



ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

Premium performance pilot operated relief valves that maximize operating pressures, minimize emissions and provide reliable performance.



FEATURES

- **Soft Seat Design**—Provides repeatable bubble-tight performance before and after each relief cycle.
- **Metal-to-Metal Seat Design**—Provides pilot valve performance in high temperature service.
- **Bubble-Tight Seats near Set Pressure**—Allows higher system operating pressure and, therefore, maximum process output; not as sensitive to vibrational and pulsating service; reduces product loss.
- **Pop Action Available**—No main valve throttling, which helps prevent freeze-ups in cryogenic or refrigerant type services.
- **Modulating Action Available**—Minimized product loss per relief situation; reduced environmental pollution; avoids oversizing consequences; not as sensitive to inlet pressure losses as pop action.
- **Field Test Connection**—Quick, simple verification of set pressure while valve remains in service.
- **Balanced Design**—Lift unaffected by back pressure; no expensive and fragile bellows required to balance against high back pressure.
- **Full Lift at Set Pressure**—No overpressure required for full lift; allows D.O.T. installation to be set higher than Maximum Allowable Operating Pressure (MAOP) when pop action is used.
- **Replaceable Soft Seats and Seals**—All seats and seals are renewable easily and quickly; no expensive, time-consuming seat lapping required.
- All Anderson Greenwood pilot operated relief valves are DOT [49CFR192.199] and CSA [Z662] compliant.
- High Gain Modulating Action available on Series 400 pilots providing full main valve lift by 5% overpressure while minimizing product loss during relief events.
- API 526 direct spring center-to-face dimensions available for Series 200, 400, 500 and 800 pilots eliminating the need for piping modifications during upgrades.
- Full nozzle main valve available as an option for Series 200, 400 and 800.

GENERAL APPLICATION

Anderson Greenwood Pilot Operated Pressure Relief Valves (POPRVs) provide advanced, reliable and efficient overpressure protection. With a track record of more than 50 years, the product technology is designed for a wide range of applications, from basic to the most severe service conditions.

TECHNICAL DATA

Sizes:	1 x 2 in. to 10 x 14 in. (DN 25 x 50 to DN 250 x 350)
Orifices:	0.110 to 63.5 in ² (0.710 to 409.7 cm ²)
Inlet ratings:	ANSI Class 150 to 2500
Temperature range:	-423 to + 600°F (-253 to + 316°C)
Set pressures:	15 to >6170 psig (1.03 to >425.41 barg)
Code:	ASME VIII and XIII (UV Designator), DOT, CSA

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

This datasheet is divided into six primary sections, which provide step-by-step instructions that make it easy for you to select a valve type, determine the proper orifice area and order the valve:

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You can access our sizing software at: valvesizing.emerson.com

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Section 8: Ordering

Once you have chosen the appropriate valve type and size, this section explains how to select and order the specific model number.

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ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

HIGHER MAXIMUM SET PRESSURES

POPRVs are able to operate at considerably higher set pressures than is possible with spring loaded Safety Relief Valves (SRVs). In some cases one POPRV can replace multiple spring loaded SRVs, reducing capital and installation costs.

MAXIMUM SET PRESSURE COMPARISON

VALVE		ORIFICE AREA		DIRECT SPRING OPERATED		AG PILOT OPERATED	
In.	DN	in ²	cm ²	psig	barg	psig	barg
10 x 14	254 x 356*	63.50	409.7	N/A		740+	51.0+
8 x 10	200 x 250*	38.96	251.37	N/A		1480+	102.0+
8T10	200T250	26.00	167.75	300	20.7	1480+	102.0+
6R8	150R200	16.00	103.23	300	20.7	1480+	102.0+
4P6	100P150	6.38	41.16	1000	69.0	3705+	255.5+
3K4	80K100	1.83	11.86	2220	153.1	3705+	255.5+

*Full bore

LOWER HEIGHT PROFILE

Because the POPRV does not use a spring to hold the main valve seat closed, considerable height savings are achieved in the valve design. The same pilot valve is used for all main valve sizes providing significant height savings particularly on larger and higher pressure valves. This enables the POPRVs to be used in applications where space is at a premium.

HEIGHT COMPARISON

VALVE		RATING	DIRECT SPRING OPERATED		AG PILOT OPERATED		HEIGHT SAVING
In.	DN		In.	mm	In.	mm	
8 x 10	200 x 250	Class 150	57	1448	30	762	47%
6 x 8	150 x 200	Class 300	43	1092	26	660	40%
4 x 6	100 x 150	Class 300	37	940	23	584	38%
3 x 4	80 x 100	Class 600	34	864	20	508	41%
2 x 3	50 x 80	Class 600	23	584	19	483	19%

WEIGHT SAVINGS

On spring loaded SRVs, as valve size and set pressure increases, a larger spring is needed to keep the seat closed – increasing the weight of the valve. Significant weight savings are provided by the POPRV, which uses system pressure via the pilot valve to maintain seat tightness. These weight savings allow cost reductions on plant construction and, in particular, on offshore oil and gas platforms.

WEIGHT COMPARISON

VALVE		RATING	DIRECT SPRING OPERATED		AG PILOT OPERATED		WEIGHT SAVING
In.	DN		lbs	kg	lbs	kg	
8 x 10	200 x 250	Class 150	750	340.9	421	191.4	44%
6 x 8	150 x 200	Class 300	480	218.2	264	120.0	45%
4 x 6	100 x 150	Class 300	230	104.5	160	72.7	30%
3 x 4	80 x 100	Class 600	160	72.7	92	41.8	42%
2 x 3	50 x 80	Class 600	70	31.8	53	24.1	24%

Why specify pilot operated pressure relief valves?

- Resolve difficult application issues
- Reduced installation costs
- Reduced product loss
- Increased production levels
- Reduced maintenance costs
- Reduced environmental pollution
- Increased operating income

Why specify Anderson Greenwood pilot operated pressure relief valves?

More than six decades of pilot valve experience enables us to produce, supply and support pressure relief valves that:

- Assure leak-free system operation very close to PRV set pressure.
- Relieve consistently within code tolerances.
- Reseat bubble-tight after a short and stable blowdown.
- Operate through many relief cycles without maintenance.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

SELECTING A VALVE TYPE

To determine which pilot operated safety relief valve type is most appropriate for your application, please use the following guidelines:

1. In the Application Guide, note which valve types seem most appropriate for your application.
2. Read the associated descriptive and operating information in the catalog dedicated to that type of valve (Series 200, 400, 500, 700 or 800).
3. Using the formulas in Part 2, Sizing (page 23), determine the required orifice area for your service conditions and select the orifice area that suits your application.
4. If you have been able to determine a pilot operated valve type and orifice area that suits your application, refer to Part 6, Ordering (page 61), to select and order a specific model number. If you were not able to find a valve type to meet your application needs, please contact your local representative for assistance.

APPLICATION GUIDE

Options		Valve Series				
Set Pressure		200	400	500	700	800
psig	barg					
15 – 720	1.03 – 49.64 ^[1]			×		
15 – 1480	1.03 – 101.97		×			
25 – 6170	1.72 – 425.42 ^[3]	×				
50 – 1200	3.45 – 82.74				×	
1481 – 6170	102.12 – 425.42 ^[3]					×
Valve Action						
Pop		×			×	
Modulating				×		×
Service						
Gas/vapor		×	×	×	×	×
Liquid ^[2]			×	×		×
Steam				×	×	
Process Temperature						
Ambient to +1000°F	Ambient to +538°C				×	
-65 to +600°F	-54 to +315°C		×			×
-423 to +600°F	-252 to +315°C	×				
-65 to +515°F	-54 to +268°C			×		

NOTES

1. 1 x 2 in. (DN 25 x 50), 1½ x 2 in. (DN 40 x 50) and 1½ x 3 in. (DN 40 x 80) Type 546 has 25 psig (1.72 barg) minimum set.
2. Use Type 249, 259, 269 for cryogenic liquid (set pressure range for this valve type is 25 to 1440 psig (1.72 to 99.3 barg)).
3. Higher pressures available to special order.
4. Not all valves are available for service at the extreme limits for both temperature and pressure simultaneously.

ANDERSON GREENWOOD SERIES 200 PILOT OPERATED RELIEF VALVE

SERIES 200 POP ACTION SAFETY VALVE

The Series 200 is a pop action safety valve with non-flowing pilot that provides system overpressure protection from 25 to over 6170 psig (1.72 to over 425.5 barg). Since its 1966 introduction, it has been refined continuously and remains the standard against which all other pilot operated valves are compared.

GENERAL APPLICATION

The Series 200 valve is well suited for gas, vapor and many mixed phase services, including dirty and/or wet applications.

FEATURES

- Increased system output with total valve tightness to at least 95% of set pressure enabling operation nearer set pressure without valve leakage.
- Balanced design ensures proper valve operation and lift unaffected by back pressure, eliminating the need for costly and fragile metal bellows.
- Unique field test capability allows accurate set pressure verification with valve in service. No system isolation block valve required.
- Soft seats greatly extend service life and reduce maintenance cost, eliminating expensive metal seat lapping.
- Reduced product loss and pollution through soft seats for premium tightness before and after relief cycles.
- Suited for dirty or wet service with non-flowing pilot minimizing entrance of dirt and formation of hydrates. Low velocities ensure most particles drop out upstream of pilot inlet screen.
- Full lift at set pressure ensures no overpressure needed to reach full valve capacity.
- Rugged bracket pilot mounting protects against vibration and careless handling.
- External, independent blowdown adjustment provides easy, accurate and repeatable settings, negates costly valve removal and reduces system downtime.
- ASME Section VIII and Section XIII (UV Designator) Code Stamp for gas service and CE mark to European PED 2014/68/EU.

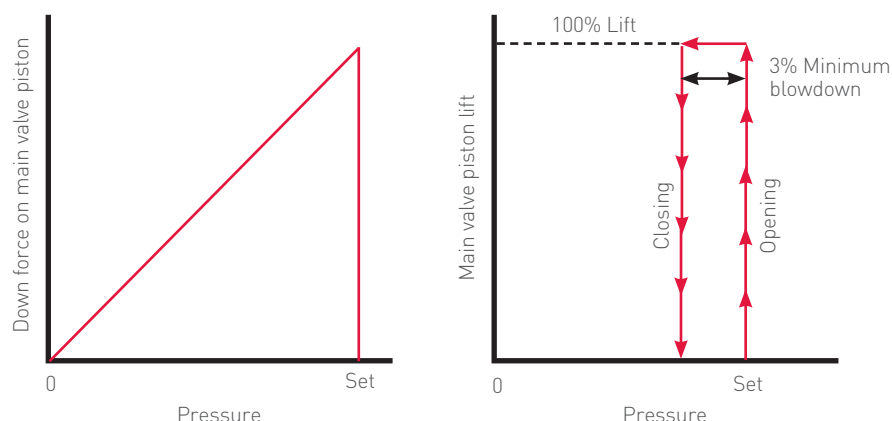


TECHNICAL DATA

Sizes:	1 x 2 in. to 10 x 14 in. (DN 25 x 50 to DN 250 x 350)
Orifices:	0.110 to 63.5 in ² (0.710 to 409.7 cm ²)
Inlet ratings:	ANSI Class 150 to 2500
Temperature range:	-423 to + 600°F (-253 to + 316°C)
Set pressures:	25 to >6170 psig (1.72 to >425.52 barg) Up to 10,500 psig (724 barg) on request
Code:	ASME VIII and XIII (UV Designator), DOT, CSA

ANDERSON GREENWOOD SERIES 200 PILOT OPERATED RELIEF VALVE

FIGURE 1



OPERATION

In the normal closed position, full system pressure is sensed at the pressure pick-up in the main valve inlet. This pressure is transmitted through the pilot and into the main valve dome (volume above the main valve piston). Because the piston seal area is greater than the main seat sealing area, the net force on the piston is downward, keeping the valve tightly closed. The higher the system pressure, the greater the downward force on the piston - exactly the opposite of direct spring operated valves.

When the pilot senses set pressure, its relief seat snaps open and the blowdown seat snaps closed simultaneously, venting the dome pressure through the pilot relief seat to atmosphere. This allows the main valve to open fully at set pressure.

The blowdown seat is held tightly closed during the relief cycle until the desired system blowdown is achieved, at which time the blowdown seat snaps open and the relief seat snaps closed simultaneously. This fully re-pressures the dome to system pressure and closes the main valve.

The valve reseal pressure is dependent on the lift of the spindle off the relief seat. Higher spindle lift results in more spring compression and a higher spindle closing force stored in the pilot spring; the higher the lift, the shorter the blowdown (higher valve reseal pressure). The spindle lift, and thus blowdown, is adjustable externally by raising or lowering the pilot's blowdown assembly.

SPECIFICATIONS

- Non-flowing pilot.
- Replaceable main valve seat located on piston maximizes seat sealing ability.
- Vertical pilot mounting.
- Options mounted on main valve with heavy duty brackets.
- Optional cartridge type pilot filter for extremely dirty services.
- Remote sense option available at no added cost.
- Field replaceable main valve nozzle.
- Lettered orifice valves meet API standard 526 dimension requirements.

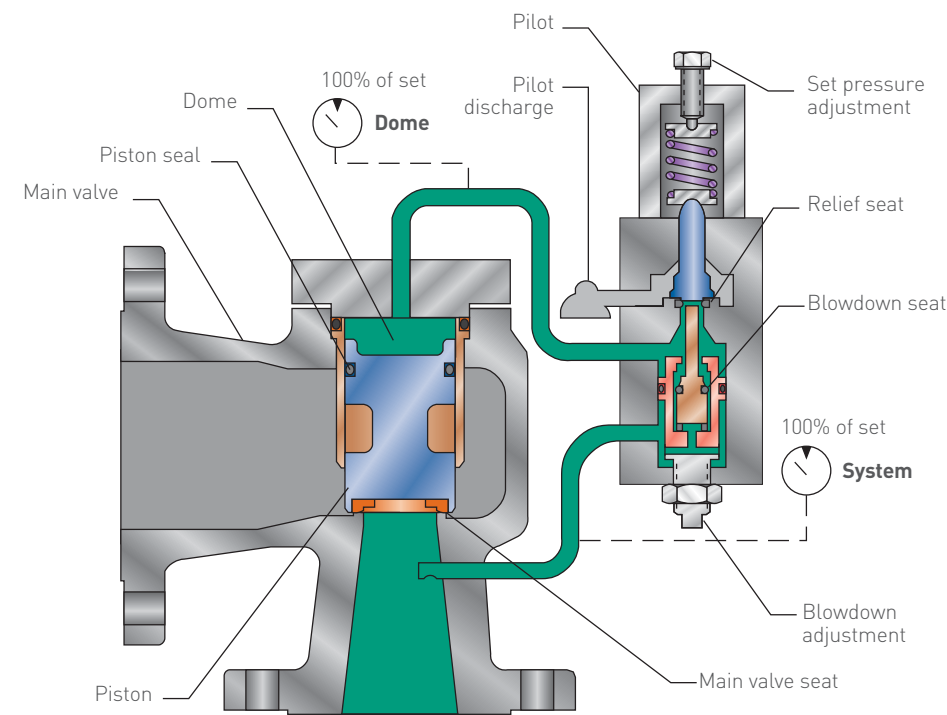
OPTIONAL ACCESSORIES

- Field test connection
- Backflow preventer
- Pilot supply filter
- Pressure spike snubber (gas)
- Remote pressure sense connection
- Remote valve lift indicator
- Manual unloader
- Pilot lift lever
- Remote unloader
- NACE trim (MR0175/ISO 15156:2015)

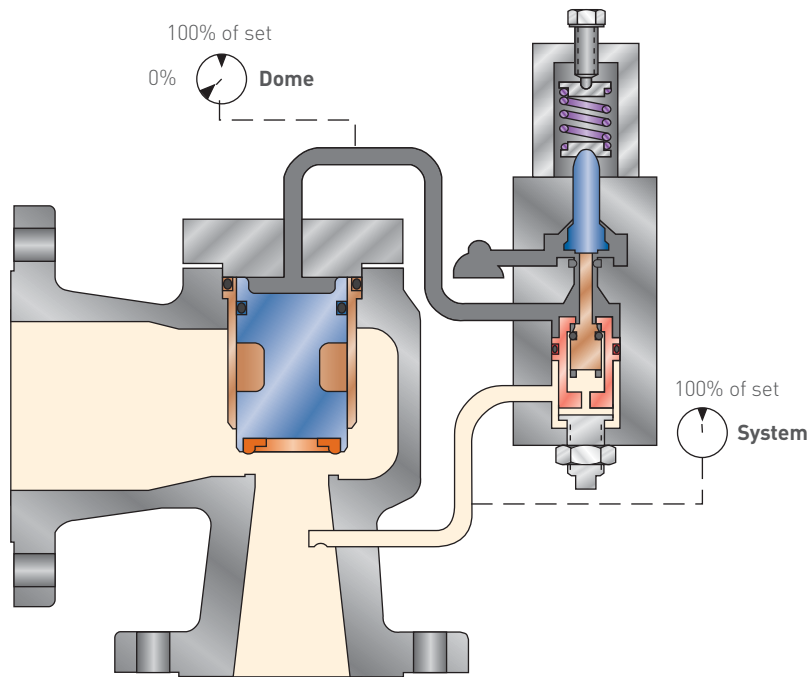
ANDERSON GREENWOOD SERIES 200 PILOT OPERATED RELIEF VALVE

FIGURE 2

NORMAL CLOSED POSITION



RELIEVING POSITION



ANDERSON GREENWOOD SERIES 400 PILOT OPERATED RELIEF VALVE

SERIES 400 MODULATING SAFETY RELIEF VALVE

The Series 400 modulating valve, with non-flowing pilot, incorporates an advanced design in pilot operated valves. Under process conditions, main valve can be seat tight to as high as 98% of set pressure. The main valve lifts proportionally according to required flow (relief demand), restricting product loss to only the mass required to be relieved to prevent process pressure from exceeding the code allowance.

GENERAL APPLICATION

The Series 400 is well suited for gas and/or liquid services, including dirty and/or wet services. The modulating action is strongly preferred for liquid relief because it minimizes the destructive effects of 'liquid hammer'.

FEATURES

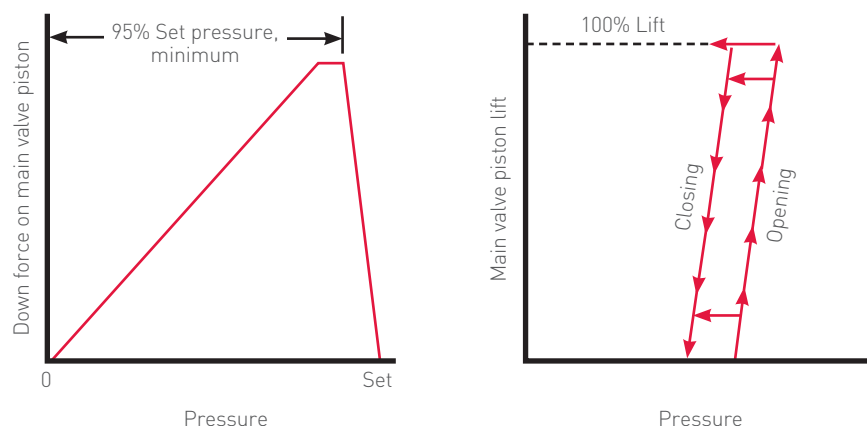
- Increased system output with main valve seat tightness to 98% of set pressure without leakage.
- Balanced design ensures proper valve operation and lift unaffected by back pressure, eliminating the need for costly and fragile metal bellows.
- Unique field test capability allows accurate set pressure verification with valve in service. No system isolation block valve required.
- Soft seats greatly extend service life and reduce maintenance cost, eliminating expensive metal seat lapping.
- Reduced product loss and pollution through soft seats for premium tightness before and after relief cycles. Modulating action relieves minimum product to prevent overpressure.
- Suited for dirty or wet service with non-flowing pilot minimizing entrance of dirt and formation of hydrates. Low velocities ensure most particles drop out upstream of pilot inlet screen.
- Modulating action minimizes flow and resultant noise during normal system upset, reducing noise abatement costs.
- Rugged bracket pilot mounting protects against vibration and careless handling.
- Easy, single set pressure adjustment is accurate and dependable.
- Minimal blowdown as the valve reseats slightly below set pressure.
- ASME Section VIII and Section XIII (UV Designator) Code Stamp for gas and liquid service and CE mark to European PED 2014/68/EU.
- High Gain Modulating Action option available on the Series 400 pilot provides full main valve lift by 5% overpressure while minimizing product loss during relief events in DOT applications.



TECHNICAL DATA

Sizes:	1 x 2 in. to 10 x 14 in. (DN 25 x 50 to DN 250 x 350)
Orifices:	0.110 to 63.5 in ² (0.710 to 409.7 cm ²)
Inlet ratings:	ANSI Class 150 to 600
Temperature range:	-65 to +600°F (-54 to +316°C)
Set pressures:	15 to 1480 psig (1.03 to 102 barg)
Code:	ASME VIII and XIII (UV Designator), DOT, CSA

FIGURE 3



OPERATION

With no system pressure, the pilot inlet seat is open and the outlet seat is closed. As pressure is admitted to the main valve inlet, it enters the pilot through a filter screen. Pressure is then transmitted through passages in the feedback piston, past the inlet seat, into the main valve dome, causing the main valve piston to remain closed.

As system pressure increases and approaches valve set pressure, it acts upward on the sense element (diaphragm/piston), with the feedback piston also moving upward to close the inlet seat.

This seals in the main valve dome pressure at this point because the outlet seat is also closed. A small, further increase in system pressure opens the outlet seat, partially venting the main valve dome pressure. This reduced dome pressure acts on the unbalanced feedback piston to reduce piston lift, 'locking in' the dome pressure. Therefore, at any stable inlet pressure there will be no pilot flow (i.e. zero leakage).

As inlet pressure rises above set pressure, dome pressure reduction will provide modulating action of the main valve piston proportional to the process upset. Responding to system pressure, the spool/feedback piston combination will move alternately to allow pressure in the main valve dome to increase or decrease. This moves the main valve piston to the exact lift that will keep system pressure constant at the required flow. Full main valve lift, and therefore full flow, is achieved with relatively little overpressure. As system pressure decreases below set pressure, the feedback piston moves downward and opens the inlet seat to admit system pressure to the dome. This closes the main valve. The pilot exhaust is always discharged to the main valve outlet.

For Natural Gas DOT applications, the High Gain pilot option increases the effective gain of the pilot, increasing the proportional response of the main valve to process upsets. This results in a more rapid venting of the dome pressure, reducing the required overpressure to achieve full lift and shortening the modulating action. This option is currently available for gas transportation and distribution applications from 15 psig to 1480 psig.

SPECIFICATIONS

- Non-flowing pilot.
- Replaceable main valve seat, located on piston to maximize seat sealing ability.
- Feedback mechanism in pilot, independent of primary pressure sensing mechanism, to ensure smooth modulation of main valve.
- Set point indicator button for field test capability.
- Remote sense option at no added cost.
- Optional cartridge type pilot filter for extremely dirty services.
- Field replaceable main valve nozzle.
- Lettered orifices meet API standard 526 dimension requirements.

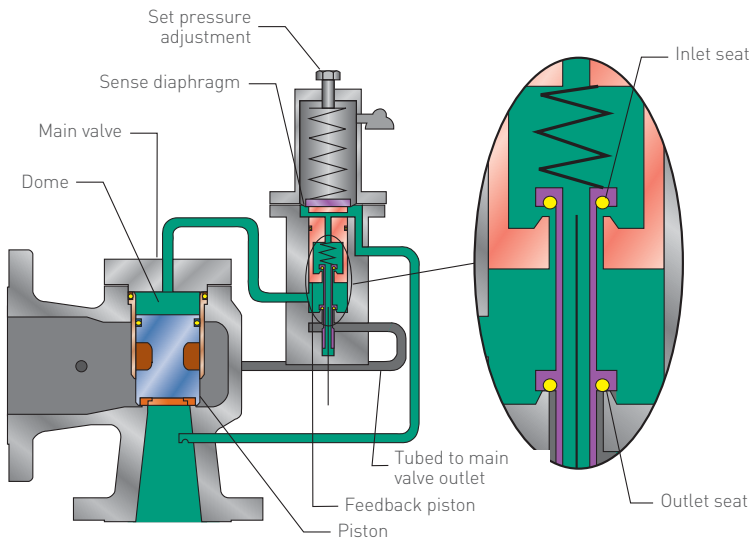
OPTIONAL ACCESSORIES

- Field test connection with indicator
- Backflow preventer
- Pilot supply filter
- Pressure spike snubber (gas)
- Remote pressure sense connection
- Remote valve lift indicator
- Manual unloader
- Pilot lift lever
- Remote unloader
- NACE trim (MR0175/ISO 15156:2015)
- High Gain Pilot

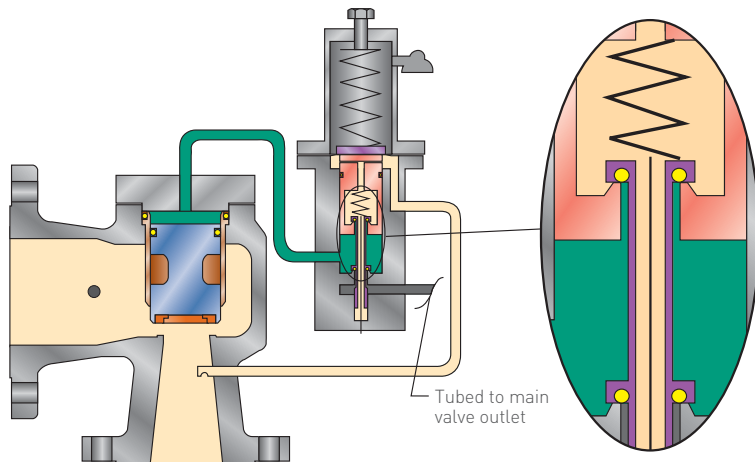
ANDERSON GREENWOOD SERIES 400 PILOT OPERATED RELIEF VALVE

FIGURE 4

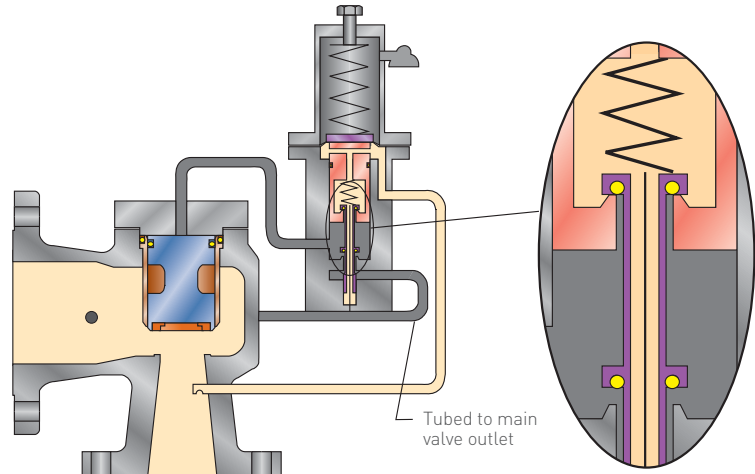
BELOW SET PRESSURE WITH MAIN VALVE CLOSED



AT OR SLIGHTLY ABOVE SET PRESSURE MAIN VALVE PARTIALLY OPEN AND MODULATING



ABOVE SET PRESSURE WITH MAIN VALVE FULLY OPEN



ANDERSON GREENWOOD SERIES 500 PILOT OPERATED RELIEF VALVE

SERIES 500 MODULATING SAFETY RELIEF VALVE

The Series 500 is a modulating, soft-seated pilot operated valve offering premium tightness with the ability to handle temperatures from -65 to 515°F (-54 to 268°C). It is designed to decrease leakage associated with metal-seated safety relief valves under extreme operating temperature conditions. The soft seat in its main valve is more resistant to particulate damage than a metal seat, has a longer service life and can be replaced quickly while the valve body remains installed in the line.

Additionally, its unique design enables the main valve to be tight at pressures up to set point. After relieving and reseating, it stays bubble-tight, cycle after cycle.

GENERAL APPLICATION

Applications for the Series 500 include hot water, steam (ASME Section VIII and XIII Unfired Pressure Vessels), hot hydrocarbon vapors or liquids and corrosive services.

FEATURES

- Increased system output with total valve tightness to 95% of set pressure without leakage.
- All plastic seats and seals provide chemical compatibility with the lading fluid.
- Balanced design ensures proper valve operation and lift unaffected by back pressure, eliminating the need for costly and fragile metal bellows.
- Unique field test capability allows accurate set pressure verification with valve in service. No system isolation block valve required.
- Resilient seats greatly extend service life and reduce maintenance cost, eliminating expensive metal seat lapping.
- Reduced product loss and pollution through soft seats for premium tightness before and after relief cycles.
- Modulating action minimizes flow and resultant noise during normal system upset, reducing noise abatement costs.
- Easy, single set pressure adjustment is accurate and dependable.
- ASME Section VIII and Section XIII (UV Designator) Code Stamp for steam, gas and liquid service and CE mark to European PED 2014/68/EU.

