / 1.6	0.64 / 1.6	2.8 / 7.0	2.8 / 7.0	40 / 100
	316 SST	1.0 / 2.5	1.5 / 3.7	1.5 / 3.7	5.6 / 14	5.6 / 14	40 / 100
4 / 100	Aluminium	0.44 / 1.1	0.60 / 1.5	0.60 / 1.5	2.8 / 7.0	2.8 / 7.0	40 / 100
	316 SST	1.0 / 2.5	1.4 / 3.4	1.4 / 3.4	5.6 / 14	5.6 / 14	40 / 100
6 / 150	Aluminium	0.44 / 1.1	0.76 / 1.9	0.76 / 1.9	2.8 / 7.0	2.8 / 7.0	40 / 100
	316 SST	1.0 / 2.5	1.7 / 4.2	1.7 / 4.2	5.6 / 14	5.6 / 14	40 / 100
8 / 200	Aluminium	0.44 / 1.1	0.88 / 2.2	0.88 / 2.2	4.8 / 12	4.8 / 12	40 / 100
	316 SST	1.0 / 2.5	1.8 / 4.5	1.8 / 4.5	8.0 / 20	8.0 / 20	40 / 100
10 / 250	Aluminium	0.44 / 1.1	0.84 / 2.1	0.84 / 2.1	5.2 / 13	5.2 / 13	40 / 100
	316 SST	1.0 / 2.5	1.7 / 4.3	1.7 / 4.3	8.8 / 22	8.8 / 22	40 / 100
12 / 300	Aluminium	0.44 / 1.1	0.80 / 2.0	0.80 / 2.0	5.6 / 14	5.6 / 14	40 / 100
	316 SST	1.0 / 2.5	1.6 / 4.1	1.6 / 4.1	9.6 / 24	9.6 / 24	40 / 100

Table 6. *Vacuum Pallet Ranges, in. w.c. / mbar*

NOMINAL SIZE, In. / DN	TRIM MATERIAL	VLP PALLET		LP PALLET		HP PALLET	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
2 / 50	Aluminium	0.48 / 1.2	0.96 / 2.4	0.96 / 2.4	2.8 / 7.0	2.8 / 7.0	40 / 100
	316 SST	1.0 / 2.5	2.3 / 5.8	2.3 / 5.8	5.6 / 14	5.6 / 14	40 / 100
3 / 80	Aluminium	0.44 / 1.1	0.68 / 1.7	0.68 / 1.7	2.8 / 7.0	2.8 / 7.0	40 / 100
	316 SST	1.0 / 2.5	1.6 / 3.9	1.6 / 3.9	5.6 / 14	5.6 / 14	40 / 100
4 / 100	Aluminium	0.44 / 1.1	0.60 / 1.6	0.60 / 1.6	2.8 / 7.0	2.8 / 7.0	40 / 100
	316 SST	1.0 / 2.5	1.4 / 3.5	1.4 / 3.5	5.6 / 14	5.6 / 14	40 / 100
6 / 150	Aluminium	0.44 / 1.1	0.80 / 2.0	0.80 / 2.0	2.8 / 7.0	2.8 / 7.0	40 / 100
	316 SST	1.0 / 2.5	1.8 / 4.4	1.8 / 4.4	5.6 / 14	5.6 / 14	40 / 100
8 / 200	Aluminium	0.44 / 1.1	0.92 / 2.3	0.92 / 2.3	4.8 / 12	4.8 / 12	40 / 100
	316 SST	1.0 / 2.5	1.9 / 4.8	1.9 / 4.8	8.0 / 20	8.0 / 20	40 / 100
10 / 250	Aluminium	0.44 / 1.1	1.0 / 2.6	1.0 / 2.6	5.2 / 13	5.2 / 13	40 / 100
	316 SST	1.0 / 2.5	1.8 / 4.6	1.8 / 4.6	8.8 / 22	8.8 / 22	40 / 100
12 / 300	Aluminium	0.44 / 1.1	0.84 / 2.1	0.84 / 2.1	5.6 / 14	5.6 / 14	40 / 100
	316 SST	1.0 / 2.5	1.8 / 4.4	1.8 / 4.4	9.6 / 24	9.6 / 24	40 / 100

