Anderson Greenwood™ Type 4142HPF Pressure Relief Valve

Table of Contents

⚠ 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 equipment must be installed, operated and maintained in accordance with federal, state and local codes, rules and regulations and Emerson Process Management Regulator Technologies Inc. (Emerson) instructions.

Only personnel (including operators, maintenance crew and servicing team) trained in the proper procedures, codes, standards and regulations, for the applicable industries should install and service this equipment.

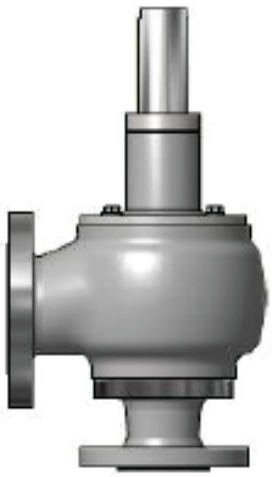


Figure 1. *Type 4142HPF Pressure Relief Valve*

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

Safety Precautions

⚠ WARNING

Read and understand this instruction manual before installing, operating or performing maintenance on the Anderson Greenwood Type 4142HPF Pressure Relief Valve (PRV) following all precautions and warnings noted herein.

Specifications

This section lists the specifications for the Type 4142HPF Pressure Relief Valve. Factory specification is stamped on the nameplate fastened on the Type 4142HPF Pressure Relief Valve at the factory.

Valve Sizes DN 50, 80, 100, 150, 200, 250 and 300 / NPS 2, 3, 4, 6, 8, 10 and 12	**Materials** See Table 2

Note

This manual is issued for guidance only and does not affect our standard terms and conditions and our Product Limited Warranty, all of which are available on request.

Introduction

Product Description

The Anderson Greenwood™ Type 4142HPF PRV is employed in gas/vapor service applications for low pressure storage tanks, vessels or applications requiring low pressure 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 relief valves are designed to limit the maximum pressure that can exist in a tank due to inflow of the tank contents or due to changes in temperature as a result of environmental conditions.

The Anderson Greenwood Type 4142HPF PRV consists of an inlet connection and a pressure seat which discharges via a flanged discharge line.

- For ease of maintenance, pressure seat is removable.
- Polytetrafluoroethylene (PTFE) coated internals are supplied as an all-weather option.

Principle of Operation

The Anderson Greenwood Type 4142HPF PRV is a direct acting vent valve with a spring-loaded pallet to keep the valve closed. When tank pressure 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 pallet to lift allowing the contents of the tank to vent through the valve (out-breathing).

In order for the valve to open and achieve its design lift, an overpressure will be required. The Type 4142HPF PRV has been designed to achieve this design lift and rated capacity within 10% overpressure. Set pressures are adjusted by altering the compression on the pressure setting spring.

Set Pressure

If the pressure is 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, the rated capacity and the 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. Establish a steady flow into the test vessel to increase the inlet pressure slowly. The adjusted set pressure is the pressure at which no further rise is observed. Repeat a further two times to ensure repeatability.

Set Pressure Adjustment (See Figure 2)

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 cap (P21) and release locknut (P19).
2. The set pressure can be increased or reduced using adjusting screw (P17). Turning clockwise increases set pressure and anticlockwise decreases set pressure. After adjustment, secure adjusting screw (P17) using locknut (P19). Ensure cap gasket (P20) is in place and refit cap (P21).
3. Repeat set pressure verification and repeat adjustment if required.

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. For correct valve operation there shall be no external loads applied to the valve body.

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.

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

Note

Storage tank inlet piping configurations should conform to recognized 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.

Any discharge pipework connected to the valve outlet should be adequately supported to prevent any loads being applied to the valve body and should have proper drainage to prevent accumulation of liquids on the downstream side.

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

Maintenance

⚠ WARNING

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

Regular inspection should be carried out to ensure that nothing is 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 authorized agent for service/repair. During transport to the workshop, the valve should be kept vertical to prevent damage to the internals.