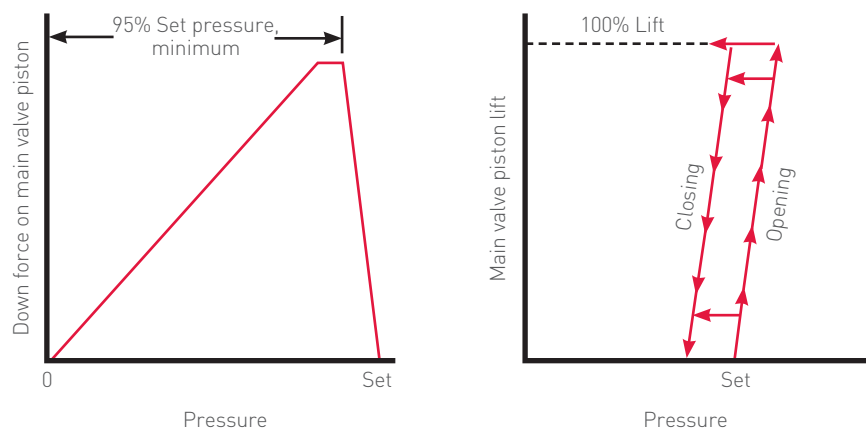


TECHNICAL DATA

Sizes:	1½ x 2 in. to 10 x 14 in. (DN 40 x 50 to DN 250 x 350)
Orifices:	0.110 to 63.5 in² (0.710 to 409.7 cm²)
Inlet ratings:	ANSI Class 150 to 600
Temperature range:	-65 to +515°F (-54 to +268°C)
Set pressures:	15 to 720 psig (1.03 to 49.6 barg)
Code:	ASME VIII and XIII (UV Designator)

ANDERSON GREENWOOD SERIES 500 PILOT OPERATED RELIEF VALVE

FIGURE 5



OPERATION

In normal operation, the system pressure acts on the area contained by the main valve seat at the bottom of the free-floating differential area piston and on the top of the piston. As the top of the piston is larger than the bottom (seat area), there is a large downward net force holding the piston closed. Under static conditions, the seating force increases as the system pressure increases and approaches set point.

When the set pressure is reached, the pilot opens and partially depressurizes the dome. This reduces the force on the top of the piston to the point where the upward force on the seat area can overcome the reduced downward loading. This causes the piston to lift, resulting in modulated flow through the main valve.

When the relief demand has been satisfied, the pilot closes. Full system pressure is diverted to the dome and the piston moves downward, closing the main valve. The pilot exhaust is always discharged to the main valve outlet.

In the larger Series 500 valves, a patented, pressure-responsive piston drag system, with a wedge ring that creates a pressure-actuated sliding friction force between the piston and liner, prevents resonant chatter and the severe valve and/or piping damage it can cause.

SPECIFICATIONS

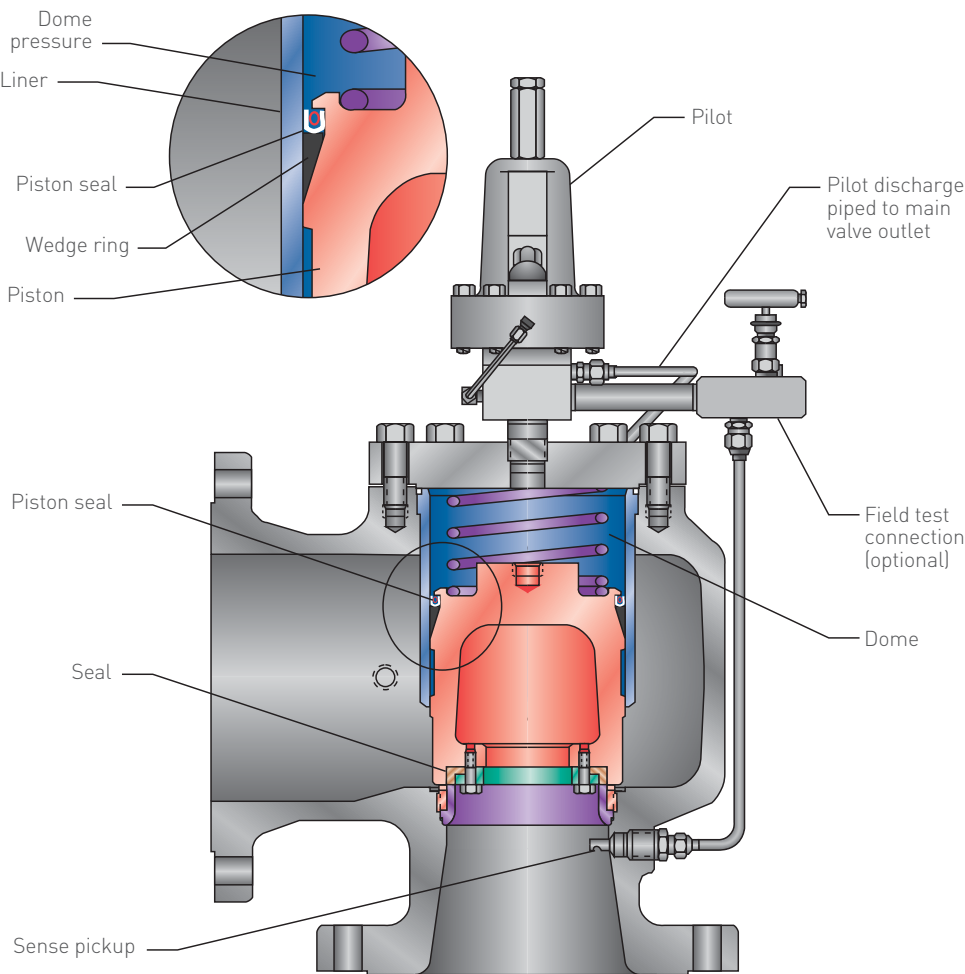
- Durable but replaceable Polytetrafluoroethylene (PTFE) seat in main valve, located on piston to maximize seat sealing ability. A totally captive seat design eliminates seat extrusion at elevated temperatures.
- PTFE/Polyether ether ketone (PEEK) seals throughout main valve and pilot for optimum chemical resistance, typically in boiler feed water.
- Dual diaphragm pilot for minimum first leak-to-relief pressure.
- Set point indicator button option for field test capability.
- Field replaceable main valve nozzle.
- Remote sense option at no added cost.
- Lettered orifice valves meet API standard 526 dimension requirements.

OPTIONAL ACCESSORIES

- Field test connection
- Field test indicator
- Backflow preventer
- Pilot supply filter
- Remote pressure sense connection
- Remote valve lift indicator
- Manual unloader
- Pilot lift lever
- Remote unloader
- NACE trim (MR0175/ISO 15156:2015)

ANDERSON GREENWOOD SERIES 500 PILOT OPERATED RELIEF VALVE

FIGURE 6



ANDERSON GREENWOOD SERIES 700 PILOT OPERATED RELIEF VALVE

SERIES 700 POP ACTION SAFETY VALVE

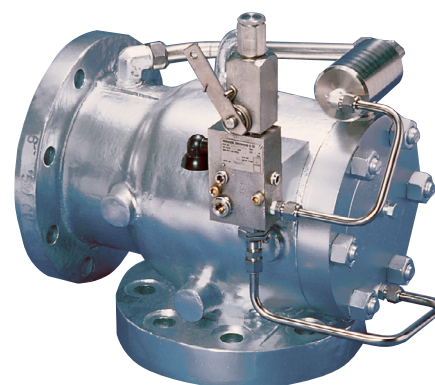
The Series 700 is an all metal seated pop action pilot and main valve that extends the use of pilot technology to temperatures up to 1000°F (538°C). It is suitable for steam and/or gas service applications at pressures to 1200 psig (82.8 barg).

GENERAL APPLICATION

The Series 700 is suitable for steam and/or gas service applications at temperatures up to 1000°F (538°C) and pressures to 1200 psig (82.8 barg).

FEATURES

- All metal-to-metal seating surfaces for high temperature service and enhanced chemical compatibility.
- Patented flexible disc reduces impact wear while increasing seat tightness.
- Dampening chambers control opening and closing response, increasing valve cycle life.
- Non-flowing pilot reduces seat wear and minimizes entrance of dirt and particulates.
- Remote sense option available at no added cost.
- Easily adjustable blowdown between 3% and 15% eliminates the need for upper and lower blowdown rings and pins, saving time, parts and costs.
- ASME Section VIII and Section XIII (UV Designator) Code Stamp for steam and gas services.
- Unique field test capability allows accurate set pressure verification with valve in service with no system isolation block valve or rupture disc required.
- Patented manifolded dual pilots option for maximum operating reliability.



TECHNICAL DATA

Sizes:	2 x 3 in. to 8 x 10 in. (DN 50 x 80 to DN 200 x 250)
Orifices:	0.503 to 26 in ² (3.245 to 167.7 cm ²)
Inlet ratings:	ANSI Class 150 to 600
Temperature range:	-423 to +1000°F (-253 to +538°C)
Set pressures:	to 1200 psig (82.8 barg)
Code:	ASME VIII and XIII (UV Designator)

ANDERSON GREENWOOD SERIES 700 PILOT OPERATED RELIEF VALVE

STEAM SERVICE

In the closed position, when operating below set point, the valve internal pressure is equal to the system pressure and the piston is pressure balanced. System pressure is directed to three key areas of the valve:

1. The dome, via the dome charging orifice
2. The pilot, via the integral pressure sensing connection and the external pilot inlet sensing line
3. The unloader, via the sensing line connections from the pilot dome and the integral sensing connection from the dome through the cap

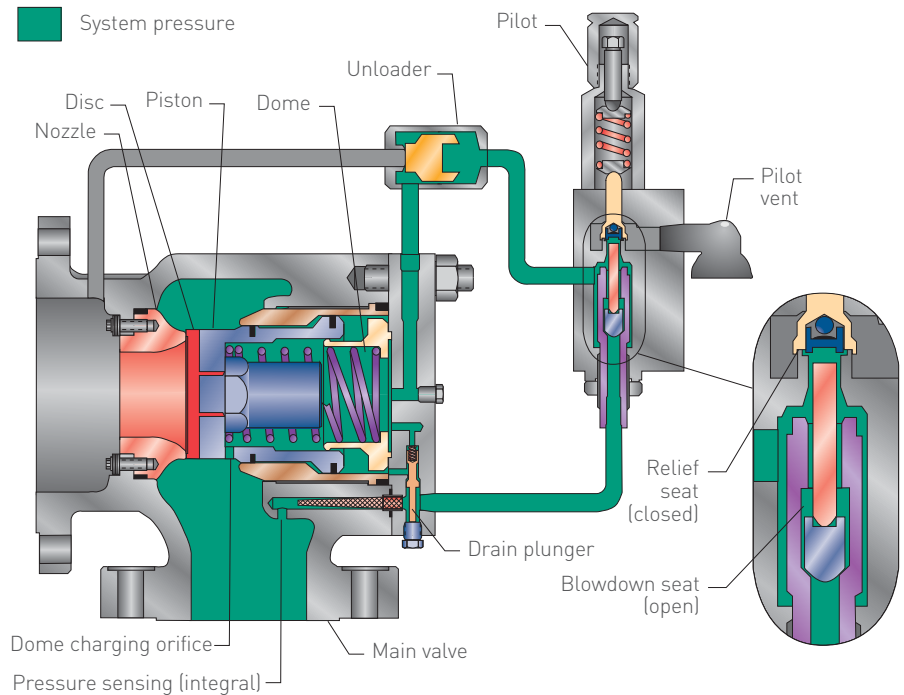
The seating force is produced by system pressure acting on the internal exposed disc surface area. As system pressure increases, so does the seating force, providing maximum seat tightness up to set pressure when the valve opens.

When system pressure reaches set point and overcomes the pilot spring force, the pilot pops open and sets into motion four key reactions:

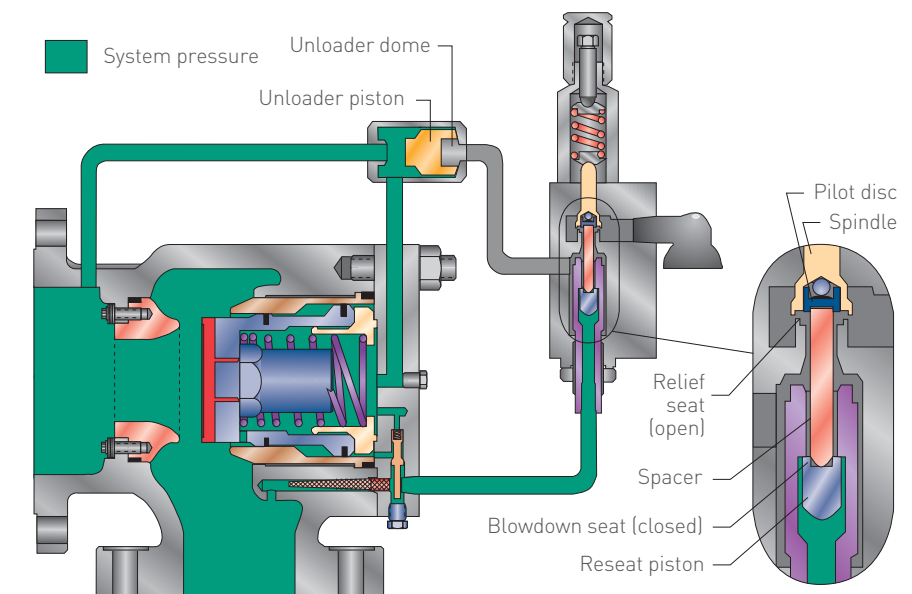
1. The normally open reseal piston moves into full lift and closes against the blowdown seat preventing further system pressure from flowing through the pilot.
2. Unloader dome pressure is vented through the pilot vent to atmosphere. With the internal pilot pressure relieved, the pilot spring now senses system overpressure in the pilot inlet sensing line via the spindle-disc-spacer rod-reseat piston.
3. The venting of unloader dome pressure creates a pressure imbalance which moves the unloader piston to the open position. Main valve dome pressure is vented, via the unloader, into the main valve outlet and the main valve dome pressure drop backseats the drain plunger, preventing system pressure from charging the dome.
4. The depressurisation of the piston dome pressure produces a pressure imbalance which moves the piston/disc assembly off the nozzle seat. As the media begins to exit through the valve outlet, the downstream disc surface area is subjected to system overpressure and the piston/disc assembly goes into full lift instantaneously.

FIGURE 7
Steam

NORMAL CLOSED POSITION



RELIEVING POSITION



ANDERSON GREENWOOD SERIES 700 PILOT OPERATED RELIEF VALVE

STEAM SERVICE (CONTINUED)

When system overpressure has been fully relieved, the pilot spring closes the pilot disc onto the pilot seat. The main valve now goes into the reseal phase, setting into motion the four key reactions detailed previously in reverse:

1. The pilot disc-spacer rod pushes the reseal piston off the blowdown seat and the internals of the pilot spring-spindle disc assembly once again sense system pressure.
2. With the pilot closed and the pilot discharge vent isolated, system pressure is now directed to the unloader dome.
3. Recharging the unloader dome causes its piston to close and stops the depressurisation of the piston dome pressure.
4. System pressure is now charging the piston dome via the dome charging orifice and the pressure imbalance closes the piston/disc assembly.

With the main disc closed and outlet pressure on the disc eliminated, the system pressure acting on the internal exposed area of the disc re-establishes maximum seat tightness.

AIR, GAS OR VAPOR SERVICE

For air, gas and vapor service, the assembly of the main valve and pilot is modified for valves 4 x 6 in. (DN 100 x 150) and smaller as follows:

1. The unloader is deleted and the pilot dome connected directly to the cap.
2. The unloader discharge port in the valve outlet is plugged.
3. The dome charging orifice in the piston is deleted.

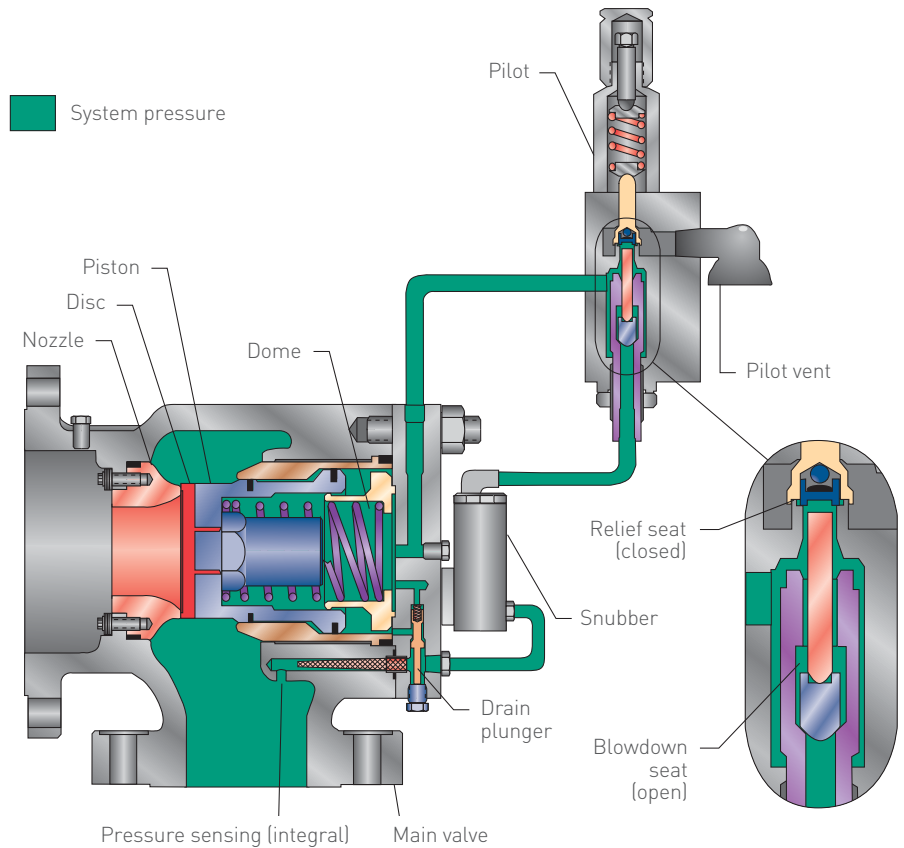
The operation of the main valve and pilot in air, gas and vapor service is the same as the steam valve.

The pilot is able to vent and depressurize the main dome with sufficient speed to provide proper opening and closing performance without the use of an unloader. For mixed phase flow, contact your sales representative to determine if an unloader is required.

FIGURE 8
Air/Gas/Vapor

NORMAL CLOSED POSITION

For 6 x 8 in. (DN 150 x 200) and 8 x 10 in. (DN 200 x 250) valves, the unloader and volume bottle is utilized to optimize the performance and a snubber is installed to the pilot inlet to dampen system pulsations.



ANDERSON GREENWOOD SERIES 700 PILOT OPERATED RELIEF VALVE

SPECIFICATIONS

- Non-flowing pilot.
- Vertical pilot mounting.
- Externally adjustable blowdown.
- Field replaceable nozzle.
- Pressure spike snubber (air/gas/vapor service) for 6 in. and larger
- ANSI pressure class 150, 300 and 600.
- All metal seats/seals.

OPTIONAL ACCESSORIES

- Field test connection
- Pilot supply filter
- Remote pressure sense connection
- Remote valve lift indicator
- Manual unloader
- Pilot lift lever
- Remote unloader
- Manifolded dual pilot
- Manifolded single pilot

MANIFOLDED DUAL PILOTS* OPTION

- For maximum operating reliability, it is recommended to use dual pilots with a built-in switching mechanism. The manifold dual pilot provides an 'on line' spare pilot.
- The safety lock allows the operator to isolate only one pilot while the active pilot protects the system.
- In-service testing and replacement of pilot under operating conditions with full system protection.

* Patented

FIGURE 12

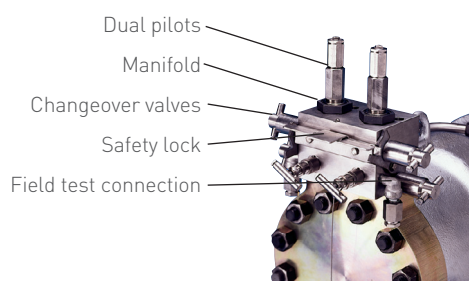


FIGURE 9

Class 150 Design Scope

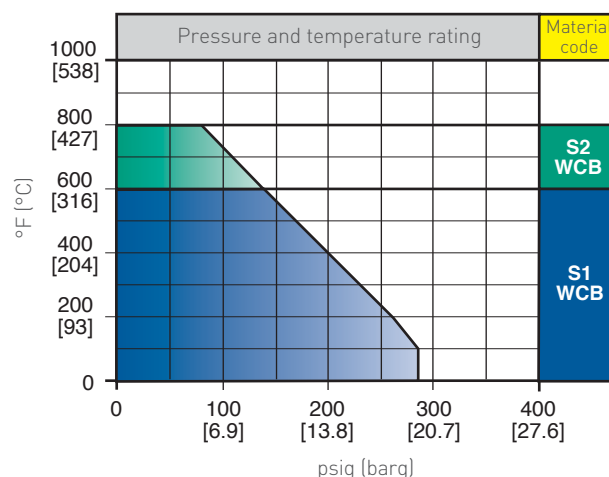


FIGURE 10

Class 300 Design Scope

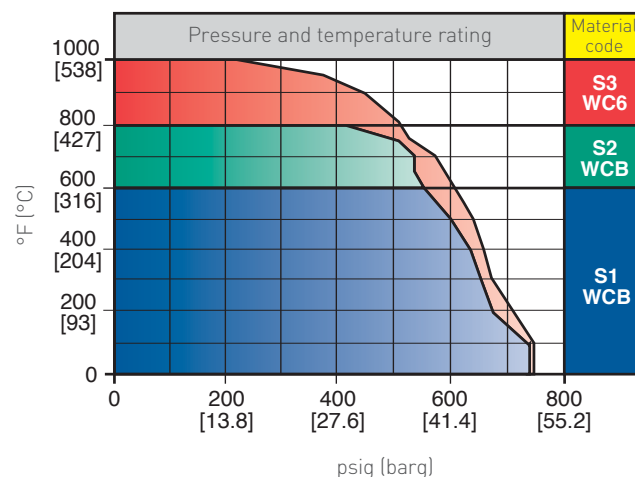
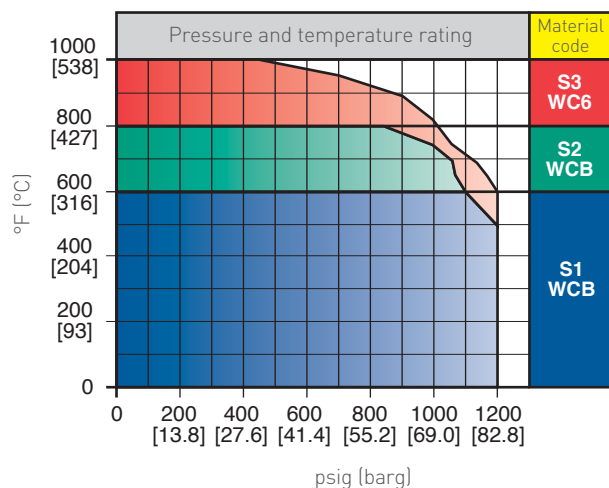


FIGURE 11

Class 600 Design Scope



ANDERSON GREENWOOD SERIES 800 PILOT OPERATED RELIEF VALVE

SERIES 800 MODULATING SAFETY RELIEF VALVES

The Series 800 modulating valve utilizes the most advanced design in pilot operated valves. The non-flowing, modulating pilot can be set at pressures up to 6170 psig (425.41 barg). Under these process conditions, the pilot and main valve can be tight up to 98 percent of set pressure. As the pilot is modulating, the main valve lifts proportionally according to required flow (relief demand), restricting product loss to the mass required to prevent the process pressure from exceeding the code allowance.

The pilot provides stable lift even on hard, liquid systems due to its unique trim.

GENERAL APPLICATION

The Series 800 can be used in liquids, gases or mixed phase lading fluids, including dirty and/or wet services.

FEATURES

- Increased system output with total valve tightness to 98% of set pressure without leakage.
- Balanced design ensures proper valve operation and lift unaffected by back pressure, eliminating the need for costly and fragile metal bellows.
- Unique field test capability allows accurate set pressure verification with valve in service. No system isolation block valve required.
- Soft seats greatly extend service life and reduce maintenance cost, eliminating expensive metal seat lapping.
- Reduced product loss and pollution through soft seats for premium tightness before and after relief cycles. Modulating action relieves minimum product to prevent overpressure.
- Suitable for dirty or wet service with non-flowing pilot minimizing entrance of dirt and formation of hydrates. Low velocities ensure most particles drop out upstream of pilot inlet screen.
- Modulating action minimizes flow and resultant noise during normal system upset, reducing noise abatement costs.
- Rugged bracket pilot mounting protects against vibration and careless handling.
- Easy, single set pressure adjustment is accurate and dependable.
- ASME Section VIII and Section XIII (UV Designator) Code Stamp for gas and liquid service and CE mark to European PED 2014/68/EU.



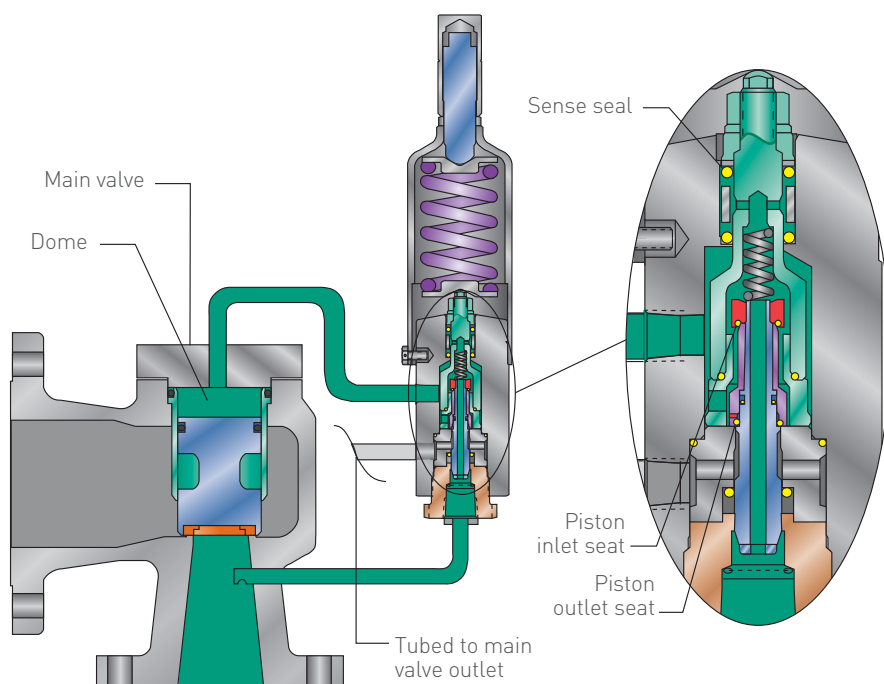
TECHNICAL DATA

Sizes:	1 x 2 in. to 4 x 6 in. (DN 25 x 50 to DN 100 x 150)
Orifices:	0.110 to 9.489 in ² (0.710 to 61.21 cm ²)
Inlet ratings:	ANSI Class 900 to 2500
Temperature range:	-65 to +600°F (-54 to +316°C)
Set pressures:	1,481 to 6,170 psig (102.11 to 425.41 barg) Up to 7,600 psig (524 barg) on request
Code:	ASME VIII and XIII (UV Designator), DOT, CSA

ANDERSON GREENWOOD SERIES 800 PILOT OPERATED RELIEF VALVE

FIGURE 13

BELOW SET PRESSURE WITH MAIN VALVE CLOSED



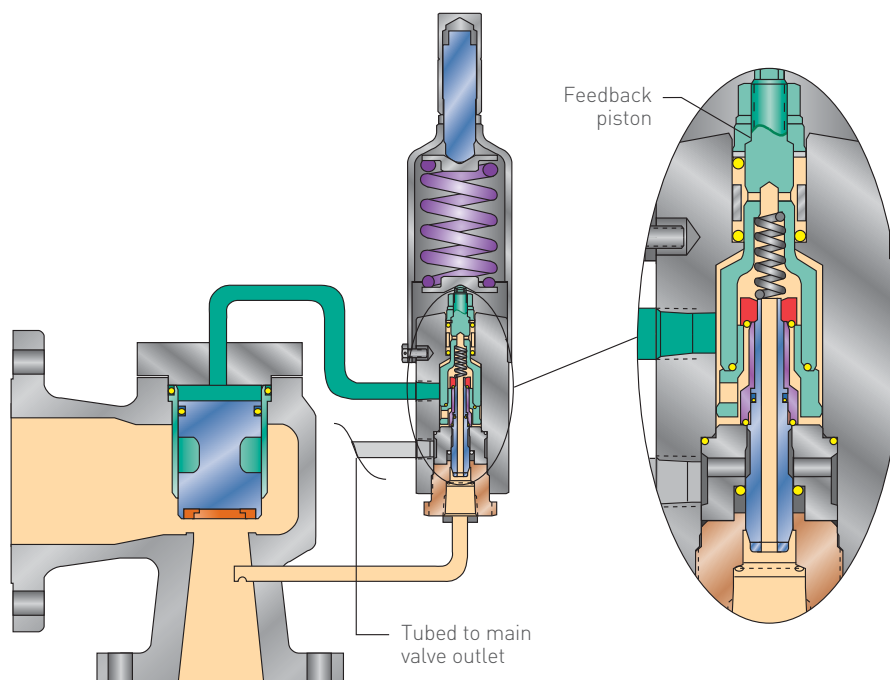
OPERATION

With no system pressure, the pilot inlet seat is open and the outlet seat is closed. As pressure is admitted to the main valve inlet, it enters the pilot through a filter screen. Pressure is then transmitted through passages in the feedback piston, past the inlet seat, into the main valve dome, which causes the main valve piston to remain closed.