Table 7. *Equivalent Weights for Pressure and Vacuum Settings*

INLET SIZE, In. / DN	2 / 50		3 / 80		4 / 100		6 / 150		8 / 200		10 / 250		12 / 300	
MEAN SEALING AREA, $in.^2$ / mm^2	4.53 / 2923		9.971 / 6433		17.603 / 11,357		39.662 / 25,588		69.829 / 45,051		109.563 / 70,686		156.894 / 101,222	
PRESSURE, in. w.c / mbar	oz	g	oz	g	oz	g	oz	g	oz	g	oz	g	oz	g
0.4 / 1	1.1	31	2.3	65	4.1	116	9.2	261	0.2	6	9.4	266	4.4	125
0.8 / 2	2.1	60	4.6	130	8.2	232	2.4	68	0.4	11	2.9	82	8.9	252
1.2 / 3	3.2	91	6.9	196	12.3	349	11.6	329	0.6	17	12.3	349	13.3	377
1.6 / 4	4.2	119	9.3	264	0.4	11	4.8	136	0.9	26	5.8	164	1.7	48
2 / 5	5.3	150	11.6	329	4.4	125	14.0	397	1.1	31	15.2	431	6.2	176
2.4 / 6	6.3	179	13.9	394	8.5	241	7.3	207	1.3	37	8.7	247	10.6	301
2.8 / 7	7.4	210	0.2	6	12.6	357	0.5	14	1.5	43	2.1	60	15.0	425
3.2 / 8	8.4	238	2.5	71	0.7	20	9.7	275	1.7	48	11.5	326	3.5	99
3.6 / 9	9.5	269	4.8	136	4.8	136	2.9	82	1.9	54	5.0	142	7.9	224
4 / 10	10.5	298	7.2	204	8.9	252	12.1	343	2.2	62	14.4	408	12.3	349
4.8 / 12	12.6	357	11.8	335	1.1	31	14.5	411	2.6	74	1.3	37	5.2	147
5.6 / 14	14.7	417	0.4	11	9.2	261	0.9	26	3.0	85	4.2	119	14.1	400
6.4 / 16	0.8	23	5.0	142	1.4	40	3.4	96	3.5	99	7.1	201	6.9	196
7.2 / 18	2.9	82	9.7	275	9.6	272	5.8	164	3.9	111	10.0	283	15.8	448
8 / 20	5.0	142	14.3	405	1.8	51	8.2	232	4.3	122	12.9	366	8.7	247
8.8 / 22	7.1	201	2.9	82	9.9	281	10.6	301	4.8	136	15.7	445	1.5	43
9.6 / 24	9.2	261	7.6	215	2.1	60	13.1	371	5.2	147	2.6	74	10.4	295
10 / 26	11.3	320	12.2	346	10.3	292	15.5	439	5.6	159	5.5	156	3.3	94
11 / 28	13.5	383	0.8	23	2.5	71	1.9	54	6.0	170	8.4	238	12.2	346
12 / 30	15.6	442	5.5	156	10.6	301	4.3	122	6.5	184	11.3	320	5.0	142
13 / 32	1.7	48	10.1	286	2.8	79	6.7	190	6.9	196	14.2	403	13.9	394
14 / 34	3.8	108	14.7	417	11.0	312	9.2	261	7.3	207	1.1	31	6.8	193
14 / 36	5.9	167	3.4	96	3.2	91	11.6	329	7.8	221	3.9	111	15.6	442
15 / 38	8.0	227	8.0	227	11.3	320	14.0	397	8.2	232	6.8	193	8.5	241
16 / 40	10.1	286	12.6	357	3.5	99	0.4	11	8.6	244	9.7	275	1.4	40
17 / 42	12.2	346	1.2	34	11.7	332	2.8	79	9.1	258	12.6	357	10.2	289
18 / 44	14.3	405	5.9	167	3.9	111	5.2	147	9.5	269	15.5	439	3.1	88
18 / 46	0.4	11	10.5	298	12.0	340	7.7	218	9.9	281	2.4	68	12.0	340
19 / 48	2.5	71	15.1	428	4.2	119	10.1	286	10.4	295	5.3	150	4.8	136
20 / 50	4.6	130	3.8	108	12.4	352	12.5	354	10.8	306	8.1	230	13.7	388