Valve Disassembly

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

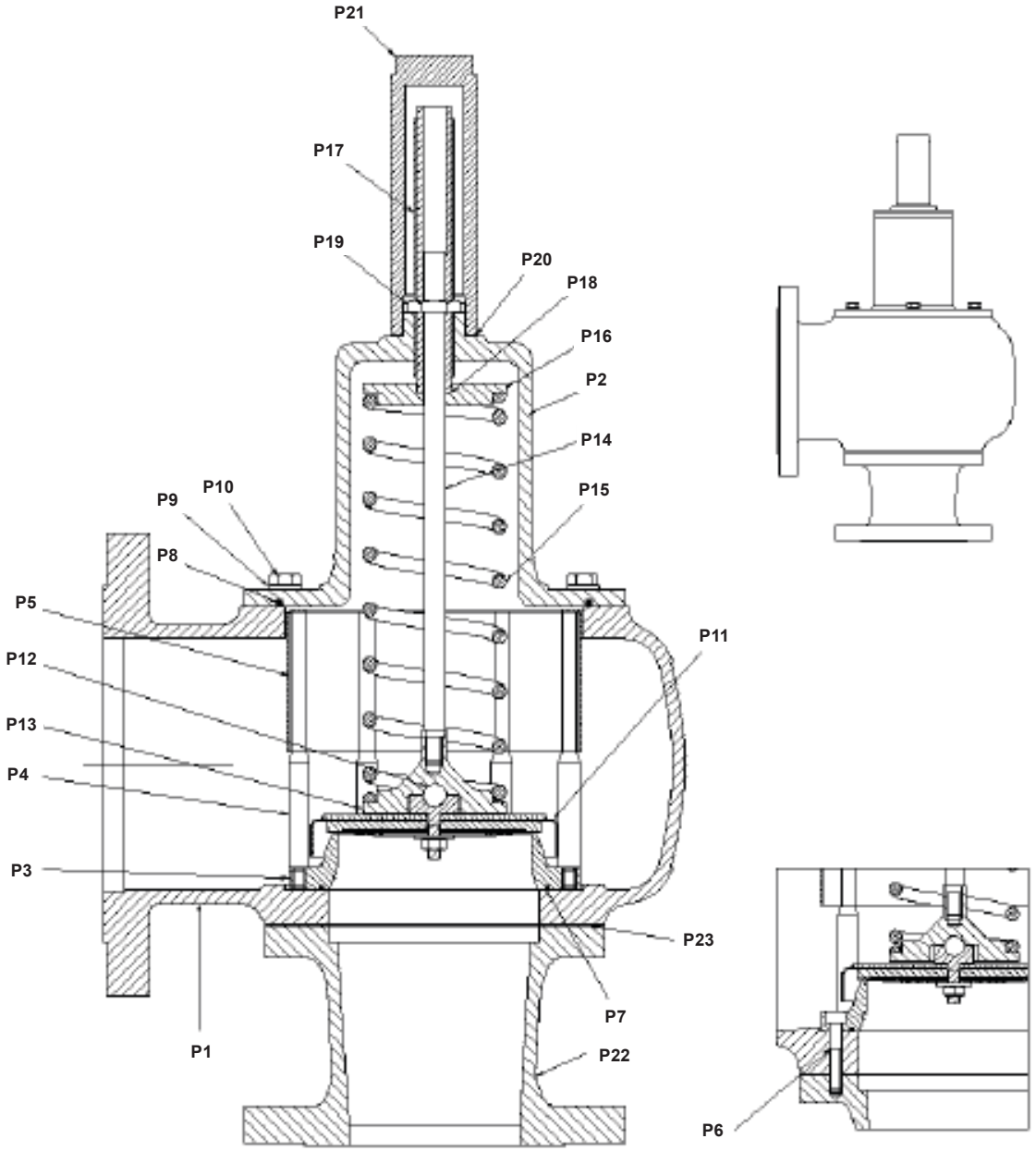
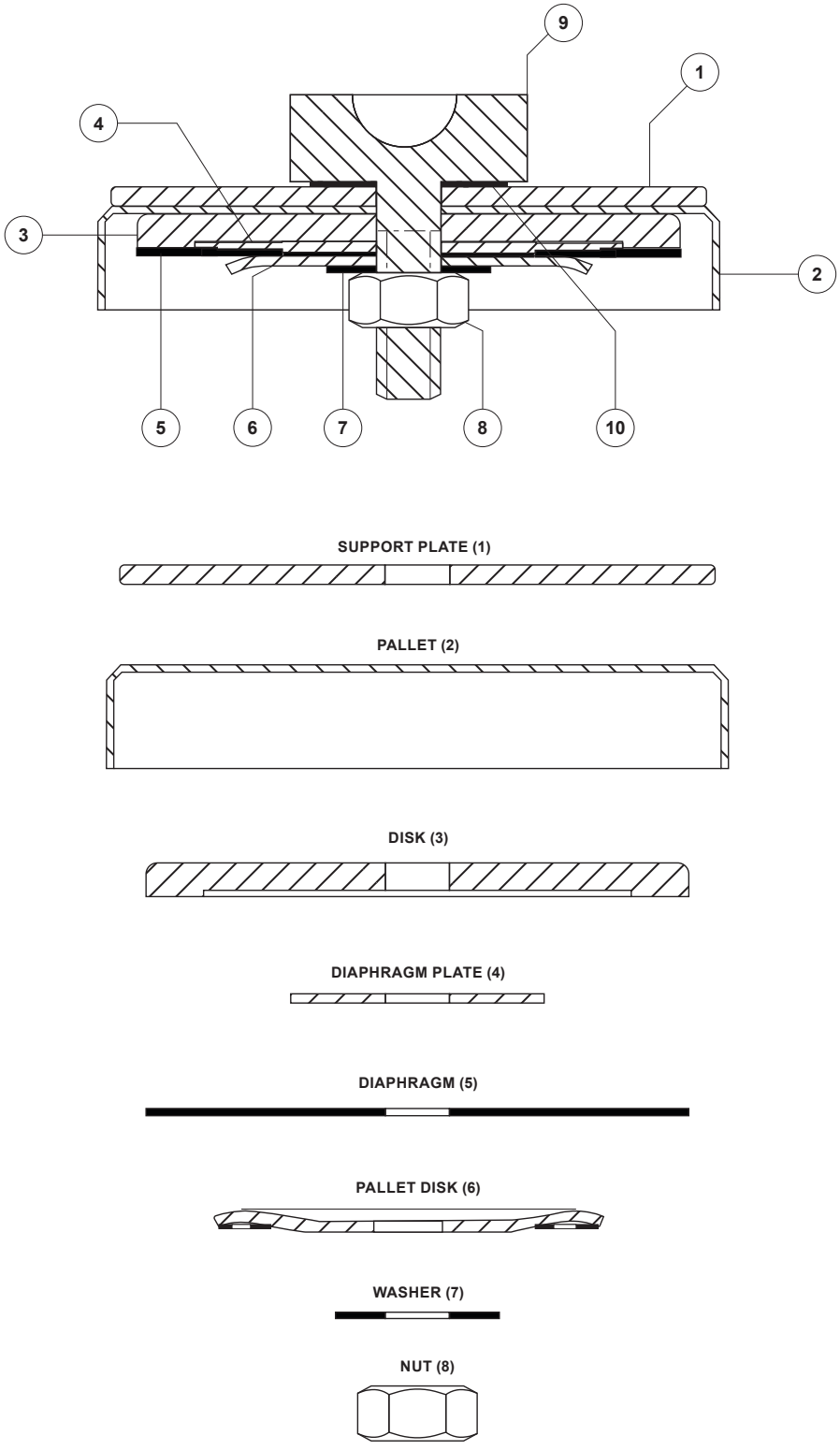