As system pressure increases and approaches valve set pressure, it acts upwards on the sense O-ring seal, with the feedback piston moving upward to close the inlet seat. This seals in the main valve dome pressure as, at this point, the outlet seat is also closed. A further small increase in system pressure opens the outlet seat, partially venting the main valve dome pressure. This reduced dome pressure acts on the unbalanced feedback piston to reduce feedback piston lift, tending to 'lock in' the dome pressure. Therefore, at any stable inlet pressure, there will be no pilot flow (i.e., zero leakage).

As inlet pressure rises above set pressure, dome pressure reduction will provide modulating action of the main valve piston proportional to the process upset. The spool/feedback piston combination will move, responding to system pressure, alternately to allow pressure in the main valve dome to increase or decrease. This moves the main valve piston to the exact lift that will keep system pressure constant at the required flow. Full main valve lift, and therefore full flow, is achieved with relatively little overpressure. As system pressure decreases below set pressure, the feedback piston moves downward and opens the inlet seat to admit system pressure to the dome, closing the main valve. The pilot exhaust is always discharged to the main valve outlet.

AT OR SLIGHTLY ABOVE SET PRESSURE MAIN VALVE PARTIALLY OPEN AND MODULATING



ANDERSON GREENWOOD SERIES 800 PILOT OPERATED RELIEF VALVE

FIGURE 13 (continued)

ABOVE SET PRESSURE WITH MAIN VALVE FULLY OPEN

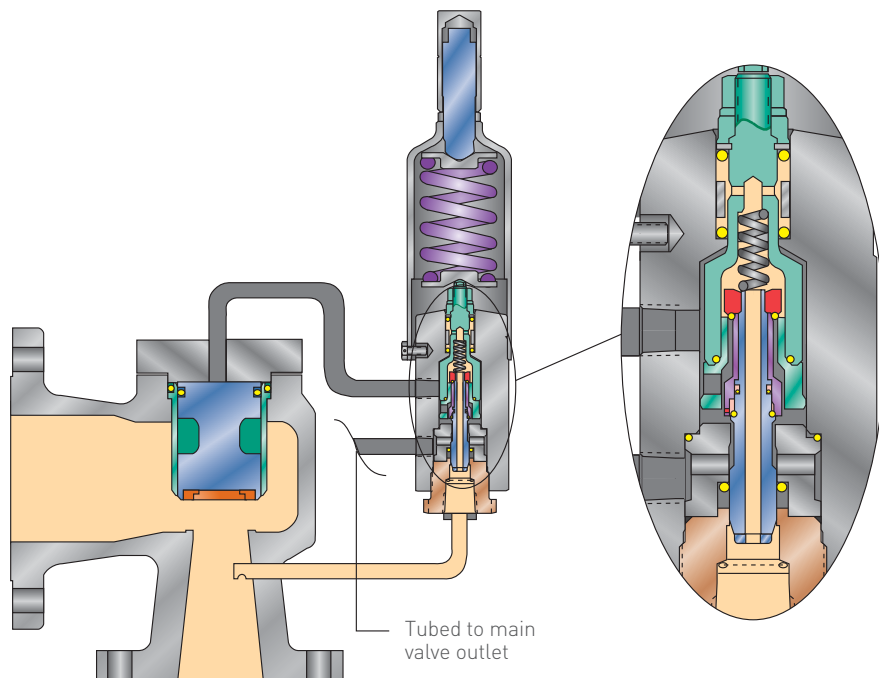
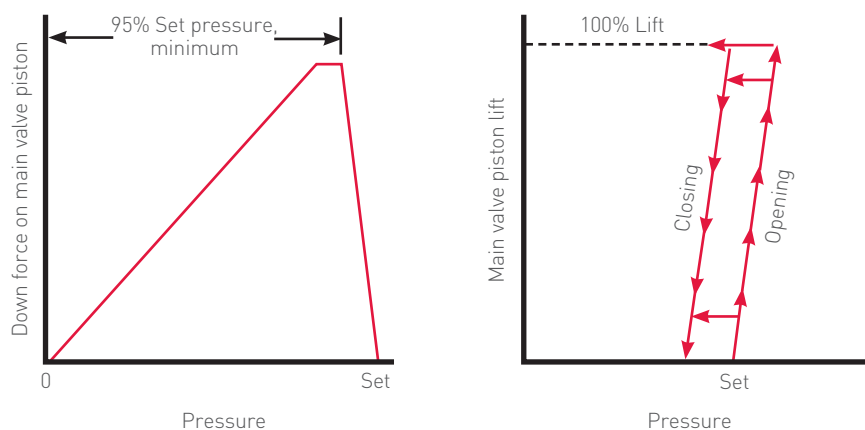


FIGURE 14



SPECIFICATIONS

- Replaceable main valve seat, located on piston to maximize seat sealing ability.
- Feedback mechanism in pilot, independent of primary pressure sensing mechanism, to ensure smooth modulation of main valve.
- Set point indication for field test capability.
- Field replaceable main valve nozzle.
- Lettered orifice valves meet API standard 526 dimension requirements.
- Optional cartridge type pilot filter available for extremely dirty services.

OPTIONAL ACCESSORIES

- Field test connection with indicator
- Backflow preventer
- Pilot supply filter
- Pressure spike snubber (gas)
- Remote pressure sense connection
- Remote valve lift indicator
- Manual unloader
- Pilot lift lever
- Remote unloader
- NACE trim [MR0175/ISO 15156:2002]

ANDERSON GREENWOOD SERIES 400 ISO-DOME PILOT OPERATED RELIEF VALVE

SERIES 400 ISO-DOME PILOT

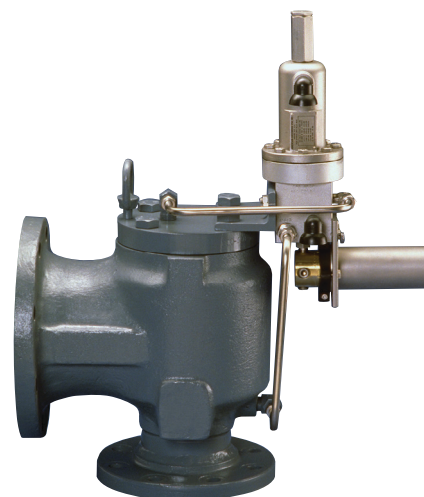
The Iso-Dome accessory for the 400 pilot provides protection of the critical pilot internals from the process media. The pilot is actuated by the process fluid and is ASME Section VIII and Section XIII (UV Designator) Code stamped.

GENERAL APPLICATION

The Series 400 Iso-Dome pilot is well suited for polymerizing, precipitating or other extremely dirty applications.

FEATURES

- Fail-safe to ASME code requirements for gas and liquid services.
- Allows system operating pressure near set pressure, maintaining SRV tightness and resulting in greater system throughout.
- All adjustments are factory sealed with only clean gas supply added for simple and inexpensive field installation.
- Modulating action minimizes fugitive emissions, product release, product loss and noise.
- Valve operation insensitive to back pressure, eliminating costly and fragile metal bellows.
- Unique field test capability allows accurate set pressure verification with valve in service. No system isolation valve or rupture disc required.
- CE mark to European PED 2014/68/EU.

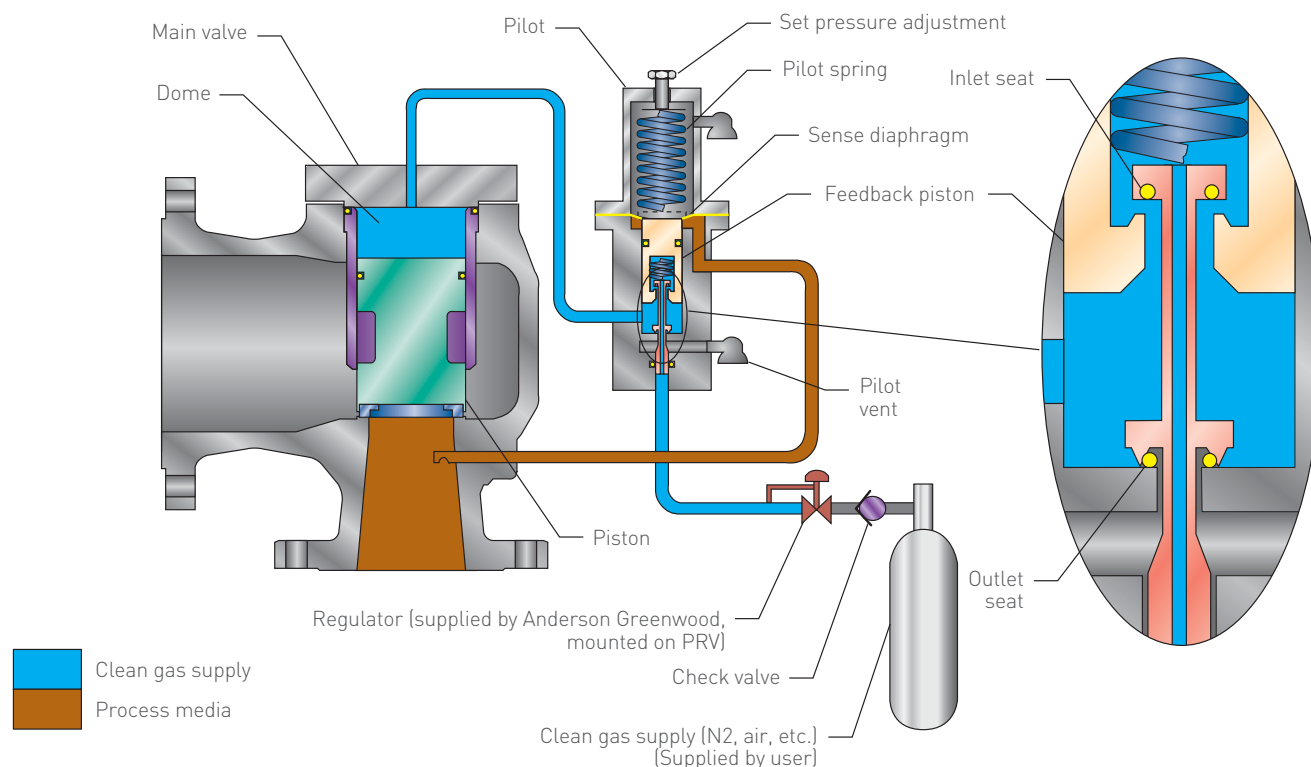


TECHNICAL DATA

Sizes:	1 x 2 in. to 10 x 14 in. (DN 25 x 50 to DN 250 x 350)
Orifices:	0.110 to 63.5 in ² (0.710 to 409.7 cm ²)
Inlet ratings:	ANSI Class 150 to 600
Temperature range:	-65 to +500°F (-54 to + 260°C)
Set pressures:	15 to 2220 psig (1.03 to 153 barg)
Code:	ASME VIII and XIII (UV Designator)

ANDERSON GREENWOOD SERIES 400 ISO-DOME PILOT OPERATED RELIEF VALVE

FIGURE 15



OPERATION

Process media enters the main valve and is ported to the pilot sense diaphragm. The motive fluid for the pilot and main valve, typically nitrogen or air (clean gas supply), is ported into the seating areas of the pilot and the main valve dome and is regulated to provide pressure at slightly below set pressure.

In the closed position, the downward force on the piston in the main valve provided by the clean gas supply exceeds the upward force on the piston developed by the process media. At just below set pressure, the static pressure of the process media compresses the pilot spring via the sense diaphragm. As the process media pressure increases, the upward movement of the sense diaphragm and feedback piston closes the pilot inlet seat. A small, further increase in process media pressure opens the outlet seat. The motive fluid now exhausts from the main valve dome via the pilot vent. This reduced dome pressure acts on the unbalanced feedback piston lift and 'locks in' dome pressure. At any stable inlet process media pressure there will be no pilot flow, conserving the clean gas supply volume to provide multiple valve cycles if necessary.

As inlet pressure rises above set pressure, further dome pressure reduction will modulate the main valve piston proportional to the process media upset. The feedback piston will move, responding to the process media pressure to exhaust or supply the main valve dome with the clean motive fluid. This puts the main valve piston in the correct position to relieve only that process media needed to satisfy the overpressure.

As the process media pressure decreases below set pressure, the feedback piston moves downward and opens the inlet seat to admit the clean gas supply into the main valve dome, closing the main valve.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

SIZING

HOW TO SIZE A VALVE

Valves are selected on their ability to meet an expected relieving condition, flowing a sufficient amount of fluid to prevent excessive pressure increase. The size of the valve orifice must be calculated taking into consideration the required flow, performance characteristics, lading fluid properties and other factors.

The sizing procedure shown uses the practice recommended in API 520 Part I. The valve orifice areas and nozzle discharge coefficients shown are effective values and are not specific to a particular valve type. Their use will always allow for the selection of a valve orifice area that will meet or exceed the required capacity.

The calculation of the actual certified valve capacity can be performed with the Anderson Greenwood sizing program, which is available for download at valvesizing.emerson.com

To select the minimum required orifice area that will flow the required capacity of the system you wish to protect, please refer to the following information which appears in this section:

1. Sizing formulas
2. Correction factors
3. Valve orifice areas

Once you have determined the required orifice area, refer to Section 5, Ordering (page 31), to select a specific valve model number.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

SIZING

SIZING FORMULAS

Gas/vapor flow

English units

Metric units

$$A = \frac{W \sqrt{TZ}}{CK_d P_1 K_b K_c \sqrt{M}}$$

$$A = \frac{W \sqrt{TZ}}{CK_d P_1 K_b K_c \sqrt{M}}$$

or

or

$$A = \frac{V \sqrt{MTZ}}{6.32 CK_d P_1 K_b K_c}$$

$$A = \frac{V \sqrt{MTZ}}{22.42 CK_d P_1 K_b K_c}$$

Steam flow

English units

Metric units

$$A = \frac{W}{51.5 K_d P_1 K_s K_b}$$

$$A = \frac{W}{52.5 K_d P_1 K_s K_b}$$

Liquid flow

English units

Metric units

$$A = \frac{V_L \sqrt{G}}{38 K_d \sqrt{P_A - P_B}}$$

$$A = \frac{V_L \sqrt{G}}{5.09 K_d \sqrt{P_A - P_B}}$$

FORMULA SYMBOLS

SYMBOL	DESCRIPTION	ENGLISH UNITS	METRIC UNITS
A	Calculated orifice area	in ²	cm ²
V	Required capacity, gas	SCFM	Nm ³ /h
V _L	Required capacity, liquid	U.S. gpm	m ³ /h
W	Required capacity, gas or steam	lb/h	kg/h
G	Specific gravity	----	----
M	Molecular weight (M = 29 x specific gravity)	----	----
T	Relief temperature, (°R = °F + 460; °K = °C + 273)	°R	°K
Z	Compressibility factor (if unknown, assume Z = 1.0)	----	----
k	Ratio of specific heats (k = C _p /C _v)	----	----
C	Gas constant (if unknown, assume C = 315 for English, 239 for metric) (page 23)	----	----
K _d	Effective nozzle coefficient for 90% of actual capacity (page 28)	----	----
K _s	Superheat correction factor (pages 26 - 27)	----	----
P	Set pressure	psig	barg
	Valve inlet flowing pressure		
P ₁	(P ₁ = P + allowable overpressure – inlet pressure loss + atmospheric pressure)	psia	bara
P ₂	Valve outlet flowing pressure	psia	bara
K _b	Back pressure factor (pages 24 - 25)	----	----
P _A	Valve inlet flowing pressure	psig	barg
	(P _A = P + allowable overpressure – inlet pressure loss)		
P _B	Valve outlet flowing pressure	psig	barg
K _C	Combination correction factor for installations with rupture disc upstream of POPRV (K _C = 1.0 w/no rupture disk, K _C = 0.9 when no combination factor is known)	----	----

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

SIZING

VALUES OF M, K AND C FOR REPRESENTATIVE GASES AND VAPORS

GAS OR VAPOR	M, MOLECULAR WEIGHT	K, SPECIFIC HEAT RATIO	C, GAS CONSTANT (ENGLISH)	C, GAS CONSTANT (METRIC)
Acetylene (C ₂ H ₂)	26.0	1.26	343	261
Air	29.0	1.40	356	270
Ammonia (NH ₃)	17.0	1.31	348	264
Argon (Ar)	40.0	1.67	378	287
Benzene (C ₆ H ₆)	78.0	1.12	329	250
Butadiene (C ₄ H ₆)	54.0	1.12	329	250
Carbon Dioxide (CO ₂)	44.0	1.28	345	262
Carbon Monoxide (CO)	28.0	1.40	356	270
Ethane (C ₂ H ₆)	30.0	1.19	336	255
Ethylene (C ₂ H ₄)	28.0	1.24	341	259
Freon 22	86.5	1.18	335	246
Helium (He)	4.0	1.66	377	286
Hexane (C ₆ H ₁₄)	86.0	1.06	322	245
Hydrogen (H ₂)	2.0	1.41	357	271
Hydrogen Sulphide (H ₂ S)	34.0	1.32	349	265
Methane (CH ₄)	16.0	1.31	348	264
Methyl Mercaptan (CH ₃ S)	48.1	1.20	337	256
n-Butane (C ₄ H ₁₀)	58.0	1.09	326	247
Natural Gas (SF = 0.60)	17.4	1.27	344	261
Nitrogen (N ₂)	28.0	1.40	356	270
Oxygen (O ₂)	32.0	1.40	356	270
Pentane (C ₅ H ₁₂)	72.0	1.97	323	303
Propane (C ₃ H ₈)	44.0	1.13	330	251
Propylene (C ₃ H ₆)	42.0	1.15	332	252
Propylene Oxide (C ₃ H ₆ O)	58.1	1.21	338	257
Steam	18.0	1.31	348	264
Sulphur Dioxide (SO ₂)	64.0	1.29	346	263
VCM (C ₂ H ₃ Cl)	62.5	1.18	335	255

GAS CONSTANT, C

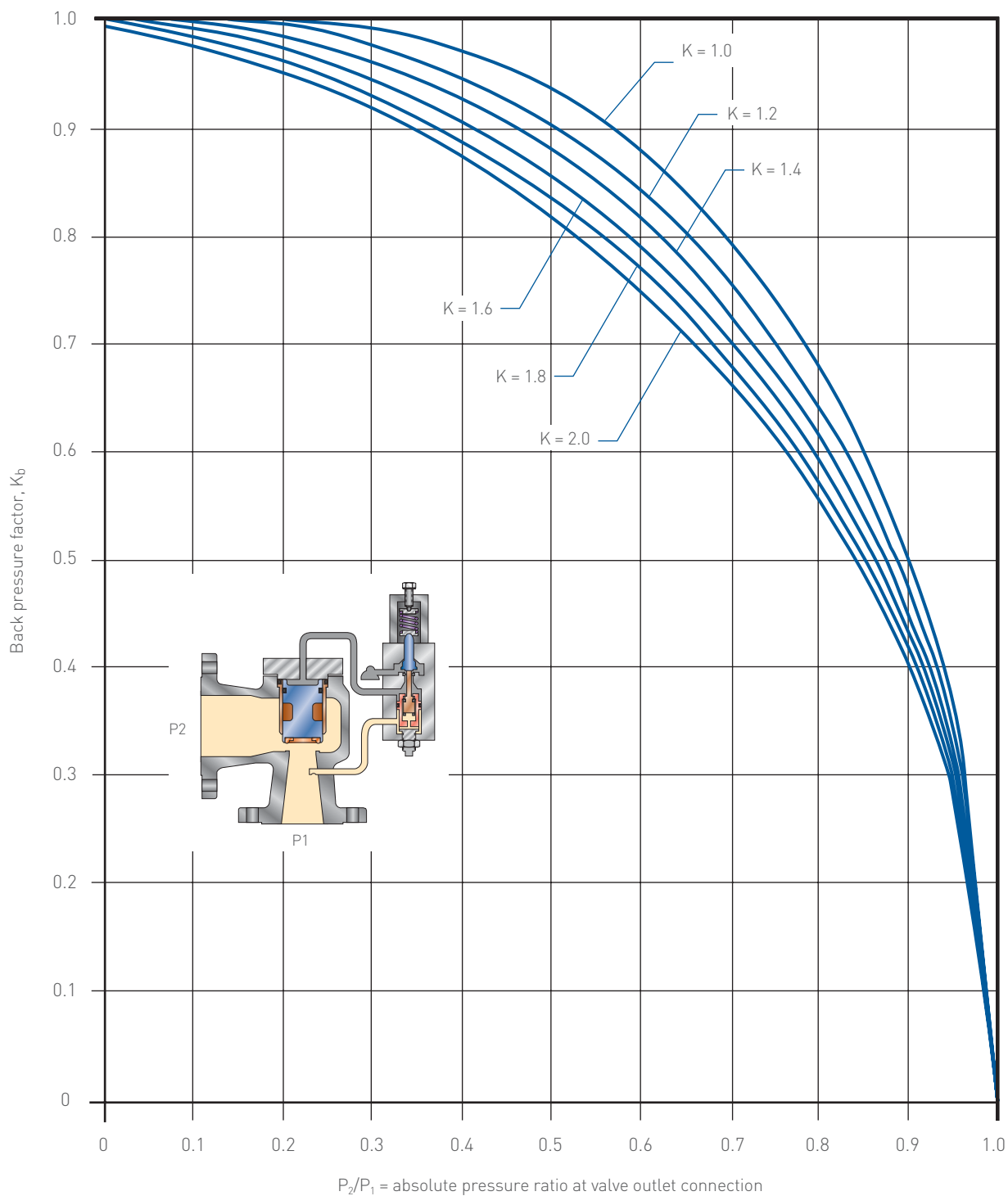
K	C (ENGLISH)	C (METRIC)	K	C (ENGLISH)	C (METRIC)
1.00	315	239	1.52	366	278
1.02	318	241	1.54	368	279
1.04	320	243	1.56	369	280
1.06	322	245	1.58	371	282
1.08	324	246	1.60	372	283
1.10	327	248	1.62	374	284
1.12	329	250	1.64	376	285
1.14	331	251	1.66	377	286
1.16	333	253	1.68	379	287
1.18	335	254	1.70	380	289
1.20	337	256	1.72	382	290
1.22	339	258	1.74	383	291
1.24	341	259	1.76	384	292
1.26	343	261	1.78	386	293
1.28	345	262	1.80	387	294
1.30	347	263	1.82	388	295
1.32	349	265	1.84	390	296
1.34	351	266	1.86	391	297
1.36	352	268	1.88	392	298
1.38	354	269	1.90	394	299
1.40	356	270	1.92	395	300
1.42	358	272	1.94	397	301
1.44	359	273	1.96	398	302
1.46	361	274	1.98	399	303
1.48	363	276	2.00	400	304
1.50	364	277	2.02	401	305

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

SIZING

FIGURE 16

Back Pressure Correction Factor for Series 200, 400, 500 and 800



NOTES

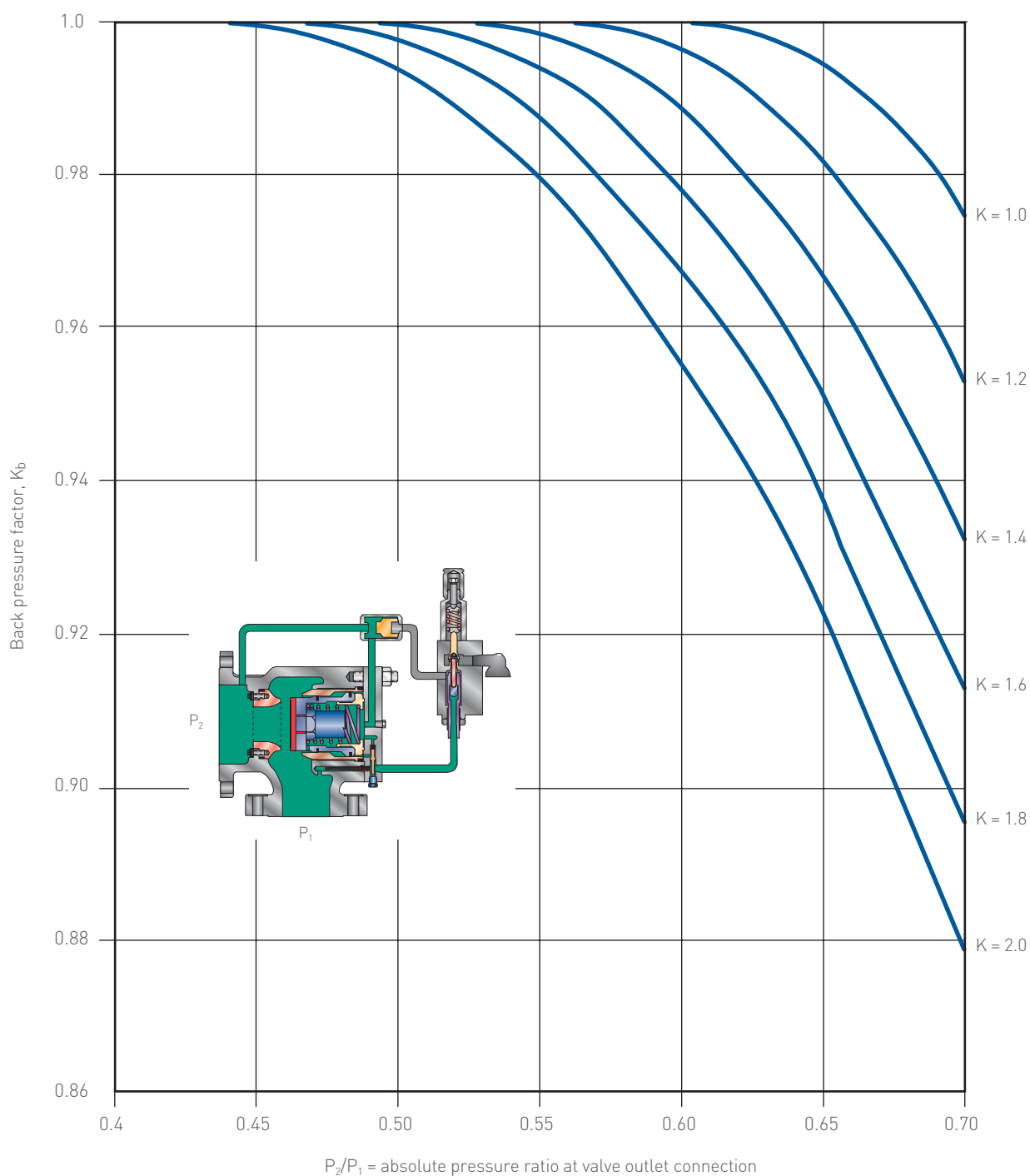
1. The curves above will vary from one size of valve and orifice combination to the other. The curves shown on this page represent the most conservative back pressure correction factor for all series of valves (except Series 700) shown in this catalog. The sizing software will utilize the actual back pressure correction factor for the valve selected.
2. When capacity reduction is represented by the above curves, it is due to obtaining critical pressure or higher at the valve's nozzle exit for full lift valves or curtain area for restricted lift valves.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

SIZING

FIGURE 17

Back Pressure Correction Factor for Series 700



NOTES

1. The curves above are the actual correction values for all series 700 configurations.
2. When capacity reduction is represented by the above curves it is due to obtaining critical pressure or higher at the valve's nozzle exit.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