Table 7. *Equivalent Weights for Pressure and Vacuum Settings (continued)*

INLET SIZE, in. / DN	2 / 50		3 / 80		4 / 100		6 / 150		8 / 200		10 / 250		12 / 300	
MEAN SEALING AREA, $in.^2$ / mm^2	4.53 / 2923		9.971 / 6433		17.603 / 11,357		39.662 / 25,588		69.829 / 45,051		109.563 / 70,686		156.894 / 101,222	
PRESSURE, in. w.c / mbar	oz	g	oz	g	oz	g	oz	g	oz	g	oz	g	oz	g
21 / 52	6.7	190	8.4	238	4.6	130	14.9	422	11.2	318	11.0	312	6.6	187
22 / 54	8.8	249	13.0	369	12.7	360	1.4	40	11.6	329	13.9	394	15.4	437
23 / 56	10.9	309	1.7	48	4.9	139	3.8	108	12.1	343	0.8	23	8.3	235
23 / 58	13.0	369	6.3	179	13.1	371	6.2	176	12.5	354	3.7	105	1.2	34
24 / 60	15.1	428	10.9	309	5.3	150	8.6	244	12.9	366	6.6	187	10.0	283
25 / 62	1.2	34	15.6	442	13.4	380	11.0	312	13.4	380	9.5	269	2.9	82
26 / 64	3.3	94	4.2	119	5.6	159	13.5	383	13.8	391	12.3	349	11.8	335
27 / 66	5.4	153	8.8	249	13.8	391	15.9	451	14.2	403	15.2	431	4.6	130
27 / 68	7.5	213	13.5	383	6.0	170	2.3	65	14.7	417	2.1	60	13.5	383
28 / 70	9.6	272	2.1	60	14.1	400	4.7	133	15.1	428	5.0	142	6.4	181
29 / 72	11.7	332	6.7	190	6.3	179	7.1	201	15.5	439	7.9	224	15.2	431
30 / 74	13.8	391	11.3	320	14.5	411	9.6	272	16.0	454	10.8	306	8.1	230
31 / 76	15.9	451	16.0	454	6.7	190	12.0	340	0.4	11	13.7	388	1.0	28
31 / 78	2.1	60	4.6	130	14.8	420	14.4	408	0.8	23	0.5	14	9.9	281
32 / 80	4.2	119	9.2	261	7.0	198	0.8	23	1.3	37	3.4	96	2.7	77
33 / 82	6.3	179	13.9	394	15.2	431	3.2	91	1.7	48	6.3	179	11.6	329
34 / 84	8.4	238	2.5	71	7.4	210	5.7	162	2.1	60	9.2	261	4.5	128
35 / 86	10.5	298	7.1	201	15.5	439	8.1	230	2.6	74	12.1	343	13.3	377
35 / 88	12.6	357	11.8	335	7.7	218	10.5	298	3.0	85	15.0	425	6.2	176
36 / 90	14.7	417	0.4	11	15.9	451	12.9	366	3.4	96	1.9	54	15.1	428
37 / 92	0.8	23	5.0	142	8.1	230	15.4	437	3.8	108	4.7	133	7.9	224
38 / 94	2.9	82	9.7	275	0.3	9	1.8	51	4.3	122	7.6	215	0.8	23
39 / 96	5.0	142	14.3	405	8.4	238	4.2	119	4.7	133	10.5	298	9.7	275
39 / 98	7.1	201	2.9	82	0.6	17	6.6	187	5.1	145	13.4	380	2.5	71
40 / 100	9.2	261	7.5	213	8.8	249	9.0	255	5.6	159	0.3	9	11.4	323

Parts Ordering

When corresponding with your local Sales Office about this pressure relief valve, include the type number, serial number and other information stamped on the nameplate.

When ordering replacement parts, specify relief valve by model number, pipe size and serial number. identify replacement parts by part number, description and material where possible.

Parts List

Key	Description	Part Number
	Replacement Parts	See Table 8
1	Lower Body	
2	Cover	
3	Vacuum Seat Assembly	
3.1	Seat	
3.2	Vacuum Post	
3.3	O-ring	
3.4	Shroud	
4	Capscrew	
5	Washer	
6	Hex Set Screw	
7	Hex Set Screw	
8	O-ring	
9	Vacuum Mesh	
10	Mesh Plate	
11	Upper Body	
12	Capscrew	
13	Pressure Seat Assembly	
13.1	Seat	
13.2	Guide Post	
13.3	O-ring	
13.4	Shroud	
14	Body Gasket	
15	Pressure Pallet Assembly	
16	Vacuum Pallet Assembly	