Figure 2. *Type 4142HPF Pressure Relief Valve Assembly*

Parts List

Key	Description
P1	Body
P2	Casing
P3	Seat
P4	Guide Post
P5	Shroud
P6	Cap Screw
P7	Seat O-ring
P8	Casing O-ring
P9	Casing Washer
P10	Casing Hex Set Screw
P11	Pallet Assembly
P12	Ball

Key	Description
P13	Lower Spring Plate
P14	Stem
P15	Compression Spring
P16	Upper Spring Plate
P17	Adjusting Screw
P18	Skid Ring (DN 150 / NPS 6 and larger)
P19	Locknut
P20	Cap Gasket
P21	Cap
P22	Inlet
P23	Body Gasket



NOTE: WASHER ITEM (7) NOT FITTED TO DN 50 / NPS 2 AND DN 80 / NPS 3 SIZES.

Figure 3. *Pressure Pallet Assembly*

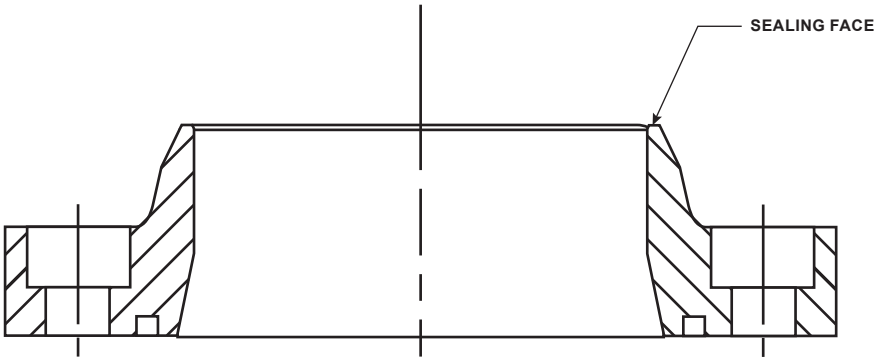


Figure 4. *Sealing Face of Valve Seat*

Table 1. *Seat Lap Band Widths*

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

General (See Figure 2)

1. Remove cap (P21), cap gasket (P20) and release locknut (P19). Remove all load from spring by removing adjusting screw (P17) complete with locknut (P19). Remove hex set screws (P10), washers (P9), casing (P2) and O-ring (P8).
2. Remove upper spring end plate (P16). For valves DN 150 / NPS 6 and larger, recover skid ring (P18) which is fitted between the adjusting screw and upper spring plate. Remove spring (P15) and stem (P14) complete with lower spring plate (P13). Remove shroud (P5), ball (P12) then lift out pallet assembly (P11).
3. Remove seat (P3) complete with guide posts (P4) by removing cap screws (P6). This will separate the upper body (P1) from the inlet (P22), (ensure upper body (P1) is adequately supported when the two bodies are separated). Remove body gasket (P23) and O-ring (P7).