SIZING

STEAM SUPER HEAT CORRECTION FACTOR, K_s

SET PRESSURE, psig (barg)	SATURATED STEAM TEMPERATURE, °F [°C]	TOTAL STEAM TEMPERATURE °F [°C]														
		280 (138)	300 (149)	320 (160)	340 (171)	360 (182)	380 (193)	400 (205)	420 (216)	440 (227)	460 (238)	480 (249)	500 (260)	520 (271)	540 (282)	560 (293)
15 (1.03)	250 (121)	1.00	1.00	1.00	.99	.99	.98	.98	.97	.96	.95	.94	.93	.92	.91	.90
20 (1.38)	259 (126)	1.00	1.00	1.00	.99	.99	.98	.98	.97	.96	.95	.94	.93	.92	.91	.90
40 (2.76)	287 (142)	----	1.00	1.00	1.00	.99	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90
60 (4.14)	308 (153)	----	----	1.00	1.00	.99	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90
80 (5.52)	324 (162)	----	----	----	1.00	1.00	.99	.99	.98	.97	.96	.94	.93	.92	.91	.90
100 (6.90)	338 (170)	----	----	----	----	1.00	1.00	.99	.98	.97	.96	.95	.94	.93	.92	.91
120 (8.27)	350 (177)	----	----	----	----	1.00	1.00	.99	.98	.97	.96	.95	.94	.93	.92	.91
140 (9.65)	361 (183)	----	----	----	----	----	1.00	1.00	.99	.98	.96	.95	.94	.93	.92	.91
160 (11.0)	371 (188)	----	----	----	----	----	1.00	1.00	.99	.98	.97	.95	.94	.93	.92	.91
180 (12.4)	380 (193)	----	----	----	----	----	----	1.00	.99	.98	.97	.96	.95	.93	.92	.91
200 (13.8)	388 (198)	----	----	----	----	----	----	1.00	.99	.99	.97	.96	.95	.93	.92	.91
220 (15.2)	395 (202)	----	----	----	----	----	----	1.00	1.00	.99	.98	.96	.95	.94	.93	.92
240 (16.6)	403 (206)	----	----	----	----	----	----	----	1.00	.99	.98	.97	.95	.94	.93	.92
260 (17.9)	409 (210)	----	----	----	----	----	----	----	1.00	.99	.98	.97	.96	.94	.93	.92
280 (19.3)	416 (213)	----	----	----	----	----	----	----	1.00	1.00	.98	.97	.96	.95	.93	.92
300 (20.7)	422 (217)	----	----	----	----	----	----	----	----	1.00	.99	.98	.96	.95	.93	.92
350 (24.1)	436 (225)	----	----	----	----	----	----	----	----	1.00	1.00	.99	.96	.96	.94	.93
400 (27.6)	448 (231)	----	----	----	----	----	----	----	----	----	1.00	.99	.96	.96	.95	.93
450 (31.0)	460 (238)	----	----	----	----	----	----	----	----	----	----	1.00	.96	.96	.96	.94
500 (34.5)	470 (243)	----	----	----	----	----	----	----	----	----	----	1.00	.96	.96	.96	.94
550 (37.9)	480 (249)	----	----	----	----	----	----	----	----	----	----	----	.97	.97	.97	.95
600 (41.4)	489 (254)	----	----	----	----	----	----	----	----	----	----	----	.97	.97	.97	.97
650 (44.8)	497 (258)	----	----	----	----	----	----	----	----	----	----	----	----	1.00	.99	.97
700 (48.3)	506 (263)	----	----	----	----	----	----	----	----	----	----	----	----	1.00	.99	.97
750 (51.7)	513 (267)	----	----	----	----	----	----	----	----	----	----	----	----	1.00	1.00	.98
800 (55.2)	520 (271)	----	----	----	----	----	----	----	----	----	----	----	----	----	1.00	.99
850 (58.6)	527 (275)	----	----	----	----	----	----	----	----	----	----	----	----	----	1.00	.99
900 (62.1)	533 (278)	----	----	----	----	----	----	----	----	----	----	----	----	----	1.00	1.00
950 (65.5)	540 (282)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.00
1000 (69.0)	546 (286)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.00
1050 (72.4)	552 (289)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.00
1100 (75.9)	558 (292)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1150 (79.3)	563 (295)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1200 (82.7)	569 (298)	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

SIZING

STEAM SUPER HEAT CORRECTION FACTOR, K_s

SET PRESSURE, psig (barg)	SATURATED STEAM TEMPERATURE, °F (°C)	TOTAL STEAM TEMPERATURE °F (°C)														
		580 (305)	600 (316)	620 (326)	640 (338)	660 (349)	680 (360)	700 (371)	720 (382)	740 (393)	760 (405)	780 (416)	800 (427)	900 (482)	1000 (537)	1100 (593)
15 (1.03)	250 (121)	.89	.88	.87	.86	.86	.85	.84	.83	.83	.82	.81	.81	.78	.75	.72
20 (1.38)	259 (126)	.89	.88	.87	.86	.86	.85	.84	.83	.83	.82	.81	.81	.78	.75	.72
40 (2.40)	287 (142)	.89	.88	.87	.87	.86	.85	.84	.84	.83	.82	.82	.81	.78	.75	.72
60 (4.14)	308 (153)	.89	.88	.87	.87	.86	.85	.84	.84	.83	.82	.82	.81	.78	.75	.72
80 (5.52)	324 (162)	.89	.89	.88	.87	.86	.85	.84	.84	.83	.82	.82	.81	.78	.75	.72
100 (6.90)	338 (170)	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82	.82	.81	.78	.75	.72
120 (8.27)	350 (177)	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82	.82	.81	.78	.75	.72
140 (9.65)	361 (183)	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82	.82	.81	.78	.75	.72
160 (11.0)	371 (188)	.90	.89	.88	.87	.86	.86	.85	.84	.83	.82	.82	.81	.78	.75	.72
180 (12.4)	380 (193)	.90	.89	.88	.87	.86	.86	.85	.84	.83	.82	.82	.81	.78	.75	.72
200 (13.8)	388 (198)	.90	.89	.88	.87	.86	.86	.85	.84	.83	.83	.82	.81	.78	.75	.72
220 (15.2)	395 (201)	.91	.90	.89	.88	.87	.86	.85	.84	.8	.83	.82	.81	.78	.75	.72
240 (16.6)	403 (206)	.91	.90	.89	.88	.87	.86	.85	.84	.84	.83	.82	.81	.78	.75	.72
260 (17.9)	409 (209)	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82	.81	.78	.75	.72
280 (19.3)	416 (213)	.91	.90	.91	.88	.87	.86	.85	.85	.84	.83	.82	.82	.78	.75	.72
300 (20.7)	422 (217)	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.82	.82	.78	.75	.72
350 (24.1)	436 (224)	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83	.83	.82	.78	.76	.72
400 (27.6)	448 (231)	.92	.91	.90	.89	.88	.87	.86	.85	.84	.84	.83	.82	.79	.76	.72
450 (31.0)	460 (238)	.93	.92	.91	.89	.88	.87	.86	.86	.85	.84	.83	.82	.79	.76	.72
500 (34.5)	470 (243)	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83	.82	.79	.76	.73
550 (37.9)	480 (249)	.94	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83	.82	.79	.76	.73
600 (41.4)	489 (254)	.94	.93	.92	.90	.89	.88	.87	.86	.85	.84	.84	.83	.79	.76	.73
650 (44.8)	497 (258)	.95	.94	.92	.91	.90	.89	.87	.86	.86	.85	.84	.83	.79	.76	.73
700 (48.3)	506 (263)	.96	.94	.93	.91	.90	.89	.88	.87	.86	.85	.84	.83	.79	.76	.73
750 (51.7)	513 (267)	.96	.95	.93	.92	.90	.89	.88	.87	.86	.85	.84	.83	.79	.76	.73
800 (55.2)	520 (271)	.97	.95	.94	.92	.91	.90	.88	.87	.86	.85	.84	.84	.80	.76	.73
850 (58.6)	527 (275)	.98	.96	.94	.93	.92	.90	.89	.88	.87	.86	.85	.84	.80	.76	.73
900 (62.1)	533 (278)	.99	.97	.95	.93	.92	.90	.89	.88	.87	.86	.85	.84	.80	.77	.73
950 (65.5)	540 (282)	.99	.97	.95	.94	.92	.91	.89	.88	.87	.86	.85	.84	.80	.77	.73
1000 (69.0)	546 (286)	.99	.98	.96	.94	.93	.91	.90	.89	.87	.86	.85	.84	.80	.77	.73
1050 (72.4)	552 (289)	1.00	.99	.97	.95	.93	.92	.90	.89	.88	.87	.86	.85	.80	.77	.73
1100 (75.9)	558 (292)	1.00	.99	.98	.95	.94	.92	.91	.89	.88	.87	.86	.85	.81	.77	.73
1150 (79.3)	563 (295)	1.00	.99	.98	.96	.94	.92	.91	.90	.88	.87	.86	.85	.81	.77	.73
1200 (82.7)	569 (298)	1.00	.99	.98	.97	.95	.93	.91	.90	.89	.87	.86	.85	.81	.77	.73

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

SIZING

EFFECTIVE API ORIFICE AREA, in² (cm²)

VALVE SIZE, In. (DN)	TYPES 253, 453, 853	TYPES 243, 443, 843	TYPES 263 ^[1] , 463 ^[1] , 863 ^[1]	
	TYPE 259	TYPE 249 TYPE 546	TYPE 269 ^[1] TYPE 566 ^[1]	TYPE 727
1 x 2 (25 x 50)	0.110 ('D') (0.710)	0.307 ('F') (1.981)	----	----
1½ x 2 (40 x 50)	0.196 ('E') (1.265)			
1½ x 2 (40 x 50)	0.503 ('G') (3.245) ^[2]	0.785 ('H') (5.065) ^[2]	1.320 (8.516)	----
1½ x 3 (40 x 80)	0.503 ('G') (3.245)	0.785 ('H') (5.065)	----	----
2 x 3 (50 x 80)	0.503 ('G') (3.245)	1.287 ('J') (8.303)	2.554 (16.47)	0.503 ('G') (3.245)
	0.785 ('H') (5.065)			0.785 ('H') (5.065)
				1.287 ('J') (8.303)
2 x Dual 3 (50 x Dual 80)	----	----	2.554 (16.47)	–
3 x 4 (80 x 100)	1.287 ('J') (8.303)	2.853 ('L') (18.41)	5.938 (38.31)	1.287 ('J') (8.30)
	1.838 ('K') (11.86)			1.838 ('K') (11.86)
				2.853 ('L') (18.41)
3 x Dual 4 (80 x Dual 100)	----	----	5.938 (38.31)	–
4 x 6 (100 x 150)	2.853 ('L') (18.41)	6.380 ('P') (41.16)	9.489 (61.21)	2.853 ('L') (18.41)
	3.600 ('M') (23.23)			3.600 ('M') (23.23)
	4.340 ('N') (28.00)			4.340 ('N') (28.00)
				6.380 ('P') (41.16)
4 x Dual 6 (100 x Dual 150)	----	----	9.489 (61.21)	–
6 x 8 (150 x 200) ^[5]	11.05 ('Q') (71.29)	16.00 ('R') (103.2)	20.57 (137.7)	11.05 ('Q') (71.29)
				16.00 ('R') (103.23)
				18.58 ('RR') (119.8) ^[5]
6 x Dual 8 (150 x Dual 200)	----	----	20.57 (137.7)	----
8 x Dual 8 (200 x Dual 200)	----	----	28.36 (182.9)	----
8 x 10 (200 x 250)	----	26.00 ('T') (167.7)	38.96 (251.3)	26.00 ('T') (167.74)
8 x Dual 10 (200 x Dual 250)	----	----	38.96 (251.3)	----
10 x 14 ^[4] (250 x 350)	----	----	63.50 (409.7)	----

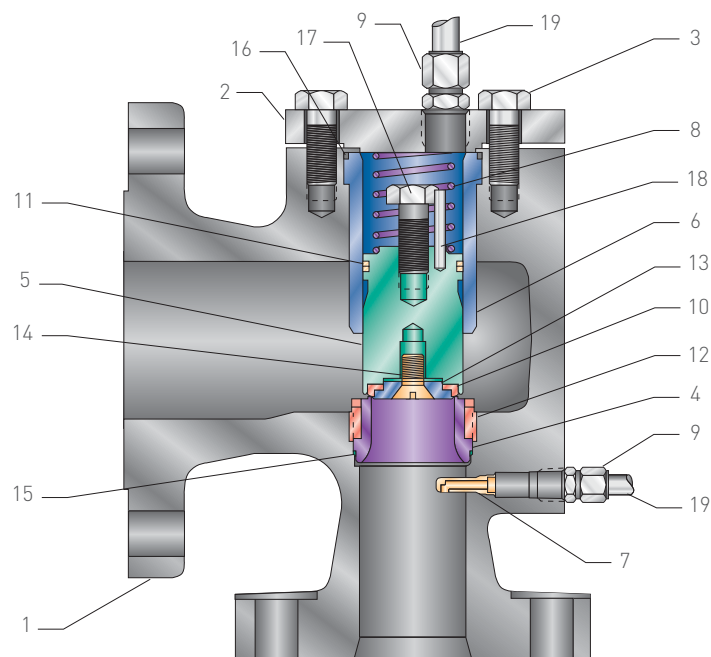
NOTES

1. There are no recognized API 'full-bore' orifice areas. These effective areas are specific to Anderson Greenwood.
2. Threaded body only.
3. Series 700 is available in a non-standard RR orifice 18.580 in² (119.871 cm²).
4. Certified for gas or steam service only.
5. 10 in. (DN 250) outlet flange available on special order.

ANDERSON GREENWOOD SERIES 200/400/500/800 STANDARD MAIN VALVE

MATERIALS

FIGURE 18



MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	/S1	/S1/N	/S	/S/N	/D, /D/N	/P, /P/N
		-20°F to +1000°F ^[1] [-29°C to +537°C ^[1]]	-20°F to +1000°F ^[1] [-29°C to +537°C ^[1]]	-450°F to +1500°F ^[1] [-268°C to +816°C ^[1]]	-450°F to +1500°F ^[1] [-268°C to +816°C ^[1]]	-20°F to +1200°F ^[1] [-29°C to +649°C ^[1]]	-20°F to +1200°F ^[1] [-29°C to +649°C ^[1]]
1	Body	SA216-WCB/WCC CS	SA216-WCB/WCC CS	SA351-CF8M SS	SA351-CF8M SS	SA-995 Gr.4A	SA-995 Gr.6A
2	Caps	SA516-70 ^[4]	SA516-70 ^[4]	SA240-316	SA240-316	SA-240 S31803 or SA-479 S31803	SA-240 S32760 or SA-479 S32760
3	Cap bolting	A449/A325 CS	A449/A325 CS	A193-B8M SS	A193-B8M SS	SA-193 Gr.B8M	SA-193 Gr.B8M
4	Nozzle	A479-316 or A351-CF8M SS A564-630 (17-4 PH),	A479-316 or A351-CF8M SS A479-316 or	A479-316 or A351- CF8M SS A564-630 (17-4 PH),	A479-316 or A351- CF8M SS A479-316 or	SA-479 S31803	SA-479 S32760
5	Piston	A479-316 or A351-CF8M SS	A351-CF8M SS A479-S32750	A479-316 or A351-CF8M SS	A351-CF8M SS A479-S32750	SA-479 S31803	SA-479 S32760
6	Liner	A479-316 or A351-CF8M	A479-316 or A351-CF8M	A479-316 or A351- CF8M SS	A479-316 or A351- CF8M SS	SA-479 S31803	SA-479 S32760
7	Dipper tube	17-4 PH SS	316 SS, S32750	17-4 PH SS	316 SS, S32750	SA-479 S31803	SA-479 S32760
8	Dome spring	316 SS	Not used	316 SS	Not used	Inconel® X750	Inconel® X750
9	Tube fittings	316 SS	316 SS	316 SS	316 SS	S31803	S32750
10	Seat	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2
11	Piston seal	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2
12	Nozzle retainer	A747-CB7CU-1 SS or 17-4 PH SS	A747-CB7CU-1 SS or 17-4 PH SS	A747-CB7CU-1 SS or 17-4 PH SS	A747-CB7CU-1 SS or 17-4 PH SS	SA-479 S31803	SA-479 S32760
13	Seat retainer	A479-316 SS	A479-316 SS	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
14	Seat retainer screw	316 SS	316 SS, S32750	316 SS	316 SS, S32750	SA-479 S31803	SA-479 S32760
15	Nozzle seal ^[3]	Filled PTFE	Filled PTFE	Filled PTFE	Filled PTFE	Filled PTFE	Filled PTFE
16	Liner seal	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2	See Tables 1 and 2
17	Lift adj. bolt ^[2]	A193-B8M SS	A193-B8M SS	A193-B8M SS	A193-B8M SS	SA-479 S31803	SA-479 S32760
18	Lock pin ^[2]	302 SS	302 SS	302 SS	302 SS	SA-479 S31803	SA-479 S32760
19	Tubing	316 SS	316 SS	316 SS	316 SS	S31803	S32760

NOTES

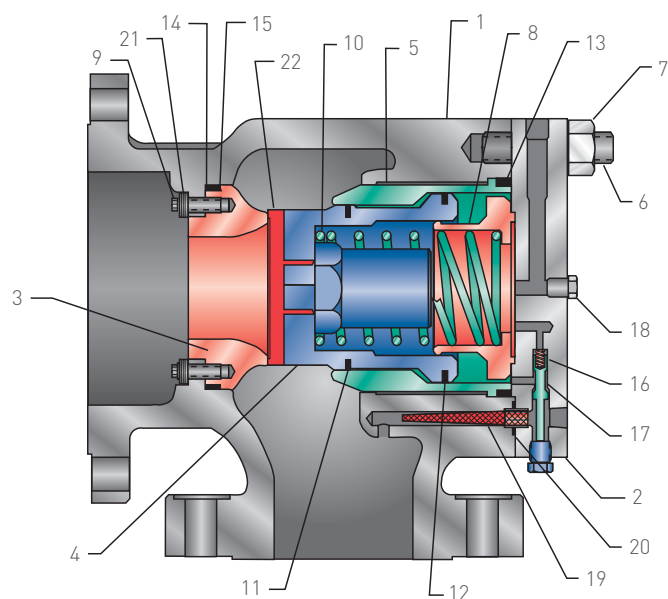
1. Maximum temperature relates to fire case conditions. Continuous service temperature is limited by the choice of seat and seal materials.
2. Not required in 6 in. or larger Series 40/50 valve sizes or in 4 in. and larger Series 60 valve sizes.
3. Fluorosint 500 for temperatures below -65°F (-54°C) or above 400°F (204°C). Standard for Types 249/259/269.
4. Cap material is SA240-316 for Series 500

ANDERSON GREENWOOD SERIES 700 STANDARD MAIN VALVE

MATERIALS

FIGURE 19

Standard Main Valve



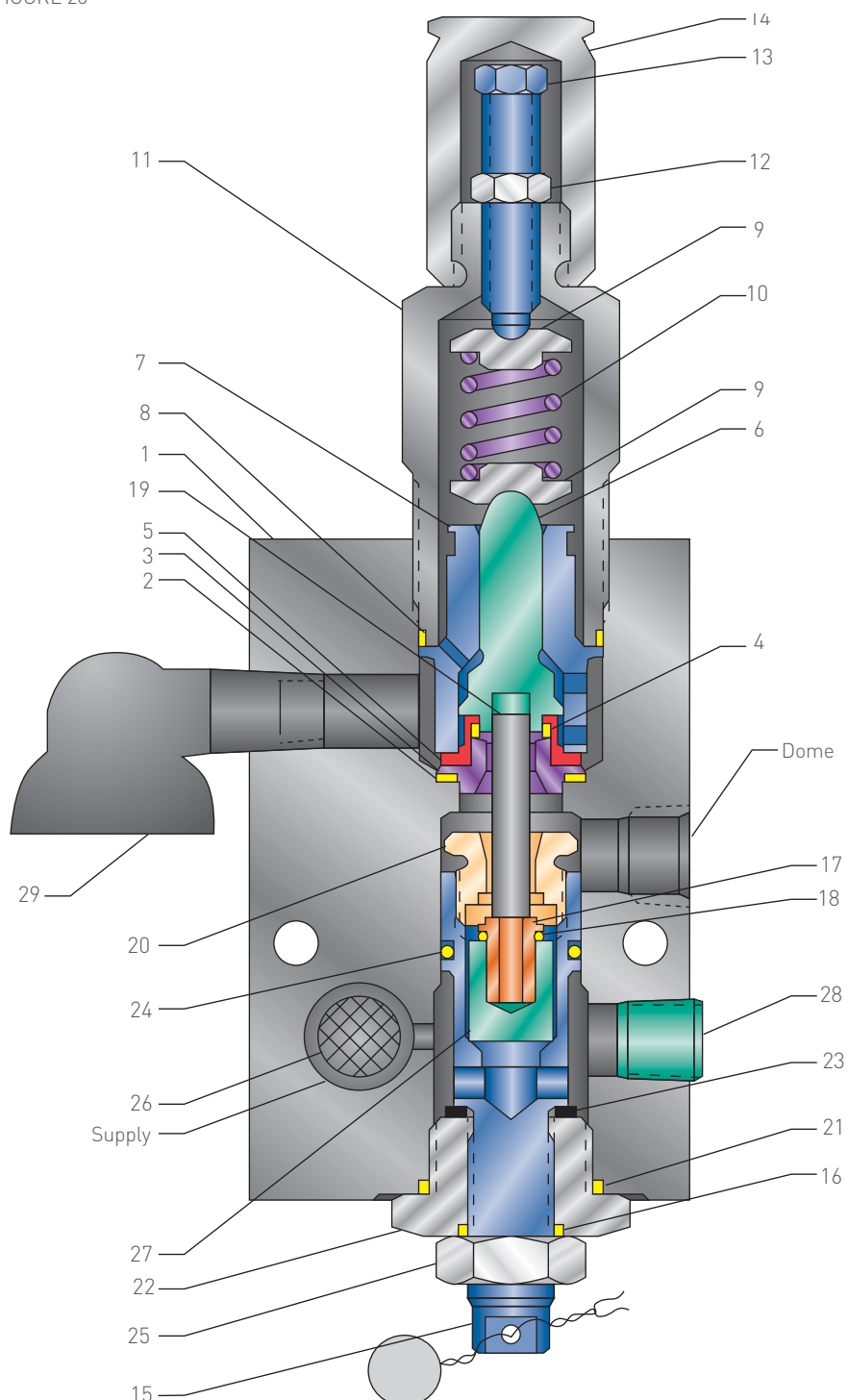
MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	/S	/S1	/S2	/S3
		Ambient to 1000°F [Ambient to 538°C]	Ambient to 600°F [Ambient to 316°C]	601°F to 800°F [318°C to 427°C]	801°F to 1000°F [427°C to 538°C]
1	Body	SA351-CF8M SS	SA216-WCB CS	SA216-WCB CS	SA217-WC6 AS
2	Cap	SA240-316	SA516-70	SA516-70	SA387-11
3	Nozzle	A351-CF8M SS	A351-CF8M SS	A351-CF8M SS	A351-CF8M SS
4	Piston assembly	A217CA-151	A217CA-151	A217CA-151	A217CA-151
5	Liner	A479-410	A479-410	A479-410	A479-410
6	Stud	A193-B7	A193-B7	A193-B7	A193-B7
7	Nut	A194-2H	A194-2H	A194-2H	A194-2H
8	Piston damper	A479-410	A479-410	A479-410	A479-410
9	Retainer screw	A574	A574	A574	A574
10	Dome spring	Inconel®	Inconel®	Inconel®	Inconel®
11	Damper ring with centralizer spring	Ductile iron	Ductile iron	Ductile iron	Ductile iron
12	Piston seal ring with centralizer spring	Ductile iron	Ductile iron	Ductile iron	Ductile iron
13	Liner seal	GRAFOIL®	GRAFOIL®	GRAFOIL®	GRAFOIL®
14	Seal extrusion ring	1018	STL 1018	STL 1018	STL 1018
15	Nozzle seal	Thermabraid SS	Thermabraid SS	Thermabraid SS	Thermabraid SS
16	Drain spring	316 SS	316 SS	316 SS	316 SS
17	Drain plunger	17-4 SS	17-4 SS	17-4 SS	17-4 SS
18	Pipe plug, Hex HD	316 SS	316 SS	316 SS	316 SS
19	Filter assembly	316 SS	316 SS	316 SS	316 SS
20	Pitot tube seal	GRAFOIL®	GRAFOIL®	GRAFOIL®	GRAFOIL®
21	Belleville washer	17-7 SS	17-7 SS	17-7 SS	17-7 SS
22	Disc	718 Nickel alloy	17-4 SS or 718 Nickel alloy	718 Nickel alloy	718 Nickel alloy

ANDERSON GREENWOOD SERIES 200 PILOT

MATERIALS

FIGURE 20



ANDERSON GREENWOOD SERIES 200 PILOT

MATERIALS

MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	/S1, /S, /S1/N, /S/N	/D, /D/N	/P, /P/N
1	Body	A479-316 SS	SA-240 S31803 or SA-479 S31803	SA-240 S32760 or SA-479 S32760
2	Nozzle seal	PCTFE	PCTFE (NEOFLO M-400H)	PCTFE (NEOFLO M-400H)
3	Nozzle	A479-316 SS	SA-479 S31803	SA-479 S32760
4	Seat	See Tables 1 and 2 ^[2]	See Tables 1 and 2	See Tables 1 and 2
5	Seat retainer (upper)	A479-316 SS	SA-479 S31803	SA-479 S32760
6	Spindle	A479-316 SS/CR PL	SA-479 S31803 / Chrome plated	SA-479 S32760 / Chrome plated
7	Guide	A479-316 SS	SA-479 S31803	SA-479 S32760
8	Bonnet seal	See Tables 1 and 2 ^[2]	See Tables 1 and 2	See Tables 1 and 2
9	Spring washer	A479-316 SS	SA-479 S31803	SA-479 S32760
10	Spring	316 SS ^[1]	Inconel® X750 or MP35N	Inconel® or MP35N
11	Bonnet	A479-316 SS	SA-479 S31803	SA-479 S32760
12	Jam nut	316 SS	SA-479 S31803	SA-479 S32760
13	Set pressure adjustment screw	A276 316 SS	SA-479 S31803	SA-479 S32760
14	Cap	A479-316 SS	SA-479 S31803	SA-479 S32760
15	Blowdown adjustment screw	A479-316 SS	SA-479 S31803	SA-479 S32760
16	Blowdown adjustment seal	See Tables 1 and 2 ^[2]	See Tables 1 and 2	See Tables 1 and 2
17	Seat retainer (lower)	A276 316 SS	SA-479 S31803	SA-479 S32760
18	Piston seal	See Tables 1 and 2 ^[2]	See Tables 1 and 2	See Tables 1 and 2
19	Spacer	A276 316 SS	SA-479 S31803	SA-479 S32760
20	Reseat seat	A479-316 SS	SA-479 S31803	SA-479 S32760
21	Bushing seal	See Tables 1 and 2 ^[2]	See Tables 1 and 2	See Tables 1 and 2
22	Reseat adjustment bushing	A479-316 SS	SA-479 S31803	SA-479 S32760
23	Spacer washer	316 SS	SA-479 S31803	SA-479 S32760
24	Blowdown seal	PTFE	PTFE	PTFE
25	Jam nut	316 SS	SA-479 S31803	SA-479 S32760
26	Inlet screen	316 SS	SB574-N10276 (Hast C-276)	SB574-N10276 (Hast C-276)
27	Reseat piston	A276 316 SS	SA-479 S31803	SA-479 S32760
28	Pipe plug	A479-316 SS	SA-479 S31803	SA-479 S32760
29	Vent	Zytel®/316 SS	Zytel	Zytel

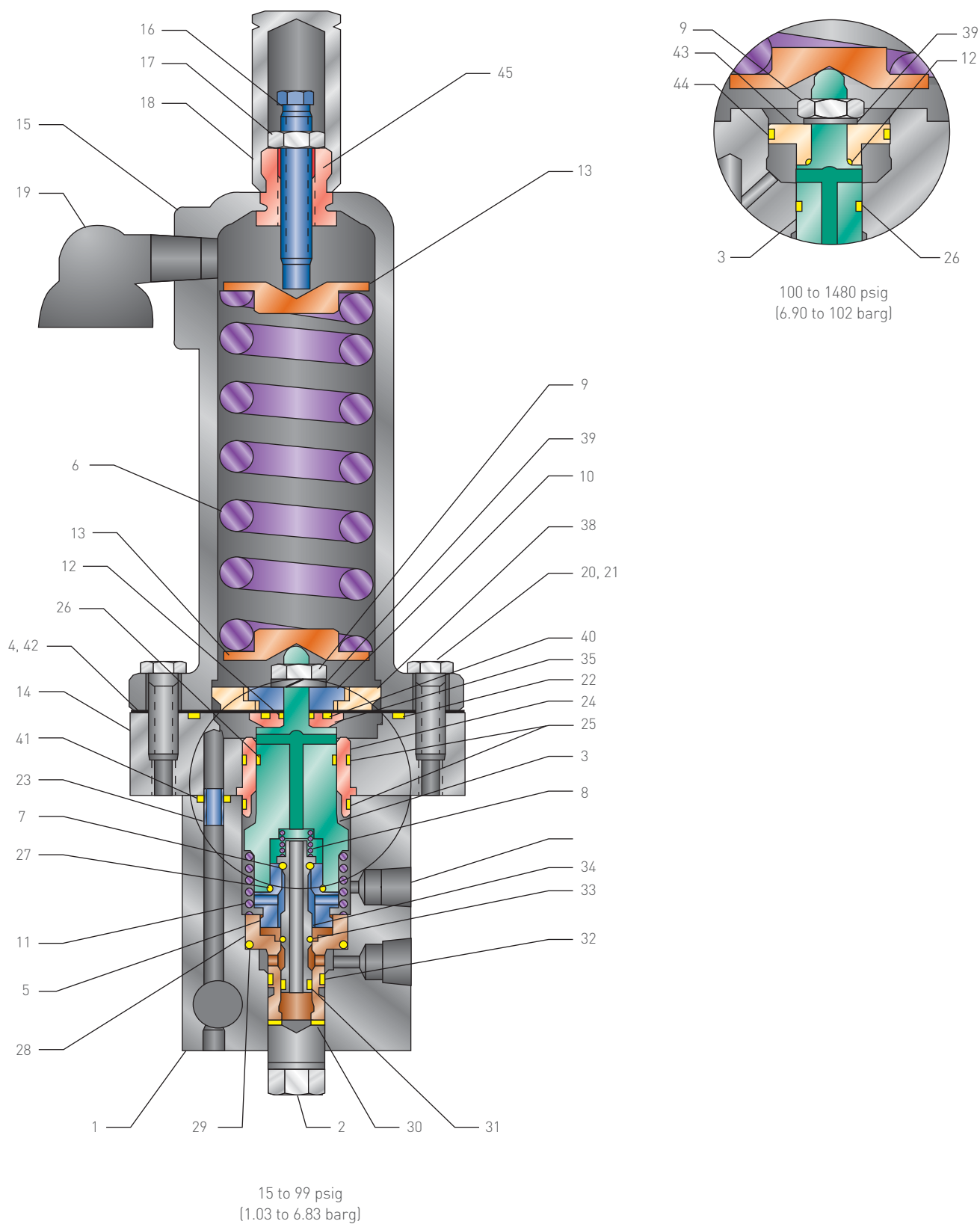
NOTES

1. For NACE trim, item 10 is Inconel®.
2. Fluoroelastomer (FKM) standard for NACE service.

ANDERSON GREENWOOD SERIES 400 PILOT (GAS SERVICE)