Table 8. *Replacement Parts*

DESCRIPTION	USAGE	MATERIAL	NOMINAL SIZE, IN. / DN						
			2 / 50	3 / 80	4 / 100	6 / 150	8 / 200	10 / 250	12 / 300
Pallet Disc (key 2)	Very low pressure/vacuum	Stainless Steel	809736-228	809742-228	809748-228	809754-228	809760-228	809766-228	809772-228
	Low pressure/vacuum	Stainless Steel	809397-228	809398-228	809399-228	809400-228	809443-228	809506-228	809522-228
	High pressure/vacuum	Stainless Steel	809397-228	809398-228	809399-228	809400-228	809443-228	809506-228	809522-228
Diaphragm (key 6)	Very pressure/vacuum	PFA	810044-574	810046-574	810048-574	809589-574	809592-574	809595-574	809598-574
		PTFE	809580-A29	809583-A29	809586-A29	809589-A29	809592-A29	809595-A29	809598-A29
	Low pressure/vacuum	PFA	810045-574	810047-574	810049-574	810314-574	810316-574	810318-574	810320-574
		PTFE	809581-A29	809584-A29	809587-A29	810314-A29	810316-A29	810318-A29	810320-A29
	High pressure/vacuum	PTFE	809582-A29	809585-A29	809588-A29	809591-A29	809594-A29	809597-A29	809600-A29
Backing Disc (key 7)	Very low pressure/vacuum	Gen. Service	N/A	N/A	N/A	809989-447	810050-447	810051-447	810052-447
	Low pressure/vacuum	Gen. Service	N/A	N/A	N/A	810313-447	810315-447	810317-447	810319-447
	High pressure/vacuum	Gen. Service	809601-447	809602-447	809630-447	809604-447	809605-447	809606-447	809607-447
Spacer Disc (key 8)	Very low pressure/vacuum	Gen. Service	N/A	N/A	N/A	809990-447	810053-447	810054-447	810055-447
	Low pressure/vacuum	Gen. Service	N/A	N/A	N/A	809611-447	809612-447	809613-447	809614-447
	High pressure/vacuum	Gen. Service	809608-447	809609-447	809610-447				
Body Gasket (key 14)	HC121F	Gen. Service	809401-447	809402-447	809403-447	808422-447	809444-447	809507-447	809523-447
O-ring (key 13.3, 3.3, 8)	Seat	Viton®	809702-504	809703-504	809632-504	800397-504	809634-504	807878-504	800386-504
		Nitrile	809702-503	809703-503	809632-503	800397-503	809634-503	807878-503	800386-503
		PTFE	809702-502	809703-502	809632-502	800397-502	809634-502	807878-502	800386-502
	Cover	Viton®	809630-504	809631-504	809633-504	809634-504	809640-504	809641-504	809642-504
		Nitrile	809630-503	809631-503	809633-503	809634-503	809640-503	809641-503	809642-503
		PTFE	809630-502	809631-502	809633-502	809634-502	809640-502	809641-502	809642-502