Pallet Assembly (See Figure 3)

1. Remove nut (8) and washer, where used (7) to release pivot point (9) from assembly. Separate pallet disk (6), diaphragm (5), diaphragm plate (4), disk (3), pallet (2) and support plate (1). Remove pivot point gasket (10).

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 posts); however, care should be taken not to increase the width of the seat face beyond those given on Table 1. 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
- gaskets
- skid ring (if fitted)

Also discard and replace the pallet disk.

Table 2. *Replacement Parts*

DESCRIPTION	REF.	USAGE	MATERIAL	NOMINAL SIZE, DN / NPS						
				DN 50 / NPS 2	DN 80 / NPS 3	DN 100 / NPS 4	DN 150 / NPS 6	DN 200 / NPS 8	DN 250 / NPS 10	DN 300 / NPS 12
Pallet Disk(1)	Fig. 2	Pallet Assembly	Stainless steel	11182941	11182943	11182945	11182946	11183009	11183092	11183133
Diaphragm(1)	Fig. 2	<200 mbar	PTFE	11281485	11280622	11281490	11281493	11281496	11281498	11281500
		>200 mbar	PTFE	11281489	11280624	11281492	11281495	11281497	11280837	11281502
Gasket(1)	Fig. 1	Body	Gen Service Gasket	11182947	11182948	11182949	11182247	11183010	11183093	11183134
	Fig. 2	Pivot Point(1)		11272778			11405355	11272733		
	Fig. 1	Cap(1)		11411641			11411646		11411649	
O-ring	Fig. 1	Seat	Viton®	11183351	11183354	11183320	11180110	11183326	11182024	11180089
			Nitrile (NBR)	11183350	11183353	11183319	11180109	11183325	11182023	11180088
			PTFE	11183349	11183352	11183318	11180108	11183324	11182022	11180087
		Cover(1)	Viton®	11183314	11183317	11183323	11183326	11183334	11183337	11183340
			Nitrile (NBR)	11183313	11183316	11183322	11183325	11183333	11183336	11183339
			PTFE	11183312	11183315	11183321	11183324	11183332	11183335	11183338
Skid Ring(1)	Fig. 1	- - - -	PTFE	- - - - - - - - - - -			11405352	11272734	11275612	

1. Included in the Standard SGK.
Viton® is a mark owned by DuPont Polymers, Inc.

Valve Reassembly

Pallet (See Figure 3)

Assemble pivot point gasket (10), support plate (1), pallet (2), disk (3), diaphragm plate (4), diaphragm (5) and pallet disk (6), to pivot point (9) and secure using washer if fitted (7) and nut (8).

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

General (See Figure 2)

Reassemble guide posts (P4) (if removed) and O-ring (P7) to seat (P3). Fit gasket (P23) between upper body (P1) and inlet (P22); secure seat (P3) and upper body (P1) to inlet (P23) using cap screws (P6) ensuring that O-ring is not dislodged during assembly.

Reinstall pallet ensuring it slides easily between the guide posts (P4). Place ball (P12) in socket of pivot point (9).

Assemble shroud (P5) over guide posts (P4) then assemble stem (P14) complete with bottom spring plate (P13), to locate on ball (P12). Assemble spring (P15) and top spring plate (P16). For valves DN 150 / NPS 6 and larger, fit skid ring (P18) in recess of top spring plate.

Assemble casing O-ring (P8) to casing (P2) and assemble over stem (P14) securing with washers (P9) and hex set screws (P10). Assemble adjusting screw (P17) over stem (P14) and screw into casing (P2). Apply nominal load to spring and secure using locknut (P19). Assemble cap gasket (P20) and cap (P21).

Testing Set Pressure

The set pressure should be checked and if necessary, adjusted as described in Section 4.

Type 4142HPF

Webadmin.Regulators@emerson.com
Emerson.com
Facebook.com/EmersonAutomationSolutions
LinkedIn.com/company/emerson-automation-solutions
X.com/EMR_Automation

Emerson

Americas
McKinney, Texas 75069 USA
T +1 800 558 5853
+1 972 548 3574

Asia Pacific
Singapore 128461, Singapore
T +65 6777 8211

Europe
Bologna 40013, Italy
T +39 051 419 0611

Middle East and Africa
Dubai, United Arab Emirates
T +971 4 811 8100

EMERSON™