MATERIALS

FIGURE 21



ANDERSON GREENWOOD SERIES 400 PILOT

MATERIALS

MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	/S1, /S	/S1/N, /S/N	/D, /D/N	/P, /P/N
1	Body	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
2	Body plug	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
3	Feedback piston	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
4	Sense diaphragm	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
5	Inlet nozzle	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
6	Spring	17-7 SS1	17-7 SS ^{[1][3]}	Inconel® X-750	Inconel® X-750
7	Inlet seat	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
8	Spool spring	302 SS	Elgiloy	Elgiloy	Elgiloy
9	Piston nut	316 SS	316 SS	SA-479 S31803	SA-479 S32760
10	Sense washer	A479-316 SS	316 SS	SA-479 S31803	SA-479 S32760
11	Bias spring	316 SS	Elgiloy	Elgiloy	Elgiloy
12	Upper piston seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
13	Spring washer	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
14	Diaphragm case	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
15	Spring bonnet	A351-CF8M SS	A351-CF8M SS	SA-995 Gr.4A	SA-995 Gr.6A
16	Adjustment screw	A276-316 SS	A276-316 SS	SA-479 S31803	SA-479 S32760
17	Jam nut	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
18	Cap	A479- 316 SS ^[4]	A479- 316 SS ^[4]	SA-479 S31803	SA-479 S32760
19	Bonnet vent	Zytel®	Zytel®	Zytel ST801-BK10	Zytel ST801-BK10
20	Case bolt	A193-B8M SS ^[2]	A193-B8M SS ^[2]	SA193 Gr.B8M	SA193 Gr.B8M
21	Body bolt	A193-B8M SS ^[2]	A193-B8M SS ^[2]	SA193 Gr.B8M	SA193 Gr.B8M
22	Case/diaphragm seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
23	Bushing	A26-316 SS	A276-316 SS	SA-479 S31803	SA-479 S32760
24	Piston sleeve	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
25	Sleeve/case seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
26	Lower piston seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
27	Inlet nozzle seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
28	Outlet nozzle	A564-630 (17-4PH) SS	A479-316 SS	SA-479 S31803	SA-479 S32760
29	Upper outlet nozzle seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
30	Body plug seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
31	Spool seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
32	Lower outlet nozzle seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
33	Outlet seat	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
34	Spool	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
35	Diaphragm retainer washer	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
38	Sense plate	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
39	Lock washer	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
40	Diaphragm seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
41	Body/case seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
42	Diaphragm shield	PTFE-FEP	PTFE-FEP	Teflon®	Teflon®
43	Sense piston	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
44	Piston sense seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
45	Bonnet insert	(17-4PH) SS	(17-4PH) SS	SA-479 S31803	SA-479 S32760

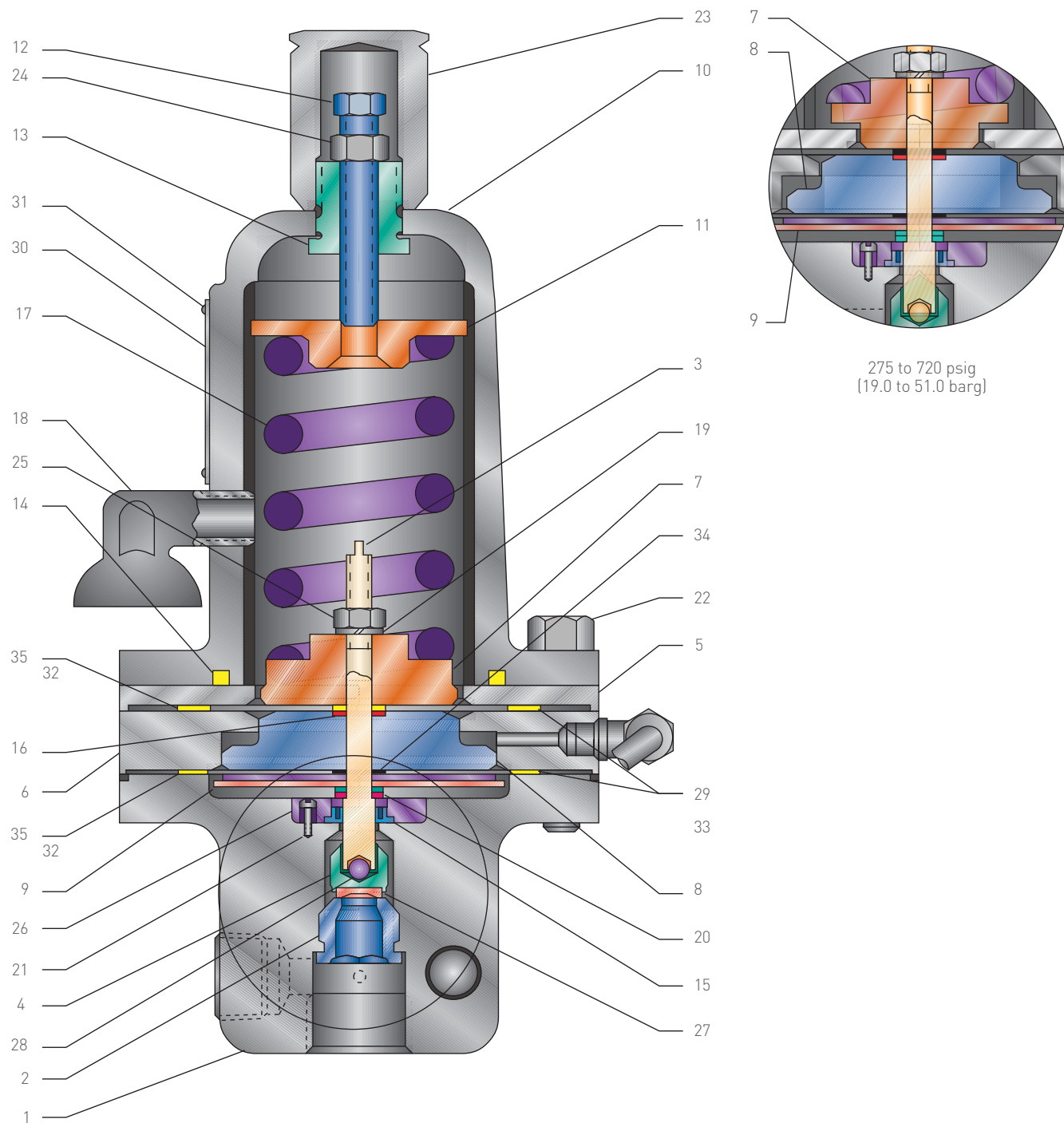
NOTES

1. 316 SS for set pressure range 15 to 65 psig (1.03 to 4.48 barg).
2. 302 SS for set pressure range 501 to 1480 psig (34.5 to 102.1 barg).
3. Inconel® optional.
4. A582-303 SS for cap with lift lever option.

ANDERSON GREENWOOD SERIES 500 PILOT

MATERIALS

FIGURE 22



ANDERSON GREENWOOD SERIES 500 PILOT

MATERIALS

MATERIALS OF CONSTRUCTION

Item	Description	/S1, /S, /S1/N, /S/N
1	Body	A351 GR. CF8M
2	Nozzle	A479-316 SS
3	Spindle	A276-316 SS
4	Socket/seat	A479-316 SS
5	Diaphragm support plate	A479-316 SS
6	Spacer ring	A479-316 SS
7	Sense plate	A479-316 SS
8	Boost plate	A479-316 SS
9	Diaphragm shield	A240-304 SS
10	Bonnet	A351-CF8M SS
11	Spring washer	A479-316 SS
12	Pressure adjustment screw	A276-316 SS
13	Bonnet insert	SA564-670 (17-4) SS
14	Bonnet seal	NBR
15	Spindle seal	PTFE ^[1]
16	Plate boost seal	PTFE
17	Spring	316 SS ^[2]
18	Bonnet vent	Aluminum
19	Lock washer ^[3]	316 SS
20	Shim washer	18-8 SS ^[4]
21	Retainer screw	18-8 SS ^[5]
22	Bolt	17-4 SS PH
23	Cap	316 SS ^[10]
24	Jam nut	A479-316 SS
25	Jam nut	18-8 SS
26	Seal retainer	A479-316 SS
27	Seat	PEEK
28	Ball	316 SS ^[6]
29	Diaphragm	PTFE-FEP Type L ^[7]
30	Nameplate	A240-304 SS
31	Drive screw	304 SS
32	Gasket ³	PTFE
33	Diaphragm	Hastelloy [®] [8]
34	Spindle gasket	PTFE-FEP
35	Gasket	PEEK ^[9]
36	Upper diaphragm shield	A240-304 SS

NOTES

1. Carbon filled PTFE seal Hastelloy[®] spring loaded.
2. 316 SS used 60 psig (4.14 barg) and below, 17-7 SS used 61 to 720 psig (4.21 to 49.6 barg).
3. Used 180 psig (12.4 barg) and below.
4. 316 SS annealed for NACE.
5. Monel[®] for NACE.
6. Hastelloy[®] C for NACE.
7. Upper and lower diaphragm, 15 to 30 psig (1.03 to 2.07 barg), lower diaphragm only, 31 to 120 psig (2.14 to 8.27 barg).
8. Upper diaphragm only 31 to 120 psig (2.14 to 8.27 barg), upper and lower diaphragm, 121 to 720 psig (8.34 to 49.6 barg).
9. Used above 180 psig (12.4 barg).
10. 303 SS cap used on bonnets with lift levers and/or gag.

FIGURE 23

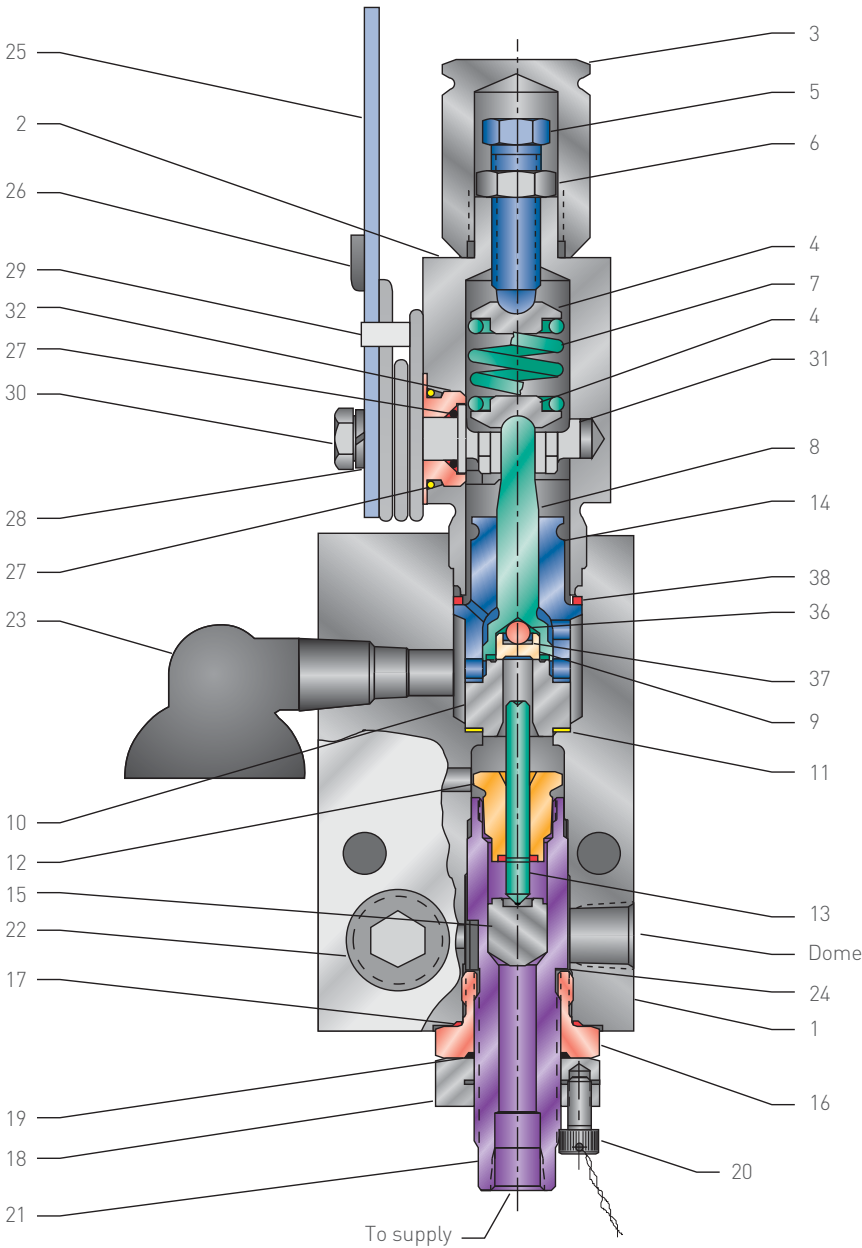
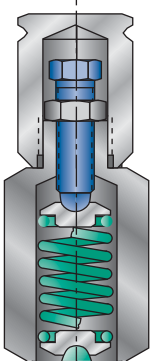
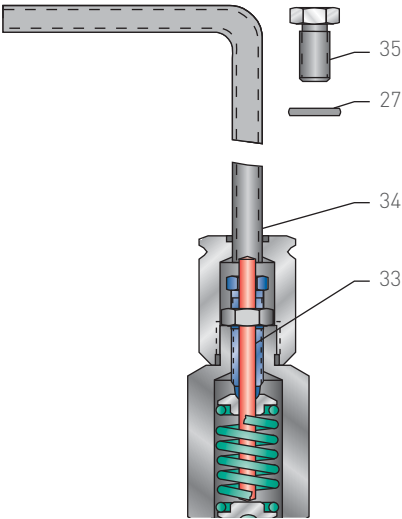


FIGURE 24
Optional Features

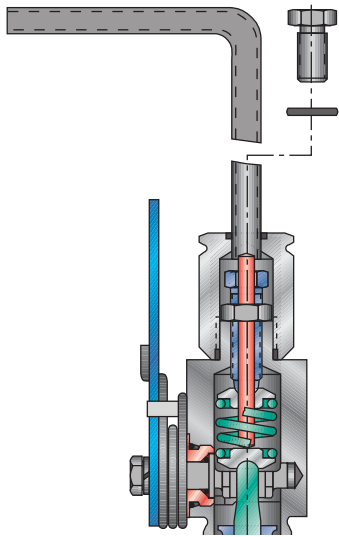
THREADED CAP



THREADED CAP AND GAG



LIFT LEVER AND GAG



ANDERSON GREENWOOD SERIES 700 PILOT

MATERIALS

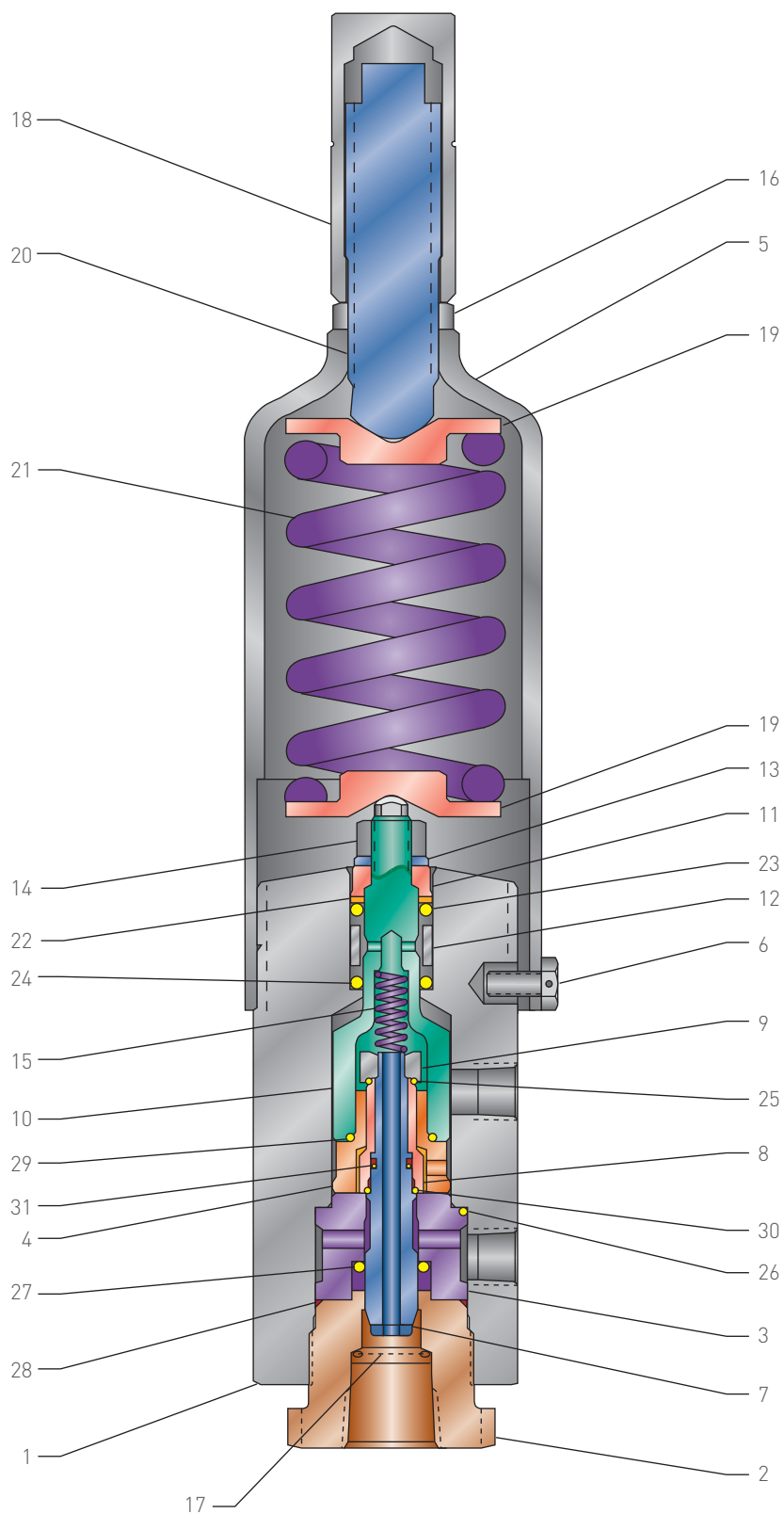
MATERIALS OF CONSTRUCTION

Item	Description	/S1, /S2, /S3, /S
1	Body	SS A479-316
2	Lift lever bonnet	SS A479-316
3	Cap	SS A479-316
4	Spring washer	SS A479-316
5	Adjusting screw	SS A479-316
6	Hex jam nut	SS 316
7	Spring	Inconel® X750
8	Spindle	SS 17-4
9	Disc	SS 17-4
10	Nozzle	SS 17-4
11	Nozzle seal	Grafoil®/SST
12	Reseat seat	SS 17-4
13	Spacer	SS 17-4
14	Cage guide	SS A479-316
15	Reseat piston	SS 17-4
16	Reseat bushing	SS A479-316
17	Thread seal	Grafoil®
18	Blowdown adjustment nut	SS A479-316
19	Blowdown adjustment packing	Grafoil®
20	Safety lock screw	SS 18-8
21	Blowdown adjustment screw	SS A479-316
22	½ NPT pipe plug	SS A479-316
23	Vent	Aluminum
24	Shim	SS 316
25	Lever	SS 316
26	Torsion spring	SS 316
27	O-ring	PTFE
28	Lock washer	SS 18-8
29	Roll pin	SS 420
30	¼-28 x ¼ bolt	SS 18-8
31	Cam	SS 316
32	Gland nut	SS A479-316
33	Gag rod	SS 300 or 4130 Alloy steel
34	Gag rod lever	SS 18-8
35	Bolt	SS A193-B8M
36	Ball	SS 440C
37	Disc spring washer	MP35N® Alloy
38	Bonnet spring washer	SS 17-4

ANDERSON GREENWOOD SERIES 800 PILOT

MATERIALS

FIGURE 25



ANDERSON GREENWOOD SERIES 800 PILOT

MATERIALS

MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	/S1, /S	/S1/N, /S/N	/D, /D/N	/P, /P/N
1	Body	A564-630 H1150 17-4 SS	A564-630 H1150 17-4 SS	SA-479 S31803	SA-479 S32760
2	Inlet bushing	A564-630 H1150 17-4 SS	A564-630 H1150 17-4 SS	SA-479 S32760	SA-479 S32760
3	Outlet nozzle	A564-630 H1150 17-4 SS	A564-630 H1150 17-4 SS	SA-479 S31803	SA-479 S32760
4	Inlet nozzle	A564-630 H1150 17-4 SS	A564-630 H1150 17-4 SS	SA-479 S31803	SA-479 S32760
5	Bonnet	A351-CF8M SS	A351-CF8M SS	SA-995 Gr.4A	SA-995 Gr.6A
6	Bonnet lock bolt	316 SS	316 SS	SA193 Gr.B8M	SA193 Gr.B8M
7	Inner spool	A564-630 H1150 17-4 SS	A564-630 H1150 17-4 SS	SA-479 S31803	SA-479 S32760
8	Outer spool	A564-630 H1150 17-4 SS	A564-630 H1150 17-4 SS	SA-479 S31803	SA-479 S32760
9	Spool nut	A564-630 H1150 17-4 SS	A564-630 H1150 17-4 SS	SA-479 S31803	SA-479 S32760
10	Feedback piston	A564-630 H1150 17-4 SS	A564-630 H1150 17-4 SS	SA-479 S31803	SA-479 S32760
11	Sense piston	A564-630 H1150 17-4 SS	A564-630 H1150 17-4 SS	SA-479 S31803	SA-479 S32760
12	Feedback spacer	A269-316 SS	A269-316 SS	SA-479 S31803	SA-479 S32760
13	Lock washer	316 SS	316 SS	SA-479 S31803	SA-479 S32760
14	Hex nut	A194-8M SS	A194-8M SS	SA-479 S31803	SA-479 S32760
15	Spool spring	Inconel® X-750	Inconel® X-750	Inconel® X-750	Inconel® X-750
16	Lock nut	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
17	Screen assembly	316 SS	316 SS	SB574-N10276 (HAST C-276)	SB574-N10276 (HAST C-276)
18	Cap	A582-303 SS	A582-303 SS	SA-479 S31803	SA-479 S32760
19	Spring washer	A479-316 SS	A479-316 SS	SA-479 S31803	SA-479 S32760
20	Pressure set screw	A564-630 H1150 17-4 SS	A564-630 H1150 17-4 SS	SA-479 S31803	SA-479 S32760
21	Set spring	17-7 SS ⁽¹⁾	Inconel® X-750 or MP35N	Inconel® X-750	Inconel® X-750
22	Piston seal backup ring	See Tables 1 and 2	FKM	Teflon®	Teflon®
23	Sense seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
24	Feedback seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
25	Inlet seat	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
26	Outlet nozzle seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
27	Spool seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
28	Inlet bushing seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
29	Inlet nozzle seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
30	Outlet seat	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2
31	Inner spool seal	See Tables 1 and 2	FKM	See Tables 1 and 2	See Tables 1 and 2

NOTE

1. Inconel® X-750 or MP35N for set pressures 3000 psig and higher.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

FLANGE RATINGS AND SOFT GOODS LIMITS

INLET FLANGE RATINGS

MAXIMUM PRESSURE RATING, psig (barg)

FLANGE CLASS	MATERIAL ⁽¹⁾	TEMPERATURE, °F (°C)								
		-423 to -21 [-253 to -30]	-20 to 100 [-29 to 38]	200 [93]	300 [149]	400 [205]	500 [260]	600 [316]	700 [371]	800 [427]
Class 150	CS	- - - -	285 (19.7)	260 (17.9)	230 (15.9)	200 (13.8)	170 (11.7)	140 (9.66)	110 (7.59)	80 (5.52)
	SS	275 (19.0)	275 (19.0)	240 (16.6)	215 (14.8)	195 (13.5)	170 (11.7)	140 (9.66)	110 (7.59)	80 (5.52)
Class 300	CS	- - - -	740 (51.0)	675 (46.6)	655 (45.2)	635 (43.8)	600 (41.4)	550 (37.9)	535 (36.9)	410 (28.3)
	SS	720 (49.6)	720 (49.7)	620 (42.8)	560 (38.6)	515 (35.5)	480 (33.1)	450 (31.0)	430 (29.7)	415 (28.6)
Class 600	CS	- - - -	1480 (102.1)	1350 (93.1)	1315 (90.7)	1270 (87.6)	1200 (82.8)	1095 (75.5)	1065 (73.4)	825 (56.9)
	SS	1440 (99.3)	1440 (99.3)	1240 (85.5)	1120 (77.2)	1030 (71.0)	955 (65.9)	905 (62.4)	865 (59.7)	830 (57.2)
Class 900	CS	- - - -	2220 (153.1)	2025 (139.6)	1970 (135.8)	1900 (131.0)	1795 (123.8)	1640 (113.1)	1600 (110.3)	1235 (85.2)
	SS	2160 (149.0)	2160 (149.0)	1860 (128.3)	1680 (115.8)	1540 (106.2)	1435 (99.0)	1355 (93.5)	1275 (87.9)	1245 (85.9)
Class 500	CS	- - - -	3705 (255.5)	3375 (232.7)	3280 (226.2)	3170 (218.6)	2995 (206.6)	- - - -	- - - -	- - - -
	SS	3600 (248.2)	3600 (248.2)	3095 (213.4)	2795 (192.7)	2570 (177.2)	2390 (164.8)	- - - -	- - - -	- - - -
Class 2500	CS	- - - -	6170 (425.4)	5625 (387.8)	5470 (377.2)	5280 (364.1)	4990 (344.1)	- - - -	- - - -	- - - -
	SS	6000 (413.7)	6000 (413.8)	5160 (355.8)	4660 (321.3)	4280 (295.1)	3980 (274.5)	- - - -	- - - -	- - - -

NOTES

- CS: SA216, Grade WCB.
SS: SA351, Grade CF8M.
- Ratings at temperatures at and above -20°F (-29°C) per ANSI B16.34.

OUTLET FLANGE RATINGS

The outlet flange of any PRV should be selected based on the back pressure developed at the flange during a relief cycle or worst case scenario.

As an example, for valves that are installed to discharge through a tailpipe to atmosphere, the following maximum set pressures can be accommodated. These are calculated based on:

- Schedule 40 tailpipe, absolute roughness 0.00015, L/D = 15
- Total actual valve capacity at 10% overpressure
- Compressible flow (k = 1.4)
- Carbon steel bodied valves (SS valve ratings are at 97% of those listed)

RECOMMENDED SOFT GOODS LIMITS

All valves except the Series 700 require the use of soft goods for their seats and seals. To assist in selecting acceptable soft goods, please note the following:

- Choose the main valve seat material based on set pressure and relieving temperature (non-fire case) or operating temperature (fire case) from pages 43-49.
- Choose the main valve seal based on relieving temperature (non-fire case) or operating temperature (fire case) from page 50.
- Choose the pilot valve seat and seal based on set pressure and relieving temperature (non-fire case) or operating temperature (fire case) from page 50.
- The final soft goods selected should be chemically compatible with the lading fluid.