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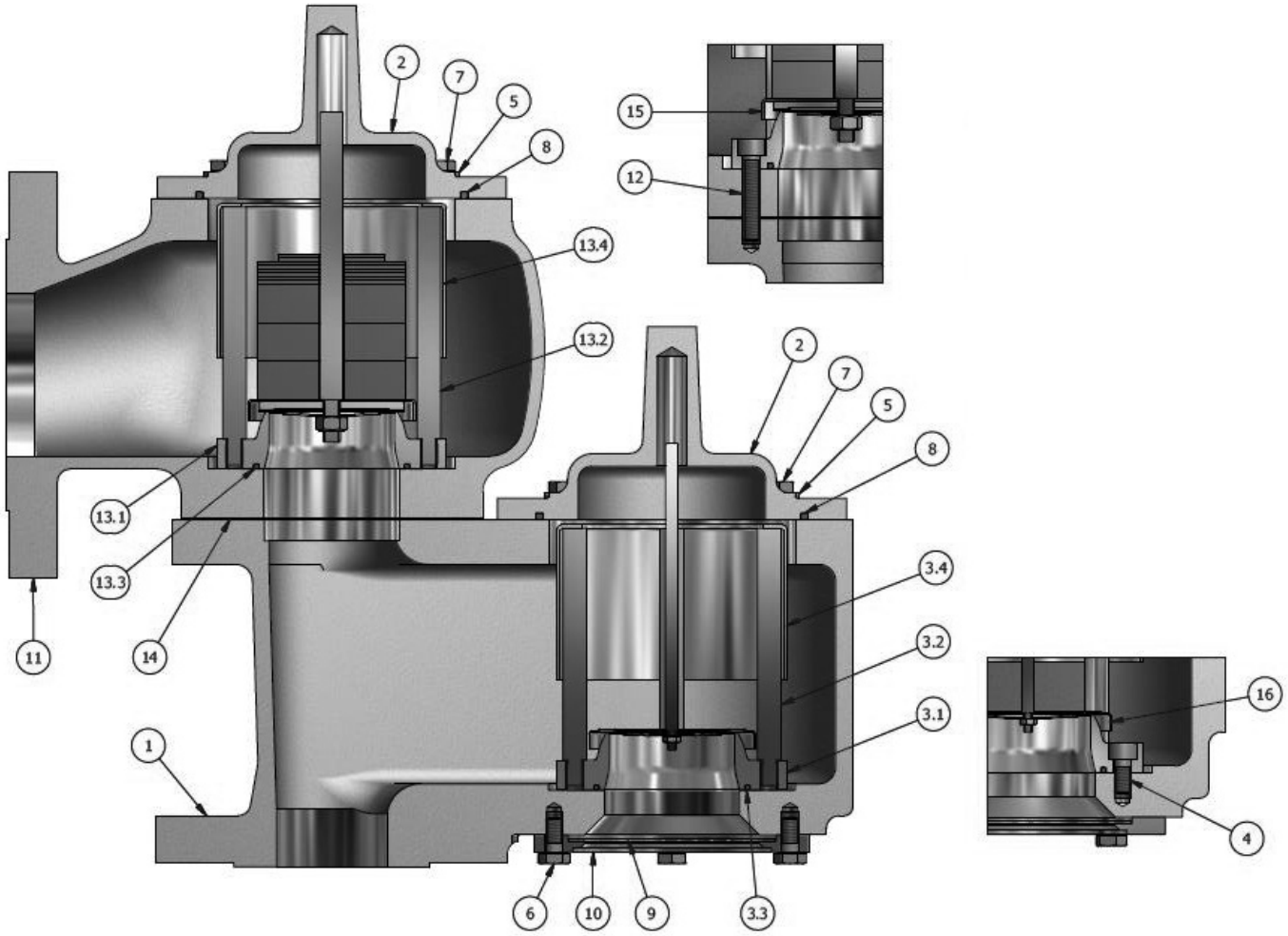