SIZE	ORIFICE	OUTLET FLANGE	MAXIMUM SET PRESSURE,
			psig (barg)
1.5 x 2	Full bore	Class 300	2101 (144)
2 x 3	J	Class 300	4624 (318)
2 x 3	Full bore	Class 150	952 (65)
3 x 4	L	Class 150	1426 (98)
3 x 4	L	Class 300	3630 (250)
3 x 4	Full bore	Class 150	710 (49)
3 x 4 x 4	Full bore	Class 300	3638 (250)
4 x 6	P	Class 150	1426 (98)
4 x 6	P	Class 300	3630 (250)
4 x 6	Full bore	Class 150	1027 (70)
4 x 6 x 6	Full bore	Class 150	2068 (142)
6 x 8	Q	Class 150	1454 (100)
6 x 8	R	Class 150	1020 (70)
6 x 8	Full bore	Class 150	822 (56)
8 x 8 x 8	Full bore	Class 150	1204 (83)
8 x 10	T	Class 150	985 (67)
8 x 10	Full bore	Class 150	691 (47)
8 x 10 x 10	Full bore	Class 150	1394 (96)

ANDERSON GREENWOOD

SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

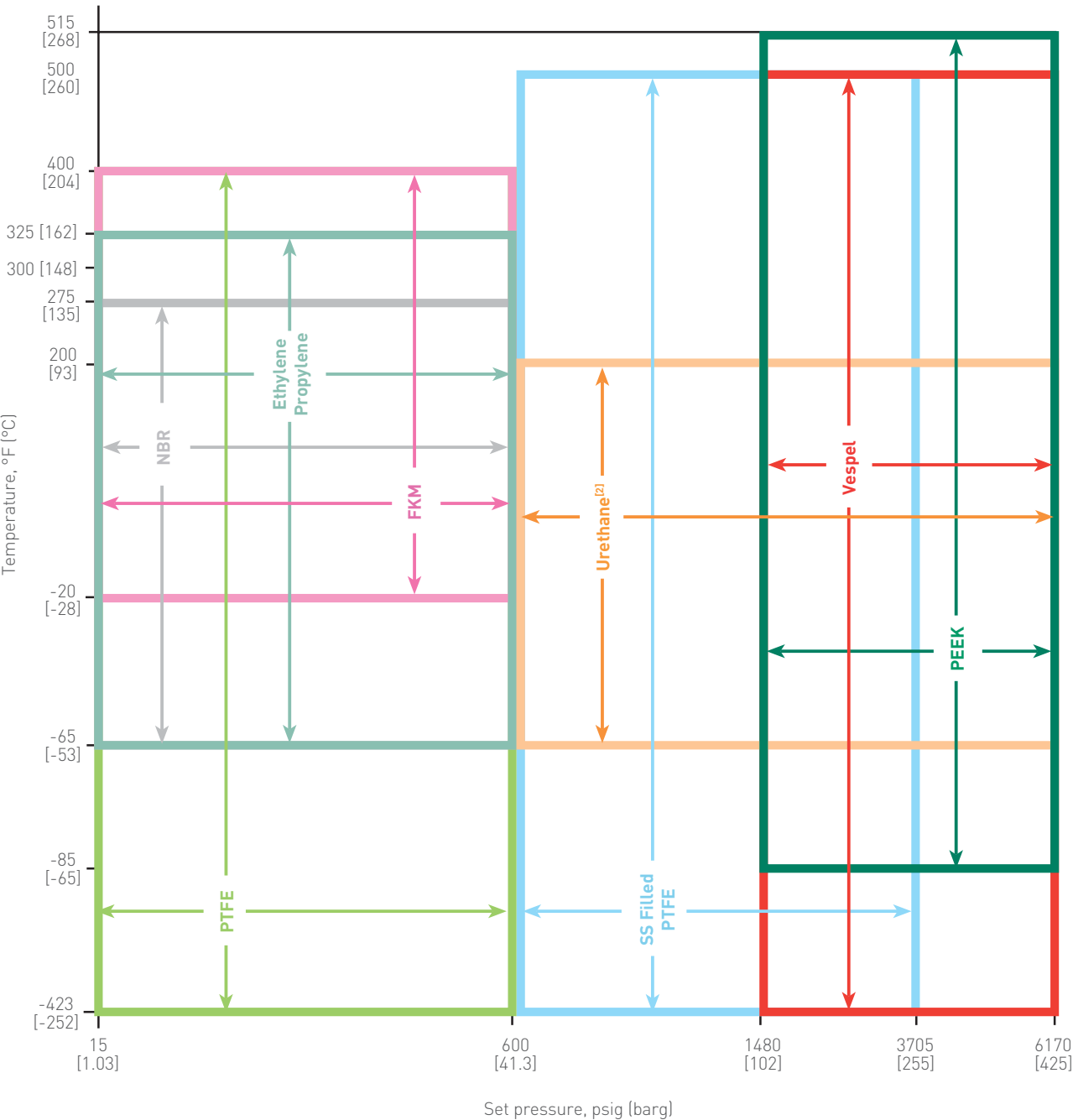
RECOMMENDED SOFT GOODS

MAIN VALVE SEAT – TYPES 243/253, 443/453, 843/853, 249/259^[1]

ORIFICE	MAIN VALVE	NOTES
D, E, F	1 x 2	1. Select PTFE or filled PTFE seat only.
	1.5 x 2	2. Urethane seat not available with Series 800 pilot.
	1.5 x 2	3. Available seat materials are dependent upon pilot series selected.
G, H	1.5 x 3	

PILOT	MINIMUM SET, psig (barg)	MAXIMUM SET, psig (barg)
200	25 (1.72)	6170 (425)
400	15 (1.03)	1480 (102)
800	1481 (102)	6170 (425)

FIGURE 26



ANDERSON GREENWOOD

SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

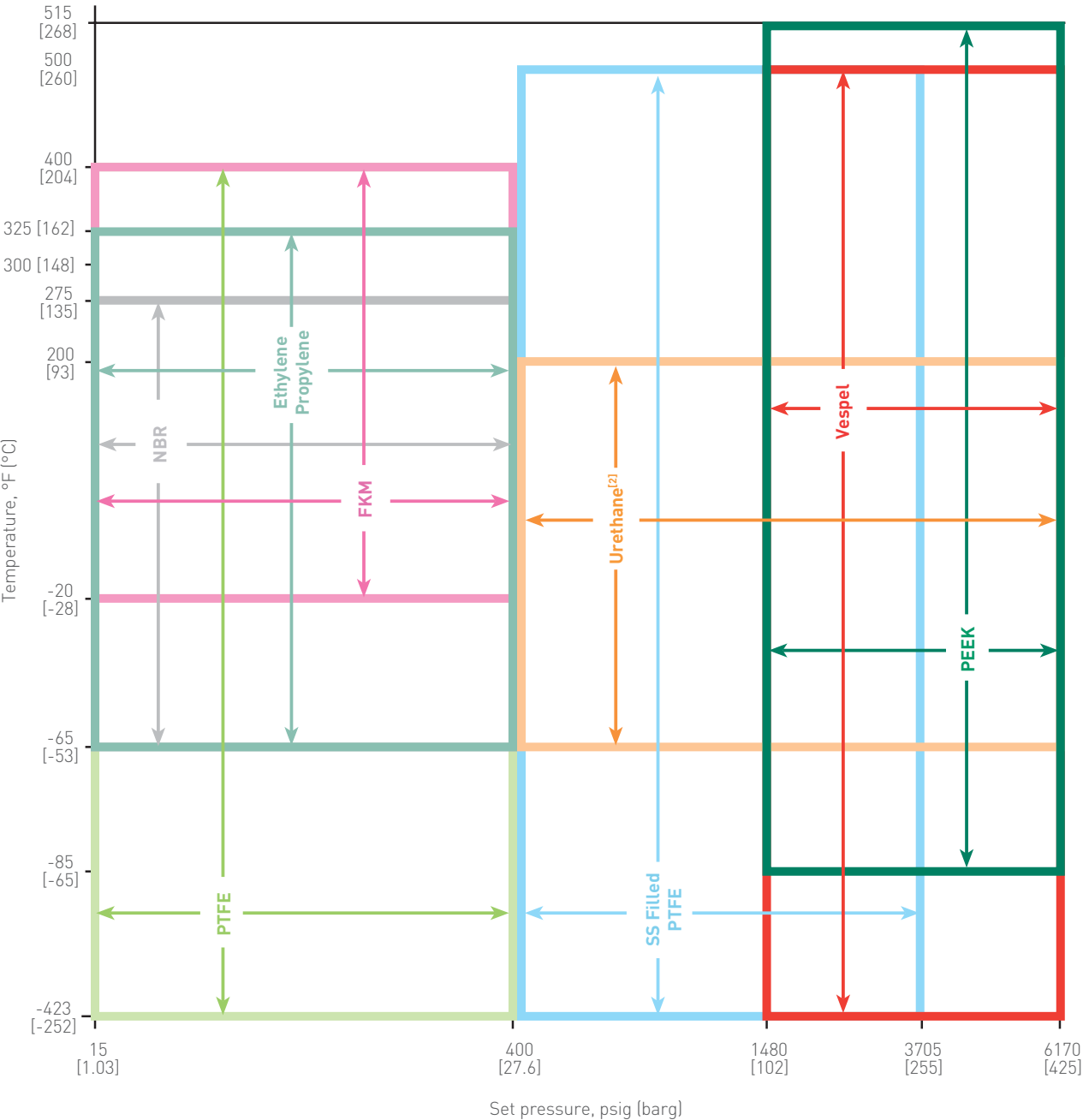
RECOMMENDED SOFT GOODS

MAIN VALVE SEAT – TYPES 243/253/263, 443/453/463, 843/853/863, 249/259/269^[1]

ORIFICE	MAIN VALVE	NOTES
Full bore	1.5 x 2	1. Select PTFE or filled PTFE seat only.
G, H, J	2 x 3	2. Urethane seat not available with Series 800 pilot.
Full bore	2 x 3	3. Available seat materials are dependent upon pilot series selected.
	2 x 3 x 3	
J, K, L	3 x 4	

PILOT	MINIMUM SET, psig (barg)	MAXIMUM SET, psig (barg)
200	25 (1.72)	6170 (425)
400	15 (1.03)	1480 (102)
800	1481 (102)	6170 (425)

FIGURE 27



ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

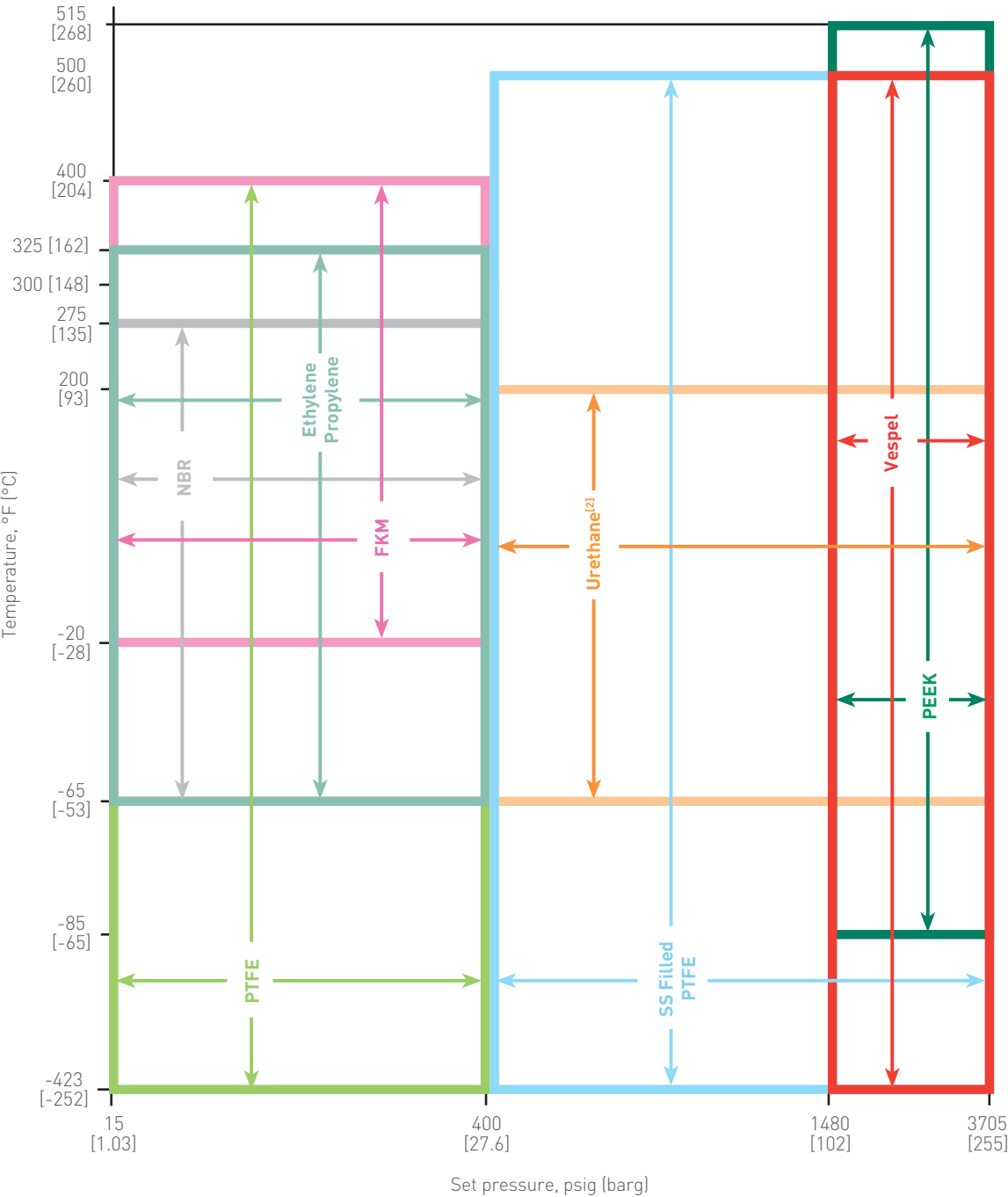
RECOMMENDED SOFT GOODS

MAIN VALVE SEAT – TYPES 243/253/263, 443/453/463, 843/853/863, 249/259/269⁽¹⁾

ORIFICE	MAIN VALVE	NOTES
Full bore	3 x 4	1. Select PTFE or filled PTFE seat only.
	3 x 4 x 4	2. Urethane seat not available with Series 800 pilot.
L, M, N, P	4 x 6	3. Available seat materials are dependent upon pilot series selected.

PILOT	MINIMUM SET, psig (barg)	MAXIMUM SET, psig (barg)
200	25 (1.72)	3705 (255)
400	15 (1.03)	1480 (102)
800	1481 (102)	3705 (255)

FIGURE 28



ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

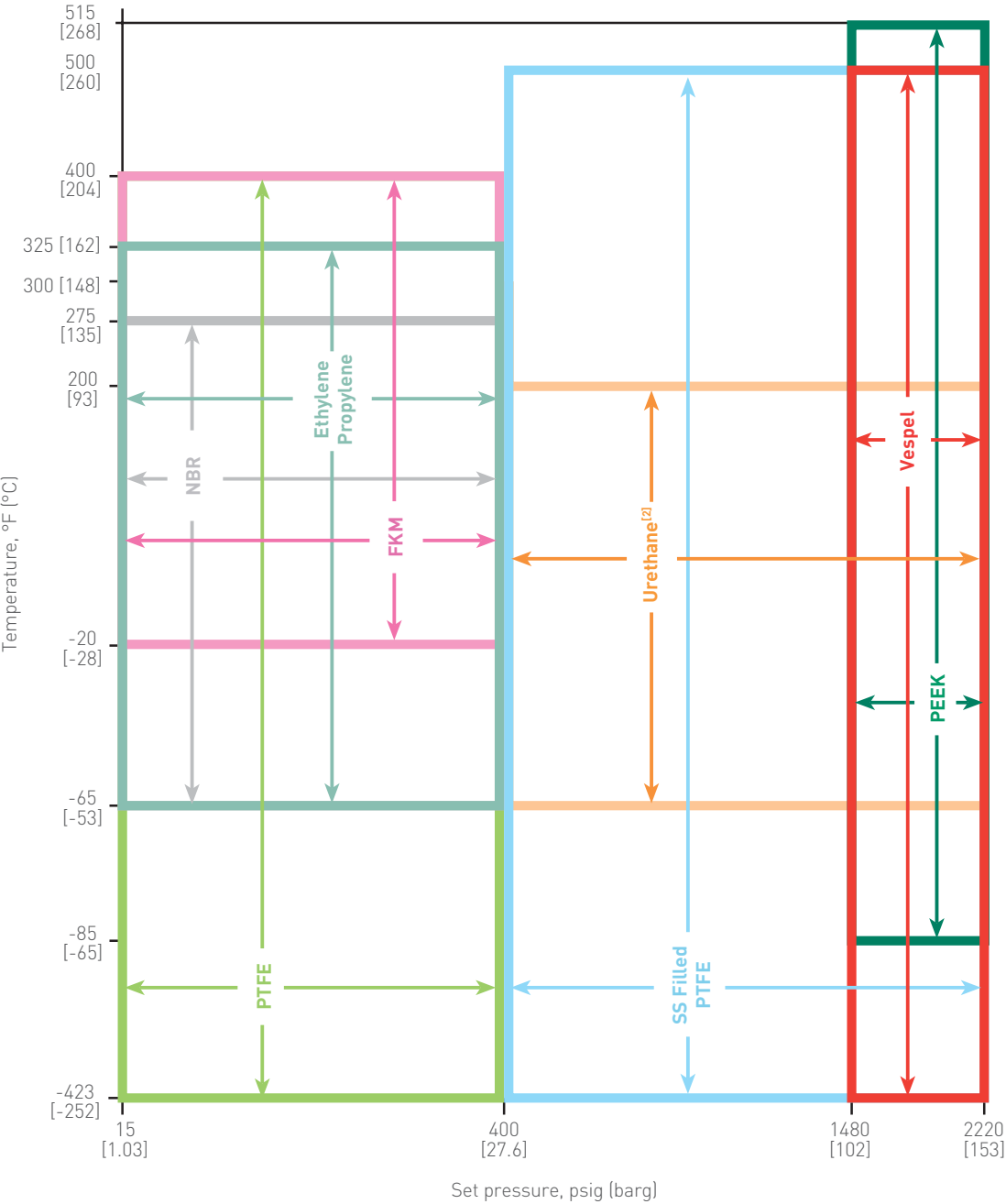
RECOMMENDED SOFT GOODS

MAIN VALVE SEAT – TYPES 263, 463, 863, 269^[1]

ORIFICE		MAIN VALVE	NOTES
Full bore		4 x 6 4 x 6 x 6	

PILOT	MINIMUM SET, psig (barg)	MAXIMUM SET, psig (barg)
200	25 (1.72)	2220 (153)
400	15 (1.03)	1480 (102)
800	1481 (102)	2220 (153)

FIGURE 29



ANDERSON GREENWOOD

SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

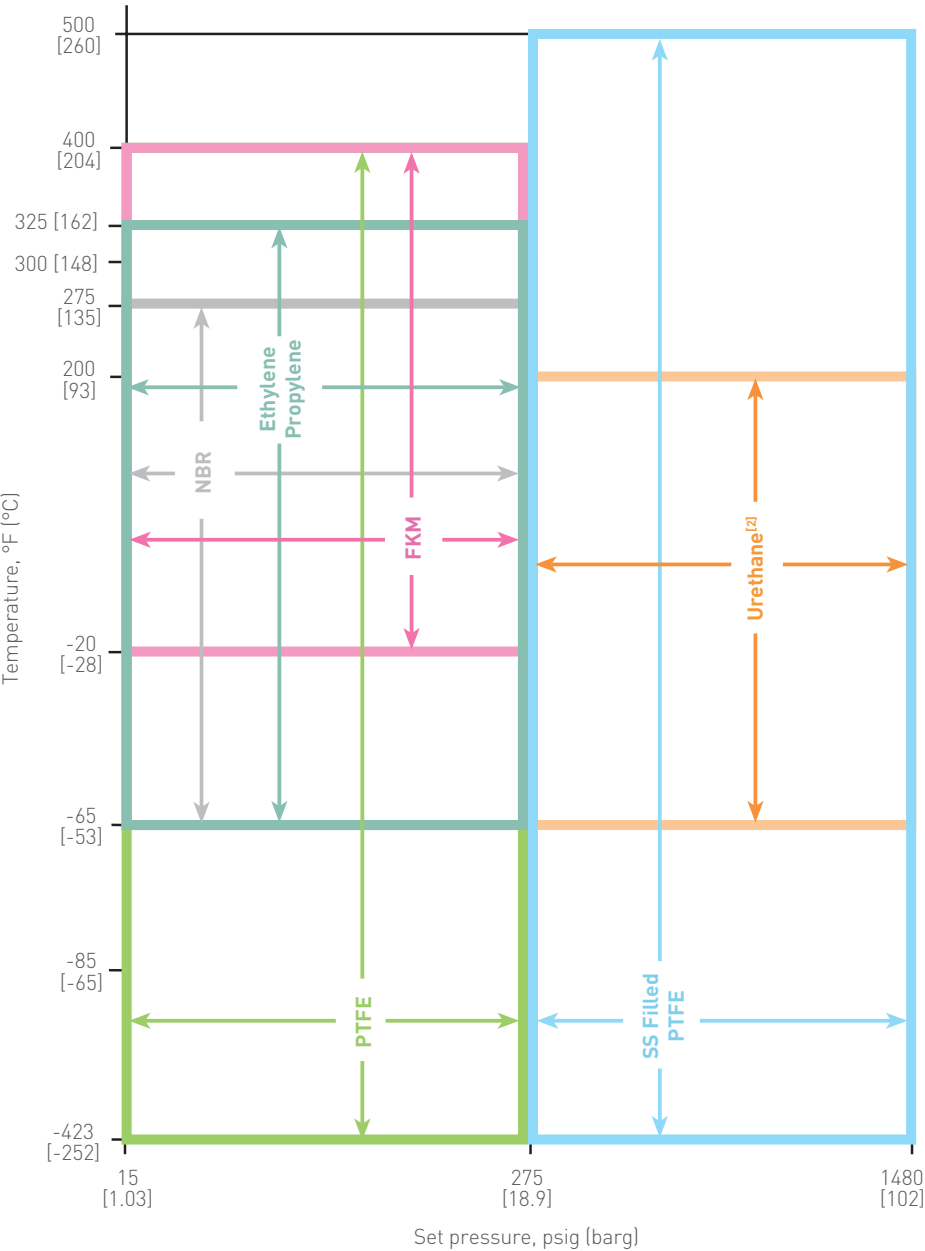
RECOMMENDED SOFT GOODS

MAIN VALVE SEAT – TYPES 243/253/263, 443/453/463, 249/259/269^[1]

ORIFICE	MAIN VALVE	NOTES
Q, R	6 x 8	1. Select PTFE or filled PTFE seat only.
Full bore	6 x 8 or 6 x 8 x 8	2. Available seat materials are dependent upon pilot series selected.
Full bore	8 x 8 x 8	
T	8 x 10	
Full bore	8 x 10	

PILOT	MINIMUM SET, psig (barg)	MAXIMUM SET, psig (barg)
200	25 (1.72)	1480 (102)
400	15 (1.03)	1480 (102)

FIGURE 30



ANDERSON GREENWOOD

SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

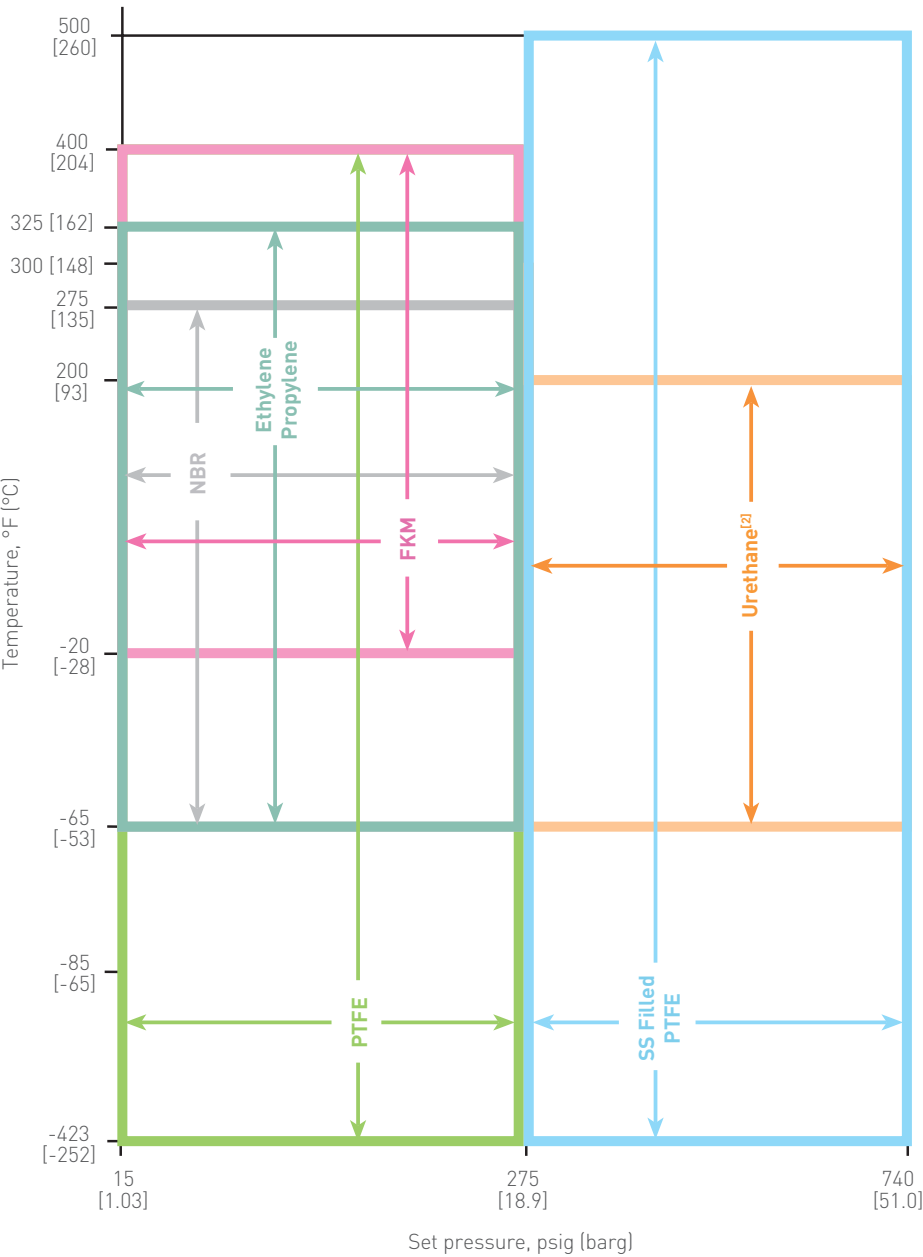
RECOMMENDED SOFT GOODS

MAIN VALVE SEAT – TYPES 243/253/263, 443/453/463, 249/259/269^[1]

ORIFICE	MAIN VALVE	NOTES
Full bore	10 x 14	1. Select PTFE or filled PTFE seat only.
		2. Available seat materials are dependent upon pilot series selected.

PILOT	MINIMUM SET, psig (barg)	MAXIMUM SET, psig (barg)
200	25 (1.72)	740 (51.0)
400	15 (1.03)	740 (51.0)

FIGURE 31

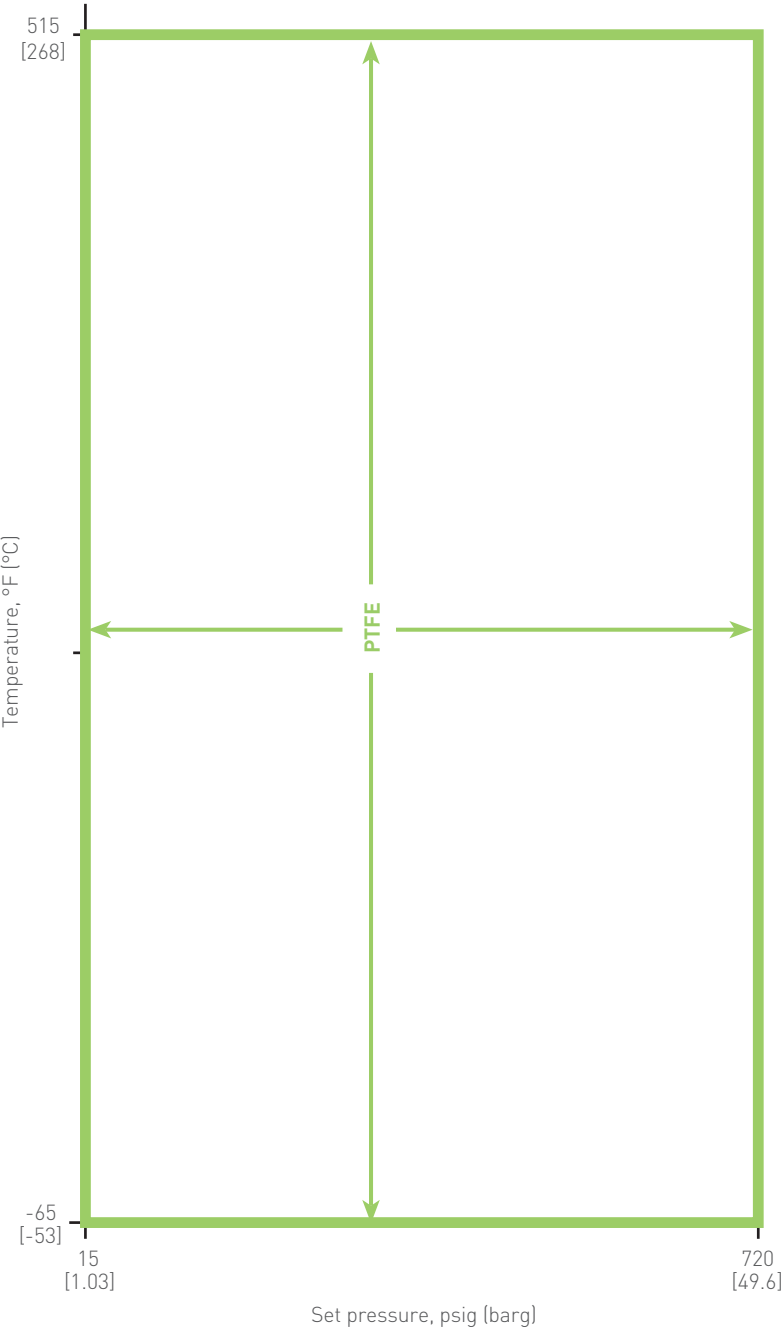


ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES
RECOMMENDED SOFT GOODS

MAIN VALVE SEAT – TYPES 546/566

ORIFICE	MAIN VALVE
All	All

FIGURE 32



ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

RECOMMENDED SOFT GOODS

MAIN VALVE SEALS

VALVE TYPE	MATERIAL	TEMPERATURE, °F (°C)		PRESSURE, psig (barg)	
		Minimum	Maximum	Minimum	Maximum ^[1]
243/253/263	NBR	-65 [-53]	275 [135]	25 [1.72]	6170 [425]
	FKM	-20 [-28]	400 [204]	25 [1.72]	6170 [425]
	Ethylene Propylene ^[2]	-65 [-53]	300 [148]	25 [1.72]	6170 [425]
	Aflas ^[2]	22 [-5.6]	400 [204]	25 [1.72]	6170 [425]
	Perfluoroelastomer (FFKM) ^[2]	0 [-18]	550 [287]	25 [1.72]	6170 [425]
443/453/463	NBR	-65 [-53]	275 [135]	15 [1.03]	1480 [102]
	FKM	-20 [-28]	400 [204]	15 [1.03]	1480 [102]
	Ethylene Propylene ^[2]	-65 [-53]	300 [148]	15 [1.03]	1480 [102]
	Aflas ^[2]	22 [-5.6]	400 [204]	100 [6.90]	1480 [102]
	FFKM ^[2]	0 [-18]	550 [287]	100 [6.90]	1480 [102]
843/853/863	NBR	-65 [-53]	275 [135]	1481 [102]	6170 [425]
	FKM	-20 [-28]	400 [204]	1481 [102]	6170 [425]
	Ethylene Propylene ^[2]	-65 [-53]	300 [148]	1481 [102]	6170 [425]
	Aflas ^[2]	22 [-5.6]	400 [204]	1481 [102]	6170 [425]
	FFKM ^[2]	0 [-18]	550 [287]	1481 [102]	6170 [425]
546/566	PTFE	-423 [-252]	515 [268]	15 [1.03]	720 [49.6]
249/259/269	PTFE	-423 [-252]	275 [135]	25 [1.72]	1480 [102]

PILOT VALVE SEAT AND SEALS

VALVE TYPE	MATERIAL	TEMPERATURE, °F (°C)		PRESSURE, psig (barg)	
		Minimum	Maximum	Minimum	Maximum ^[1]
243/253/263	NBR	-65 [-53]	275 [135]	25 [1.72]	6170 [425]
	FKM	-40 [-40]	400 [204]	25 [1.72]	6170 [425]
	Ethylene Propylene ^[2]	-65 [-53]	300 [148]	25 [1.72]	6170 [425]
	Aflas ^[2]	22 [-5.6]	400 [204]	25 [1.72]	6170 [425]
	FFKM ^[2]	0 [-18]	550 [287]	25 [1.72]	6170 [425]
443/453/463	NBR	-65 [-53]	275 [135]	15 [1.03]	1480 [102]
	FKM	-40 [-40]	400 [204]	15 [1.03]	1480 [102]
	Ethylene Propylene ^[2]	-65 [-53]	300 [148]	15 [1.03]	1480 [102]
	Aflas ^[2]	22 [-5.6]	400 [204]	100 [6.90]	1480 [102]
	FFKM ^[2]	0 [-18]	550 [287]	100 [6.90]	1480 [102]
843/853/863	NBR	-40 [-40]	250 [121]	1481 [102]	6170 [425]
	FKM	-40 [-40]	400 [204]	1481 [102]	6170 [425]
	Ethylene Propylene	-10 [-23]	400 [204]	1481 [102]	6170 [425]
	Aflas ^[2]	22 [-5.6]	400 [204]	1481 [102]	6170 [425]
	FFKM ^[2]	0 [-18]	550 [287]	1481 [102]	6170 [425]
546/566	PEEK/PTFE	-20 [-28]	515 [268]	15 [1.03]	720 [48.6]
249/259/269	NBR	-423 [-252]	275 [135]	25 [1.72]	1480 [102]

NOTES

1. Maximum pressure is limited by main valve size.
2. Higher temperature limits available, please consult the factory for specific applications.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

DIMENSIONS AND WEIGHTS

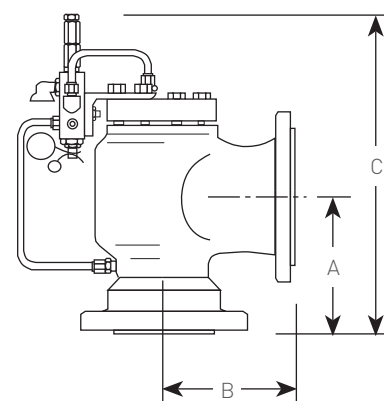
FLANGED – TYPES 243/249/253/259, 443/453, 546, 843/853

SIZE, In. (DN)	AVAILABLE EQUIVALENT FLOW AREAS	INLET FLANGE, RF OR RJ	OUTLET FLANGE, RF ⁽¹⁾	DIMENSIONS, In. (mm)			APPROXIMATE WEIGHT ⁽³⁾ , lbs (kg)
				A	B	C Approx. ⁽²⁾	
1 x 2 (25 x 50)	D, E, F	1 in. – Class 150	2 in. – Class 150	4.12 (105)	4.50 (114)	17 (430)	26 (11.8)
1 x 2 (25 x 50)	D, E, F	1 in. – Class 300	2 in. – Class 150	4.38 (111)	4.50 (114)	17 (430)	27 (12.3)
1 x 2 (25 x 50)	D, E, F	1 in. – Class 600	2 in. – Class 150	4.38 (111)	4.50 (114)	17 (430)	28 (12.7)
1 x 2 (25 x 50)	D, E, F	1 in. – Class 900	2 in. – Class 300	4.94 (126)	4.75 (121)	21 (534)	35 (15.9)
1 x 2 (25 x 50)	D, E, F	1 in. – Class 1500	2 in. – Class 300	4.94 (126)	4.75 (121)	21 (534)	35 (15.9)
1 x 2 (25 x 50)	D, E, F	1 in. – Class 2500	2 in. – Class 300	4.94 (126)	4.75 (121)	21 (534)	39 (17.7)
1½ x 2 (40 x 50)	D, E, F	1½ in. – Class 150	2 in. – Class 150	4.87 (124)	4.75 (121)	18 (448)	29 (13.2)
1½ x 2 (40 x 50)	D, E, F	1½ in. – Class 300	2 in. – Class 150	4.87 (124)	4.75 (121)	18 (448)	33 (15.0)
1½ x 2 (40 x 50)	D, E, F	1½ in. – Class 600	2 in. – Class 150	4.87 (124)	4.75 (121)	18 (448)	33 (15.0)
1½ x 2 (40 x 50)	D, E, F	1½ in. – Class 900	2 in. – Class 300	5.87 (149)	5.50 (140)	22 (557)	44 (20.0)
1½ x 2 (40 x 50)	D, E, F	1½ in. – Class 1500	2 in. – Class 300	5.87 (149)	5.50 (140)	22 (557)	44 (20.0)
1½ x 2 (40 x 50)	D, E, F	1½ in. – Class 2500	2 in. – Class 300	5.87 (149)	5.50 (140)	22 (557)	55 (25.0)
1½ x 3 (40 x 80)	G, H	1½ in. – Class 150	3 in. – Class 150	5.12 (130)	4.87 (124)	19 (482)	38 (17.3)
1½ x 3 (40 x 80)	G, H	1½ in. – Class 300	3 in. – Class 150	5.12 (130)	4.87 (124)	19 (482)	42 (19.1)
1½ x 3 (40 x 80)	G, H	1½ in. – Class 600	3 in. – Class 150	5.12 (130)	4.87 (124)	19 (482)	42 (19.1)
1½ x 3 (40 x 80)	G, H	1½ in. – Class 900	3 in. – Class 300	6.38 (162)	6.75 (172)	23 (584)	48 (21.8)
1½ x 3 (40 x 80)	G, H	1½ in. – Class 1500	3 in. – Class 300	6.38 (162)	6.75 (172)	23 (584)	48 (21.8)
1½ x 3 (40 x 80)	G, H	1½ in. – Class 2500	3 in. – Class 300	6.38 (162)	6.75 (172)	23 (584)	65 (29.5)
2 x 3 (50 x 80)	G, H, J	2 in. – Class 150	3 in. – Class 150	5.37 (136)	4.87 (124)	19 (482)	50 (22.7)
2 x 3 (50 x 80)	G, H, J	2 in. – Class 300	3 in. – Class 150	5.37 (136)	4.87 (124)	19 (482)	52 (23.6)
2 x 3 (50 x 80)	G, H, J	2 in. – Class 600	3 in. – Class 150	5.37 (136)	4.87 (124)	19 (482)	53 (26.4)
2 x 3 (50 x 80)	G, H, J	2 in. – Class 900	3 in. – Class 300	6.56 (167)	6.75 (172)	23 (591)	79 (35.9)
2 x 3 (50 x 80)	G, H, J	2 in. – Class 1500	3 in. – Class 300	6.56 (167)	6.75 (172)	23 (591)	79 (35.9)
2 x 3 (50 x 80)	G, H, J	2 in. – Class 2500	3 in. – Class 300	7.00 (178)	6.75 (172)	24 (601)	95 (43.2)

NOTES

- Higher rated outlet flanges available on special order.
- Series 200 pilot only. Add 5 in. (127 mm) for Series 400 and 800 pilots and 7 in. (178 mm) for Series 500 pilot.
- Series 200 pilot only. Add 12 lbs. (5.44 kg) for Series 400, 6 lbs. (2.72 kg) for Series 800 and 8 lbs. (3.63 kg) for Series 500 pilots.
- For DS option, refer to API 526 direct spring center-to-face dimensions table or Crosby J-Series catalog for A and B dimensions.
- Extra 0.5 in. (12.7 mm) longer stud bolt length may be required for installation.

FIGURE 34



ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

DIMENSIONS AND WEIGHTS

FLANGED – TYPES 243/249/253/259, 443/453, 546, 843/853

SIZE, In. (DN)	AVAILABLE EQUIVALENT FLOW AREAS	INLET FLANGE, RF OR RJ	OUTLET FLANGE, RF ^[1]	DIMENSIONS, In. (mm)			APPROXIMATE WEIGHT ^[2] , lbs (kg)
				A	B	C Approx. ^[2]	
3 x 4 (80 x 100)	J, K, L	3 in. – Class 150	4 in. – Class 150	6.13 (156)	6.38 (162)	20 (508)	86 (39.1)
3 x 4 (80 x 100)	J, K, L	3 in. – Class 300	4 in. – Class 150	6.13 (156)	6.38 (162)	20 (508)	90 (41.0)
3 x 4 (80 x 100)	J, K, L	3 in. – Class 600	4 in. – Class 150	6.38 (162)	6.38 (162)	20 (508)	92 (41.8)
3 x 4 (80 x 100)	J, K, L	3 in. – Class 900	4 in. – Class 300	7.50 (191)	7.12 (181)	25 (635)	121 (55.0)
3 x 4 (80 x 100)	J, K, L	3 in. – Class 1500	4 in. – Class 300	7.50 (190.5)	7.12 (181)	25 (635)	138 (62.7)
4 x 6 (100 x 150)	L, M, N, P	4 in. – Class 150	6 in. – Class 150	7.75 (197)	8.25 (210)	23 (584)	138 (62.7)
4 x 6 (100 x 150)	L, M, N, P	4 in. – Class 300	6 in. – Class 150	7.75 (197)	8.25 (210)	23 (584)	148 (69.3)
4 x 6 (100 x 150)	L, M, N, P	4 in. – Class 600	6 in. – Class 150	7.75 (197)	8.25 (210)	23 (584)	158 (71.8)
4 x 6 (100 x 150)	L, M, N, P	4 in. – Class 900	6 in. – Class 300	9.81 (249)	9.19 (233)	29 (736)	228 (103.6)
4 x 6 (100 x 150)	L, M, N, P	4 in. – Class 1500	6 in. – Class 300	9.81 (249)	9.19 (233)	29 (736)	248 (112.7)
6 x 8 (150 x 200)	Q, R	6 in. – Class 150	8 in. – Class 150	9.44 (240)	9.50 (241)	26 (660)	245 (111.4)
6 x 8 (150 x 200)	Q, R	6 in. – Class 300	8 in. – Class 150(4)	9.44 (240)	9.50 (241)	26 (660)	264 (120.0)
6 x 8 (150 x 200)	Q, R	6 in. – Class 600	8 in. – Class 150(4)	9.70 (246)	9.50 (241)	26 (660)	308 (140.0)
8 x 10 (200 x 250)	T	8 in. – Class 150	10 in. – Class 150	10.88 (276)	11.06 (281)	30 (762)	516 (234.5)
8 x 10 (200 x 250)	T	8 in. – Class 300	10 in. – Class 150	10.88 (276)	11.06 (281)	30 (762)	544 (247.3)
8 x 10 (200 x 250)	T	8 in. – Class 600	10 in. – Class 150	11.68 (297)	11.06 (281)	30 (762)	585 (265.9)

THREADED – TYPES 243/253, 443/453, 843/853

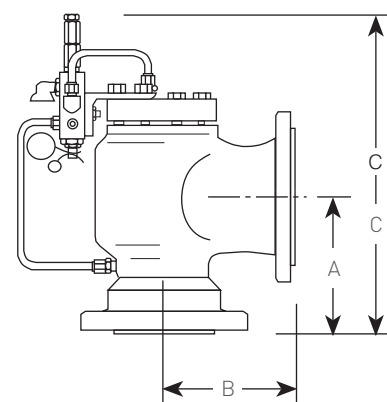
SIZE, In. (DN)	AVAILABLE EQUIVALENT	INLET, In. (mm)	OUTLET, In. (mm)	DIMENSIONS, In. (mm)			APPROXIMATE WEIGHT ^[2] , lbs (kg)
				A	B	C Approx. ^[2]	
1 x 2 (25 x 50)	D, E, F	1 (25)	2 (50)	3.57 (91)	2.88 (73)	17 (431)	22 (10.0)
1½ x 2 (40 x 50)	D, E, F	1½ (40)	2 (50)	3.57 (91)	2.88 (73)	17 (431)	22 (10.0)
1½ x 2 (40 x 50)	G, H	1½ (40)	2 (50)	3.75 (95)	3.75 (95)	17 (431)	27 (12.3)

NOTES

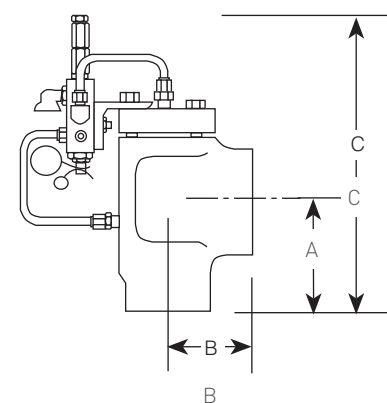
- Higher rated outlet flanges available on special order.
- Series 200 pilot only. Add 5 in. (127 mm) for Series 400 and 800 pilots and 7 in. (178 mm) for Series 500 pilot.
- Series 200 pilot only. Add 12 lbs. (5.44 kg) for Series 400, 6 lbs. (2.72 kg) for Series 800 and 8 lbs. (3.63 kg) for Series 500 pilots.
- 10 in. (DN 250) outlet flange available on special order for R orifice when specified with Class 300 or 600 inlet.
- For DS option, refer to API 526 direct spring center-to-face dimensions table or Crosby J-Series catalog for A and B dimensions.
- Extra 0.5 in. (12.7 mm) longer stud bolt length may be required for installation.

FIGURE 35

FLANGED



THREADED



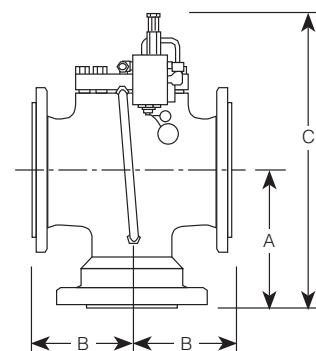
ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

DIMENSIONS AND WEIGHTS

TYPE 263/269⁽¹⁾, 463, 566, 863

SIZE, In. (DN)	INLET FLANGE	OUTLET FLANGE	DIMENSIONS, In. (mm)				APPROXIMATE WEIGHT ⁽⁴⁾	
			A		B	C	Single	Dual
			RF	RTJ	RF	Approx. ⁽³⁾	lbs (kg)	lbs (kg)
1½ x 2 (40 x 50)	Class 150 RF or RTJ	Class 150 RF	3.62 (92)	3.87 (98)	4.50 (114)	18 (457)	31 (14.1)	----
1½ x 2 (40 x 50)	Class 300 RF or RTJ	Class 150 RF	3.75 (95)	4.00 (102)	4.50 (114)	18 (457)	34 (15.5)	----
1½ x 2 (40 x 50)	Class 600 RF or RTJ	Class 300 RF	4.06 (103)	4.06 (103)	5.24 (133)	18 (457)	38 (17.3)	----
1½ x 2 (40 x 50)	Class 900 RF or RTJ	Class 300 RF	4.43 (113)	4.43 (113)	5.24 (133)	22 (558)	48 (21.8)	----
1½ x 2 (40 x 50)	Class 1500 RF or RTJ	Class 300 RF	4.43 (113)	4.43 (113)	5.24 (133)	22 (558)	48 (21.8)	----
2 x 3 (50 x 80) or 2 x 3 x 3 (50 x 80 x 80)	Class 150 RF or RTJ	Class 150 RF	4.56 (115)	4.81 (122)	5.31 (135)	19 (482)	55 (25.0)	75 (34.1)
2 x 3 (50 x 80) or 2 x 3 x 3 (50 x 80 x 80)	Class 300 RF or RTJ	Class 150 RF	4.69 (119)	5.00 (127)	5.31 (135)	19 (482)	57 (26.0)	77 (35.0)
2 x 3 (50 x 80) or 2 x 3 x 3 (50 x 80 x 80)	Class 600 RF or RTJ	Class 150 RF	5.06 (129)	5.12 (130)	5.31 (135)	19 (482)	58 (26.0)	78 (35.0)
2 x 3 x 3 (50 x 80 x 80)	Class 900 RF or RTJ	Class 300 RF	5.69 (145)	5.75 (146)	7.16 (182)	24 (619)	----	108 (49.1)
2 x 3 x 3 (50 x 80 x 80)	Class 1500 RF or RTJ	Class 300 RF	5.69 (145)	5.75 (146)	7.16 (182)	24 (619)	----	108 (49.1)
3 x 4 (80 x 100) or 3 x 4 x 4 (80 x 100 x 100)	Class 150 RF or RTJ	Class 150 RF	5.56 (141)	5.81 (148)	7.00 (178)	22 (558)	115 (52.3)	128 (58.2)
3 x 4 (80 x 100) or 3 x 4 x 4 (80 x 100 x 100)	Class 300 RF or RTJ	Class 150 RF	5.81 (148)	6.12 (155)	7.00 (178)	23 (584)	120 (54.5)	133 (60.5)
3 x 4 (80 x 100) or 3 x 4 x 4 (80 x 100 x 100)	Class 600 RF or RTJ	Class 150 RF	6.12 (155)	6.19 (157)	7.00 (178)	23 (584)	130 (59.1)	135 (61.4)
3 x 4 x 4 (80 x 100 x 100)	Class 900 RF or RTJ	Class 300 RF	6.37 (162)	6.44 (164)	8.70 (221)	27 (685)	----	175 (79.5)
3 x 4 x 4 (80 x 100 x 100)	Class 1500 RF or RTJ	Class 300 RF	7.66 (195)	7.72 (196)	8.70 (221)	29 (736)	----	190 (86.4)
4 x 6 (100 x 150) or 4 x 6 x 6 (100 x 150 x 150)	Class 150 RF or RTJ	Class 150 RF	6.90 (175)	7.06 (179)	7.38 (188)	23 (584)	140 (63.6)	155 (70.5)
4 x 6 (100 x 150) or 4 x 6 x 6 (100 x 150 x 150)	Class 300 RF or RTJ	Class 150 RF	7.43 (189)	7.74 (197)	7.38 (188)	23 (584)	150 (68.2)	165 (75.0)
4 x 6 (100 x 150) or 4 x 6 x 6 (100 x 150 x 150)	Class 600 RF or RTJ	Class 150 RF	7.93 (201)	7.99 (203)	7.38 (188)	24 (619)	160 (72.7)	175 (79.5)
4 x 6 x 6 (100 x 150 x 150)	Class 900 RF or RTJ	Class 150 RF	9.21 (234)	9.27 (236)	7.38 (188)	28 (711)	----	190 (86.4)
6 x 8 (150 x 200) or 6 x 8 x 8 (150 x 200 x 200)	Class 150 RF or RTJ	Class 150 RF	8.87 (225)	9.12 (232)	8.25 (210)	27 (685)	----	245 (111)
6 x 8 (150 x 200) or 6 x 8 x 8 (150 x 200 x 200)	Class 300 RF or RTJ	Class 150 RF	9.31 (237)	9.62 (244)	8.25 (210)	27 (685)	----	265 (120)
6 x 8 (150 x 200) or 6 x 8 x 8 (150 x 200 x 200)	Class 600 RF or RTJ	Class 150 RF	10.00 (254)	10.06 (256)	8.25 (210)	28 (711)	----	310 (141)
8 x 8 x 8 (200 x 200 x 200)	Class 150 RF or RTJ	Class 150 RF	10.44 (265)	10.69 (272)	11.44 (291)	31 (762)	----	520 (236)
8 x 8 x 8 (200 x 200 x 200)	Class 300 RF or RTJ	Class 150 RF	10.94 (278)	11.25 (286)	11.44 (291)	32 (787)	----	545 (247)
8 x 8 x 8 (200 x 200 x 200)	Class 600 RF or RTJ	Class 150 RF	11.12 (282)	11.25 (286)	11.44 (291)	32 (787)	----	585 (265)
8 x 10 (200 x 250) or 8 x 10 x 10 (200 x 250 x 250)	Class 150 RF or RTJ	Class 150 RF	10.25 (260)	10.50 (267)	11.06 (281)	33 (838)	594 (270)	625 (284)
8 x 10 or (200 x 250) or 8 x 10 x 10 (200 x 250 x 250)	Class 300 RF or RTJ	Class 150 RF	10.93 (278)	11.25 (286)	11.06 (281)	33 (838)	617 (280)	650 (295)
8 x 10 (200 x 250) or 8 x 10 x 10 (200 x 250 x 250)	Class 600 RF or RTJ	Class 150 RF	11.75 (299)	11.81 (300)	11.06 (281)	33 (838)	655 (297)	690 (313)
10 x 14 (250 x 350)	Class 150 RF	Class 150 RF	12.06 (306)	----	13.75 (349)	37 (940)	995 (451)	----
10 x 14 (250 x 350)	Class 300 RF	Class 150 RF	12.75 (324)	----	13.75 (349)	37 (940)	1010 (458)	----

FIGURE 36



NOTES

1. Dual outlets not available for Type 269.
2. Higher rated outlet flanges available. Contact your sales representative.
3. Series 200 pilot only. Add 5 in. (127 mm) for Series 400 and 800 pilots and 7 in. (178 mm) for Series 500 pilot.
4. Series 200 pilot only. Add 12 lbs. (5.44 kg) for Series 400, 6 lbs. (2.72 kg) for Series 800 and 8 lbs. (3.63 kg) for Series 500 pilots.
5. Extra 0.5 in. (12.7 mm) longer stud bolt length may be required for installation.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

DIMENSIONS AND WEIGHTS

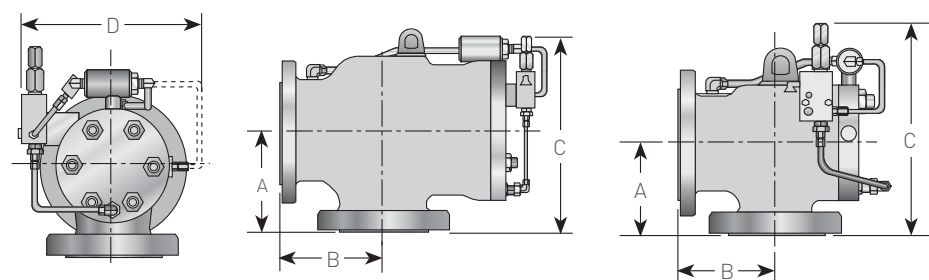
SERIES 700

SERIES 700		DIMENSIONS, In. (mm)				WEIGHT,
VALVE SIZE	BASIC MODEL	A	B	C (Maximum)	D	lbs (kg)
Class 150						
2G3	72705G23	6.06 [154]	6.38 [162]	16.84 [428]	11.87 [301]	93 [42.2]
2H3	72705H23	6.06 [154]	6.38 [162]	16.84 [428]	11.87 [301]	93 [42.2]
2J3	72705J23	6.06 [154]	6.38 [162]	16.84 [428]	11.87 [301]	93 [42.2]
3J4	72705J34	7.25 [184]	7.56 [192]	18.01 [457]	13.64 [346]	141 [64.0]
3K4	72705K34	7.25 [184]	7.56 [192]	18.01 [457]	13.64 [346]	141 [64.0]
3L4	72705L34	7.25 [184]	7.56 [192]	18.01 [457]	13.64 [346]	141 [64.0]
4L6	72705L46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	220 [100.0]
4M6	72705M46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	220 [100.0]
4N6	72705N46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	220 [100.0]
4P6	72705P46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	220 [100.0]
6Q8	72705Q68	9.44 [240]	9.50 [241]	19.56 [497]	13.78 [350]	350 [159.1]
6R8	72705R68	9.44 [240]	9.50 [241]	19.56 [497]	13.78 [350]	350 [159.1]
6RR8	72705RR68	9.44 [240]	9.50 [241]	19.56 [497]	13.78 [350]	350 [159.1]
8T10	72705T810	10.88 [276]	11.00 [279]	22.50 [572]	16.34 [415]	750 [340.9]
Class 300						
2G3	72710G23	6.06 [154]	6.38 [162]	16.84 [428]	11.87 [301]	93 [42.2]
2H3	72710H23	6.06 [154]	6.38 [162]	16.84 [428]	11.87 [301]	93 [42.2]
2J3	72710J23	6.06 [154]	6.38 [162]	16.84 [428]	11.87 [301]	93 [42.2]
3J4	72710J34	7.25 [184]	7.56 [192]	18.01 [457]	13.64 [346]	141 [64.0]
3K4	72710K34	7.25 [184]	7.56 [192]	18.01 [457]	13.64 [346]	141 [64.0]
3L4	72710L34	7.25 [184]	7.56 [192]	18.01 [457]	13.64 [346]	141 [64.0]
4L6	72710L46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	228 [103.6]
4M6	72710M46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	228 [103.6]
4N6	72710N46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	228 [103.6]
4P6	72710P46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	228 [103.6]
6Q8	72710Q68	9.44 [240]	9.50 [241]	19.56 [497]	13.78 [350]	365 [165.9]
6R8	72710R68	9.44 [240]	9.50 [241]	19.56 [497]	13.78 [350]	365 [165.9]
6RR8	72710RR68	9.44 [240]	9.50 [241]	19.56 [497]	13.78 [350]	365 [165.9]
8T10	72710T810	10.88 [276]	11.00 [279]	22.50 [572]	16.34 [415]	770 [350.0]
Class 600						
2G3	72712G23	6.06 [154]	6.38 [162]	16.84 [428]	11.87 [301]	93 [42.2]
2H3	72712H23	6.06 [154]	6.38 [162]	16.84 [428]	11.87 [301]	93 [42.2]
2J3	72712J23	6.06 [154]	6.38 [162]	16.84 [428]	11.87 [301]	93 [42.2]
3J4	72712J34	7.25 [184]	7.56 [192]	18.01 [458]	13.64 [347]	141 [64.0]
3K4	72712K34	7.25 [184]	7.56 [192]	18.01 [458]	13.64 [347]	141 [64.0]
3L4	72712L34	7.25 [184]	7.56 [192]	18.01 [458]	13.64 [347]	141 [64.0]
4L6	72712L46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	235 [106.8]
4M6	72712M46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	235 [106.8]
4N6	72712N46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	235 [106.8]
4P6	72712P46	7.75 [197]	8.75 [222]	18.34 [466]	12.47 [317]	235 [106.8]
6Q8	72712Q68	9.44 [240]	10.50 [267]	19.62 [498]	15.28 [388]	380 [172.7]
6R8	72712R68	9.44 [240]	10.50 [267]	19.62 [498]	15.28 [388]	380 [172.7]
6RR8	72712RR68	9.44 [240]	10.50 [267]	19.62 [498]	15.28 [388]	380 [172.7]
8T10	72712T810	11.50 [292]	11.00 [279]	23.12 [587]	16.84 [428]	800 [363.6]

NOTES

1. All weight and dimensions are approximate depending on the size and accessories.
2. When specifying Manifold Dual Pilot (MDP) increase the valve weight by 40 lbs (18.2 kg).
3. Extra 0.5 in. (12.7 mm) longer stud bolt length may be required for installation.

FIGURE 37



ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

ACCESSORIES AND OPTIONS

A variety of accessories and options is available to provide additional functions. Some simplify the process of periodic testing, an important safety requirement; others assist in the successful operation of the safety valve under adverse or special applications.

The standard options and accessories available are detailed in the table below. Other options such as position indicators, purge connections, multiple pilots, differential pressure sensing etc., are available for some models for special situations, on request.