Figure 5. *Type 4040H Pressure and Vacuum Relief Valve Assembly*

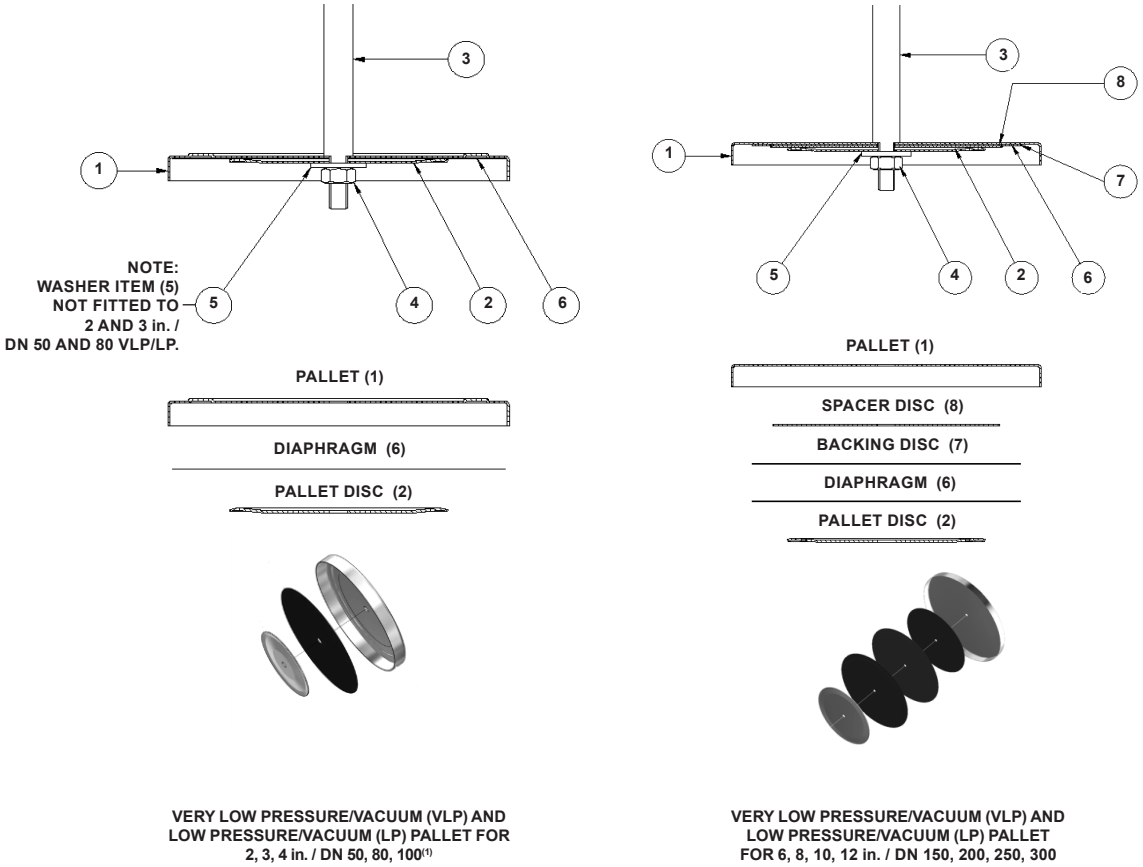

Figure 6. *Pallet Construction*

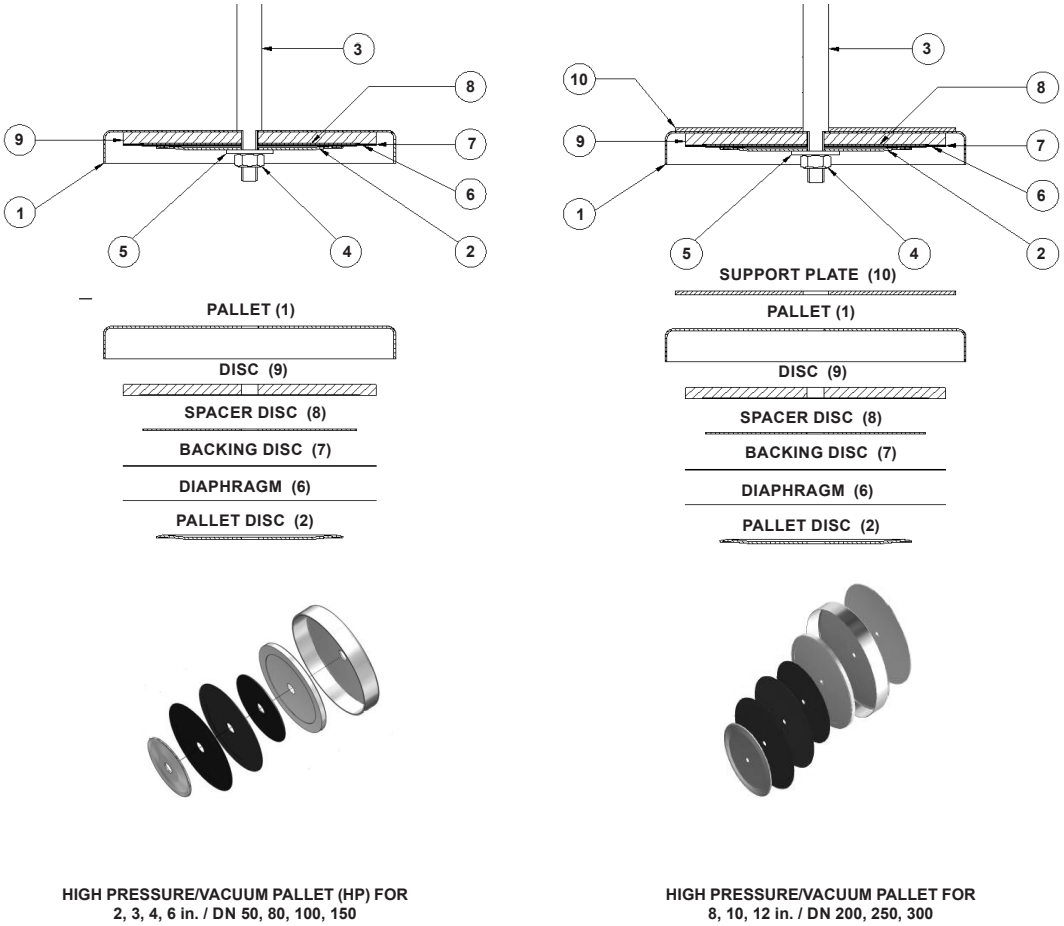

Figure 6. *Pallet Construction (continued)*

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