OPTIONS AND ACCESSORIES AVAILABILITY TABLE

ACCESSORY/OPTION	PILOT SERIES				
	200	400	500	700	800
Field test connection	0	N/A	0	0	N/A
Field test connection w/indication	N/A	0	0 ^[1]	N/A	0
Backflow preventer	0	0	0	N/A	0
Remote pressure sense connection	0	0	0	0	0
Manual unloader ^[2]	0	0	0	0	0
Remote unloader ^[3]	0	0	0	0	0
Pilot supply filter	0	0	0	0	0
Pilot lift lever	0	0	0	0	0
Pressure spike snubber (gas)	0	0	N/A	S ^[4]	0
NACE trim	0	0	0	N/A	0
Remote valve lift indicator ^[5]	0	0	0	0	0
Manifolded dual pilots	N/A	N/A	N/A	0	N/A
Manifolded single pilot	N/A	N/A	N/A	0	N/A
High gain	N/A	0	N/A	N/A	N/A
Direct spring dimensions	0	0	0	N/A	0
Full nozzle main valve	0	0	N/A	N/A	0
Block body	0	0	N/A	N/A	0

NOTES

Option Codes:

S - Standard

0 - Optional: available on request

N/A - Not available for this valve model.

Materials:

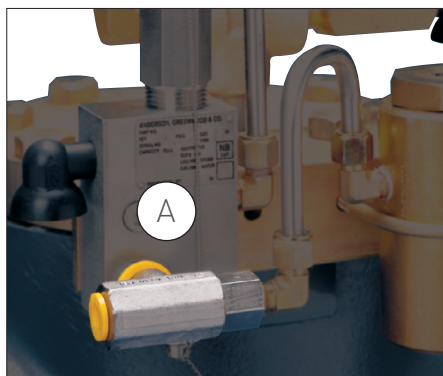
Options and accessories will use materials of construction consistent with those of the main and pilot valves.

Contact your sales representative for specific details.

1. This option is recommended whenever field test connection is specified.
2. The effective C_v of the unloader shall be at least 0.4 ($K_v = 0.35$), including any associated tubing or piping.
3. Furnish full particulars. See option description on page 60.
4. Standard for air/gas/vapor service for 6 in. or larger valves.
5. Furnish complete details on type of signal output required and power supply available.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

ACCESSORIES AND OPTIONS



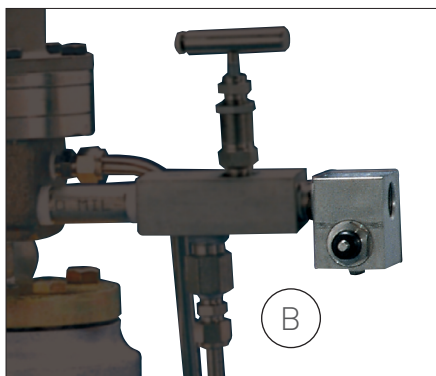
A. FIELD TEST CONNECTION

- In-service verification of set pressure.
- Simplifies the periodic testing of safety valves.

Anderson Greenwood pilot operated safety valves may be tested readily for verification of set pressure during normal system operation with this option. Field test connection is an option on most models. The customer furnishes a pressure source, plus a test gauge and metering valve for the portable field testing system. When test pressure is admitted slowly through a metering valve, the pilot and the main valve dome are pressurized, simulating an increased system pressure.

When set pressure is reached, the pilot will actuate audibly. This actuation pressure may then be compared with the nameplate value. Depending upon the current system pressure and the characteristics of the specific pilot, the main valve may also open briefly and close, or partially open and close, providing verification that the main valve piston is free to move.

When the field test connection is used with the modulating type pilots, the pilot will begin cracking at a pressure just below the nameplate setting. To establish the set pressure accurately another accessory, the Field Test Indicator, is recommended.



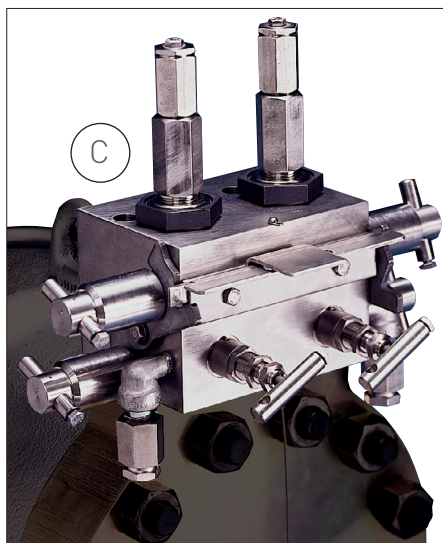
B. FIELD TEST INDICATOR

- Simplifies verification of modulating pilot set pressures.
- Only one test connection and pressure gauge required.

This is a mechanical indicator, allowing for the accurate verification of set pressure. Since the set pressure of modulating safety valves in this catalog is defined as the point when the dome pressure is reduced to 70% of set pressure, when system pressure reaches the nameplate setting, the indicator is activated. This gives positive verification that set pressure has been reached. The set point verification process for modulating pilots requires a field test indicator.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

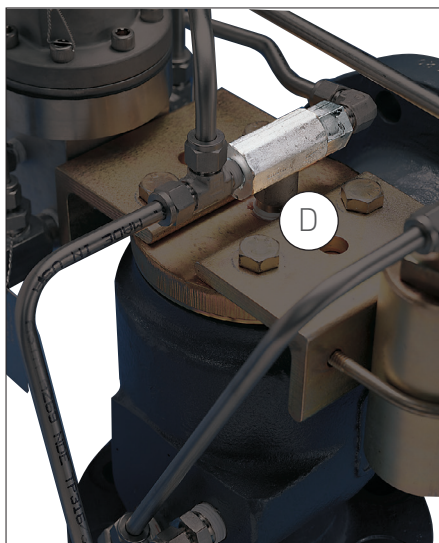
ACCESSORIES AND OPTIONS



C. MANIFOLD DUAL PILOT (MDP)

- Allows in-service replacement of pilot.
- Extends outage cycle.

The MDP is available both as an option and as a retrofit kit. The dual cartridge pilots are manifolded in a miniature safety selector valve which allows in-service replacement of the pilot without shutting the system down while maintaining full system overpressure protection. Field test connection and manual blowdown are built into the manifold.



D. BACKFLOW PREVENTER

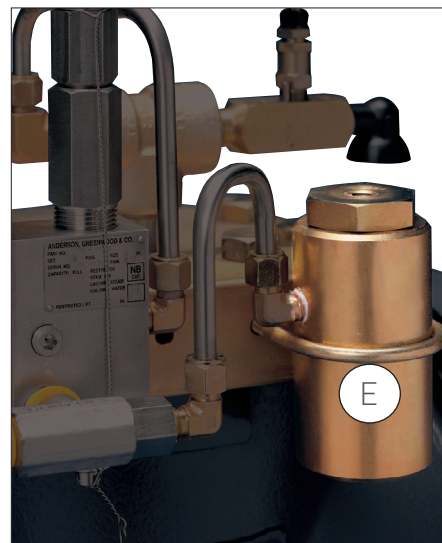
- Prevents accidental reverse flow through safety valve.

This option, sometimes called a 'vacuum block', prevents reverse flow, when sufficient vacuum is present at the inlet flange or when the pressure at the outlet flange (superimposed back pressure) is greater than the current system pressure. Reverse flow will occur with any standard type or design of pilot operated safety valve, when sufficient reverse differential pressure exists, and will be prevented by this option.

All backflow preventers operate by permitting the introduction of outlet pressure into the main valve dome, holding the piston firmly onto the nozzle and overcoming the effect of a reverse differential pressure across the safety valve. This option also includes a built-in provision to prevent reverse flow through the pilot that would otherwise pass through the pilot supply line, back into the system.

A backflow preventer should be specified whenever:

- A vacuum may be present at the inlet connection due to unusual operating conditions or when a temporary vacuum may occur under start-up conditions.
- The discharge of the safety valve is connected to a downstream pressure vessel, where pressure may vary occasionally in excess of the pressure in the upstream system.
- The discharge of multiple safety valves is combined into a single manifold or vent system, creating superimposed back pressures in excess of the current upstream system pressure.



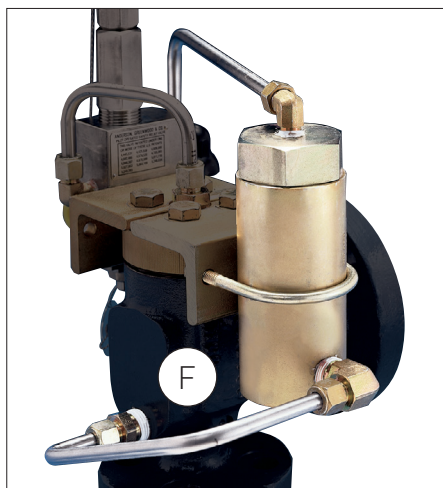
E. PILOT SUPPLY FILTER

- Protects pilot from excessive particulate matter in flow stream.

This is a mechanical filter that is available for gas and liquid applications where large amounts of particulate matter in the fluid stream are possible. The filter is optional for liquid or gas service for any pilot model, except Model 727 used in steam or condensable vapor. The pilot supply filter will be mounted rigidly to the main valve cap.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

ACCESSORIES AND OPTIONS



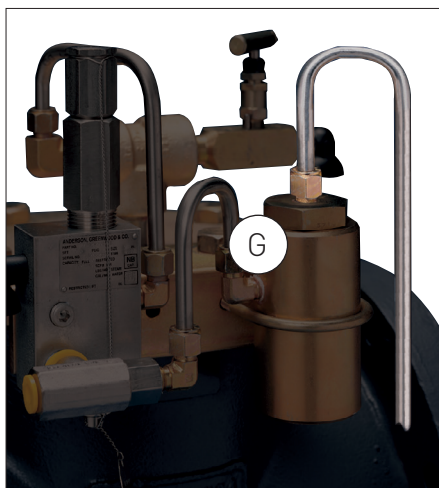
F. PRESSURE SPIKE SNUBBER (GAS SERVICE)

- Overcomes pressure 'spikes' in gas systems, preventing premature actuation.

This option may be provided on the Series 200 or 400 non-flowing type pilots, only on gas applications. The snubber is recommended for use on pulsating gas compressor applications, where instantaneous pressure values (pressure spikes) approach or exceed the set pressure and may cause inadvertent valve actuation.

The device acts as a pulsation dampener; consisting of a series of fixed orifices, combined with small volume chambers that dampen the transient pressure rises. The average static system pressure is unaffected, so no change in set pressure is experienced with this option. The pressure spike snubber is compact and is mounted to the main valve cap. Please note that it is to be applied only for air/gas/vapor applications.

For air/gas/vapor applications, the Series 700 non-flowing pilot is supplied with pressure spike snubber as standard.



G. REMOTE PRESSURE SENSE CONNECTION

- Safety valve will respond to actual system pressure conditions.
- Eliminates undesirable cycling due to excessive inlet pressure losses.
- Improves safety under adverse operating conditions.

This optional feature permits the pilot to sense system pressure at a location that most accurately reflects the actual operating pressure of the protected system. It eliminates the false system pressure indication that will occur during relieving conditions, due to pressure losses in the inlet piping to the safety valve. Most applicable codes recommend that the inlet piping system is designed for a maximum anticipated non-recoverable pressure loss of 3%. If this is not possible, the remote pressure sense connection should be specified.

The addition of a remote pilot sense line allows the pilot to sense system pressure correctly and to keep the valve from rapid cycling or chattering. With remote sensing, piston type pilot operated safety valves will remain stable against the effects of high inlet pressure loss phenomena. However, relieving capacity will be reduced proportionately whenever there is inlet pressure loss to the safety valve.

Valves furnished for remote pilot sense may be converted to integral sense, or vice versa, as the pressure pickup is installed in all main valves and the integral sense connection is closed off with a removable MNPT threaded pipe plug.



H. REMOTE VALVE LIFT INDICATOR

- Provides remote monitoring capability to transmit valve lift (relief event) with standard 4 to 20 mA wired signal or wirelessly using WirelessHart® technology.

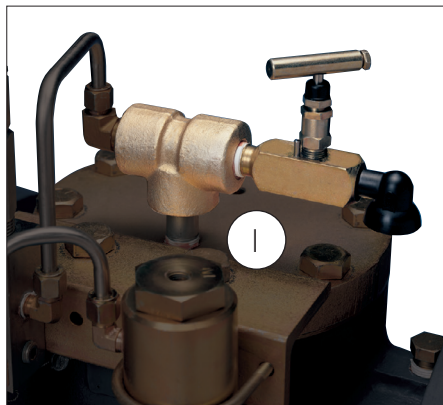
A Rosemount differential pressure transmitter is used to monitor the opening and closing of Anderson Greenwood pilot-operated relief valves by monitoring the differential pressure across dome and inlet. The transmitter periodically reads the pressure and transmits that data over a wireless or wired network.

Monitoring will enable:

- Monitor active relief events, keeping employees safe
- Troubleshoot correlating relief events against process data
- Immediate notification of events to reduce severity of releases
- Time-stamped alerts for root cause analysis
- Calculate the volumetric release of each event

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

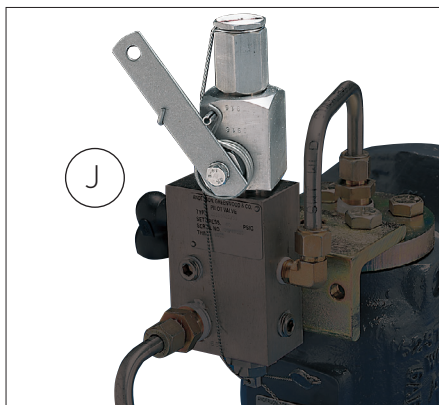
ACCESSORIES AND OPTIONS



I. MANUAL UNLOADER

- Permits the safety valve to be opened to depressurize the system.
- Acts as manual override to normal pressure setting but has no effect on the sealed pressure setting.

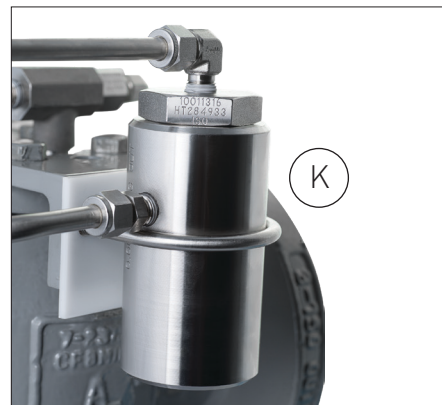
A manual unloader is a small hand valve connected to the dome line of the main valve. Opening the hand valve vents the dome pressure faster than it can be recharged by the pilot supply. Sufficient dome pressure reduction results in piston lift, due to unbalanced forces, simulating pilot actuation. This option is used to allow the safety valve to be used, along with other valves, for the emergency reduction of system pressure due to potential safety hazards. When permitted, the manual unloader may be substituted for a mechanical lift lever.



J. PILOT LIFT LEVER

- Permits manual test of safety valve operation.

For applications where the mechanical lifting of the pilot is required for verification of valve operation. Lifting of the pilot spindle will permit the main valve to lift when the system pressure is at least 75% of set pressure. The pilot lift lever is packed to prevent external leakage. Some safety regulations and codes require that a lift lever be furnished for air, hot water over 140°F (284°C) and steam applications.



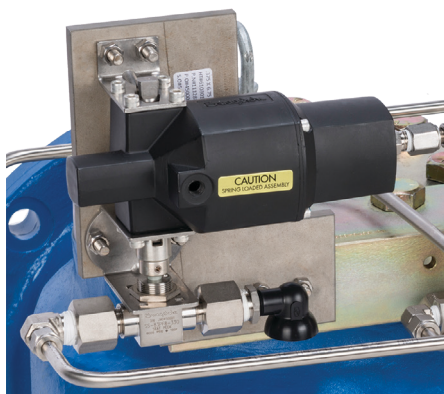
K. VAPORIZER

- Prevents the pilot from extremely low process temperatures in cryogenic applications

The stainless steel vaporizer is only used for liquid cryogenic applications (Types 249, 259, 269, 449, 459 and 469 only). It vaporizes the cryogenic liquid and warms the process fluid before it enters the pilot. This protects the pilot internals from damage due to extremely low temperatures and prevents ice formation outside the pilot.

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

ACCESSORIES AND OPTIONS



PILOT VALVE TEST DRUM

- Simplifies field and maintenance shop resetting and repair.

This is an option for the factory testing and resetting of the pilot and is offered for customer maintenance and repair shops. It comprises a small accumulator, approximately 0.01 m³ (0.25 ft³) volume, with the necessary fittings, valves and test gauges for mounting and testing of the pilot. The test drums are made to order for the pilot models specified.

Please furnish the set pressure range and the pilot models to be tested. The pressure supply to the accumulator and tools for adjusting and servicing the pilot are not included.

REMOTE UNLOADER

- Permits the safety valve to be opened remotely to depressurize the system.

Similar to the manual unloader but with the valve operated remotely, either by solenoid or pneumatically. The remote unloader is mounted mechanically to the safety valve with the pressure connection to the main valve's dome line. Venting is to the atmosphere through a weather fitting.

Please furnish full particulars of the type of unloader electro valve to be supplied and the desired valve action: normally open or closed. For solenoid operation, specify the voltage and current (AC or DC) and the frequency in Hertz for alternating current.

The type of enclosure, such as explosion proof, splash proof, corrosion resistant, etc., must also be specified for electric operators. No separate wiring enclosure is supplied unless specified.

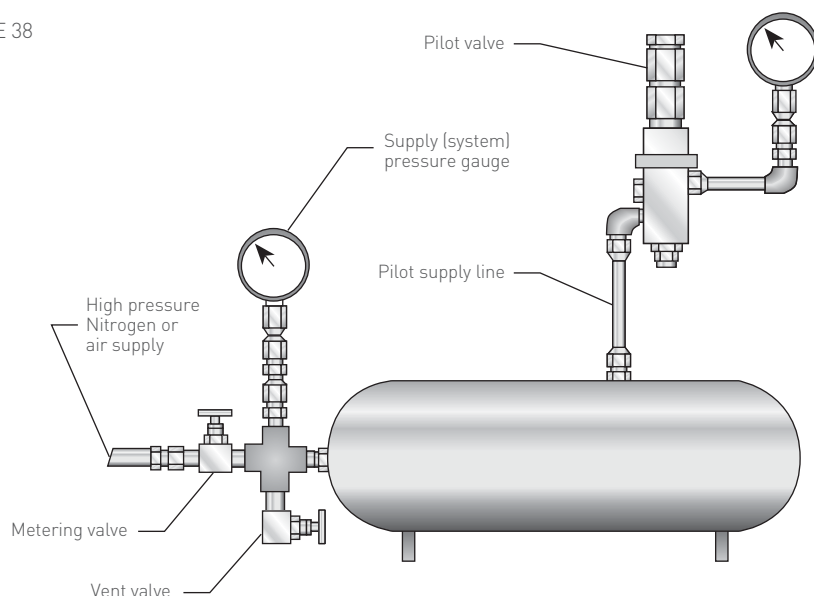
NACE OPTION

- Essential option for sour gas service.

This is a material option to meet the stress corrosion problems associated with sour gas service. For Series 200, 400 and 500, the materials in both the pilot and main valve will meet the requirements of NACE MR0175/ISO 15156:2015. For Series 800, the materials in both the pilot and main valve will meet the requirements of NACE MR0175/ISO 15156:2002.

The purchaser must decide whether their specific application requires compliance to NACE recommendations. Emerson will provide materials that meet the material requirements in the requested NACE specification; however, the purchaser must ensure all valve materials selected meet their application's NACE requirements.

FIGURE 38



ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

BLOCK BODY

PRODUCT OVERVIEW

Anderson Greenwood Series 200, 400 and 800 pilot operated relief valves can be furnished as a block body in addition to the traditional cast design. The block body design might be required for high pressure applications or with special connections.

The block body design allows use of a wide array of metals in accordance with ASME Section VIII. Utilizing the block body design, higher material integrity is offered which can minimize Non-Destructive Examination (NDE) requirements.sswsw

Block body relief valves can be designed to unconventional sizes which can be an advantage when retrofitting to existing systems. Pressure relief valve outlet sizes can be increased beyond API standards to eliminate outlet piping reducers and mitigate built-up back pressure in the downstream piping.

FEATURES

- Can be used in higher pressure applications where traditional cast design might not be possible
- Specific inlet/outlet flange configurations and combinations available with unique center-to-face dimensions to meet existing systems.
- Forged body standard construction increases choice of materials available for harsh or corrosive service applications.
- Suitable for back pressure applications considerably beyond CI 300 service.
- Reliable and field proven design.

TYPICAL MATERIALS OF CONSTRUCTION

Body, pilot and cap

- ASME SA105 carbon steel
- ASME SA479 type 316 stainless steel
- ASME SA182 grade F5a alloy steel
- ASME SA182 grade F9 alloy steel
- ASME SA182 grade F51 (S31803) Duplex stainless steel
- ASME SA182 grade F55 (S32760) Super Duplex stainless steel
- ASME SA350 grade LF2 carbon steel
- Monel® UNS N04400
- ASME SB425 UNS N08825 Incoloy® 825
- ASME SB446 UNS N06625 Inconel® 625

Trim

- ASME SA479 type 316 stainless steel
- ASME SB425 UNS N08825 Incoloy 825
- ASME SB446 UNS N06625 Inconel 625
- ASME SA479 UNS S31803 Duplex stainless steel
- ASME SA479 UNS S32760 Super Duplex stainless steel
- Monel UNS N04400

Connections

- ANSI Class 150 to 2500
- Ring type joint inlet/outlet
- API 6BX 10,000# inlet
- API 6BX 15,000# inlet
- Grayloc®
- Techlok®

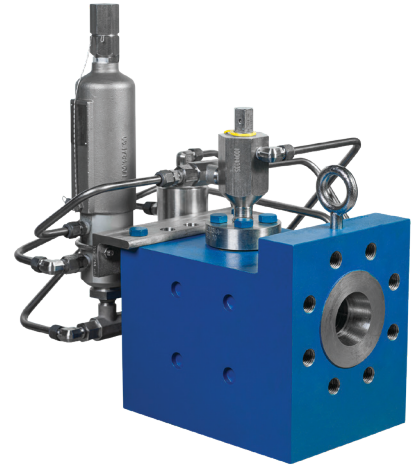
NOTES

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Hastelloy® is a registered trademark of Haynes International, Inc.

Grayloc® is a registered trademark of Grayloc Products.

Techlok® is a registered trademark of Vector International.



ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

SAFETY SELECTOR VALVE

PRODUCT OVERVIEW

The Anderson Greenwood™ Safety Selector Valve (SSV) is a compact switchover valve that provides a safe, efficient method of switching from an active Pressure Relief Valve (PRV) to a standby PRV, maintaining system overpressure protection.

The SSV is engineered to mount two relief valves on a single vessel penetration. One mounted valve is active, providing overpressure protection, while the other acts as a mounted inactive spare. The SSV facilitates the changeover of process pressure and overpressure protection from the active relief valve to the spare with no process vessel downtime. Unlike other fabricated block and bleed options that include pipe elbows, multiple block valves, bleed ports or multiple penetrations, the SSV is a simple drop-in solution. Designed specifically for use with pressure relief valves, the SSV aids relief valve stability by ensuring that pressure losses through the changeover valve are below 3%.

Unplanned outages in critical applications can be extremely expensive. The SSV provides an alternative for outages caused by relief valve malfunctions. Simply switch to the standby spare with no interruptions in process and repair the failure during your next turnaround.

FEATURES

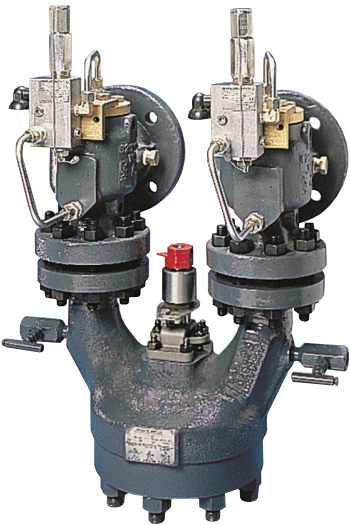
- Meets the mandatory requirements of ASME Section VIII, Division 1, Appendix M and Section XIII, Appendix B; UG-156 (d), AD-2000-A2 and can also be used on boilers per ASME I Code Case 2254
- Provides high C_v values, resulting in less than 3% pressure drop to the active PRV inlet, reducing destructive valve chatter
- Reduces field installation costs and space requirements through preassembled and compact design
- Ensures process isolation of standby PRV
- Allows PRV maintenance without process shutdown
- Bleed valve under each PRV vents entrapped process effectively and safely prior to removal for maintenance
- Clear, positive indication of active PRV
- Reliable provisions for dual padlocking in either PRV position
- Tested packing design and minimal leak points reduce fugitive emissions
- No special tools or seat lapping required for maintenance. Minimal spare parts reduce cost of ownership
- Simple operation with built-in seat equalization
- Tandem system available for dual PRV's discharging to a closed header system
- Designed to ensure both relief valves can never be blocked simultaneously

TECHNICAL DATA

Sizes:	1 to 10 in. (DN 25 to 250)
Pressure range:	Up to 6170 psig (425 barg)
Temperature range:	-423 to 800°F (-253 to 427°C)
Connections:	ANSI Class 150 to 2500
Materials:	Carbon steel, Stainless steel, Duplex and other Alloys

COMMON APPLICATIONS

- Liquefied Natural Gas (LNG)
 - Liquefied Petroleum Gas (LPG)
 - Petrochemical
 - Ammonia
 - Liquid Oxygen (LOX)
- Liquid Nitrogen (LIN)
 - Oil and Gas
 - Wastewater
 - Pulp and Paper
 - Refrigerated and Cryogenic Storage Tanks



SERIES 200 PRVS MOUNTED ON SAFETY SELECTOR VALVES IN TANDEM

SSV FLOW EFFICIENCY BY SIZE

Size, In. (DN)	Flow Efficiency (C _v)
1 (25)	34
1½ (40)	121
2 (50)	255
3 (80)	612
4 (100)	1061
6 (150)	2713
8 (200)	4512
10 (250)	6930

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

ORDERING

HOW TO ORDER A VALVE

Once you have determined the basic type of valve required (e.g. Series 200, 400, etc.) in Section 1 and determined your required orifice area in Section 2, please refer to the following information to specify and order the pressure relief valve best suited to your application.

Note: To ensure proper delivery and expedite processing, please include the model number and any additional information requested below in all specifications, purchase requisitions and orders, as applicable.

Constructing a model number

To construct the model number, identify the seven components on the Valve Model Numbering chart on page 62. Use the resulting assembled number when ordering your valve.

Specifying other information for your order

The following information might be required, depending on the type of valve and other requirements:

SPECIAL REQUIREMENTS

Please specify the details of any special procedures you require during valve manufacturing.

These might include:

- unlisted accessories
- special quality assurance
- material traceability
- non-standard plating and surface finishes
- non-destructive test requirements

Include required levels of inspection and the parties or organizations which will perform the inspections, if any.

Note: Special requirements can impact price and delivery.

VALVE TAGGING

Paper tags will be supplied at no additional cost if they are requested at the time the valve is ordered. Other types of tagging are offered at additional cost. If you would like metallic tags, please identify the specific tag material and tag numbers when you place your order.

DOCUMENTATION

Unless specified, data submittals are not furnished for products ordered. Certain standard drawings, test reports and certifications are available at no cost on request.

PACKING FOR SHIPMENT

All products are packed for normal domestic shipment from point of assembly or stocking. Special packaging requirements, such as export boxing, should be specified in your purchase order.

ORDERING INFORMATION

To process your order properly and avoid delay, please specify the following:

- Quantity
- Inlet size; flange rating and facing (see page 42)
- Outlet size; flange rating and facing (see page 42)
- Anderson Greenwood type model number (see page 62)
- Orifice size (see page 30)
- Material requirements (see individual Series datasheets)
 - Main valve body
 - Main valve trim
 - Pilot
- Soft goods (see pages 43-50)
- Set pressure
- Allowable overpressure
- Service (gas, vapor, liquid, steam)
- Temperature (operating and relief)
- Operating pressure
- Back pressure (constant superimposed, variable superimposed and built-up)
- Required relief capacity
- Molecular weight (gas) or specific gravity (liquid)
- Ratio of specific heats (gas)
- Optional accessories (see pages 56-60)

ANDERSON GREENWOOD SERIES 200/400/500/700/800 PILOT OPERATED RELIEF VALVES

ORDERING

SELECTION GUIDE

EXAMPLE:		4	4	3	10	J	23	/S1	/HG
Pilot series									
2	Series 200								
4	Series 400								
5	Series 500								
7	Series 700								
8	Series 800								
Main valve lift^[1]									
2	Full lift, API orifice (Type 727 only)								
4	Full lift, API orifice								
5	Restricted, API orifice								
6	Full lift, Full bore orifice								
Main valve piston type									
3	Soft seat/seals								
6	PTFE soft seat/seals (Types 546, 566 only)								
7	Metal seat/seals (Type 727 only)								
9	Cryogenic trim soft seat/seals (Types 249, 259, 269 only)								
Inlet flange rating, ANSI									
05	Class 150								
10	Class 300								
12	Class 600								
14	Class 900								
16	Class 1500								
18	Class 2500								
N	FNPT								
Orifice designation									
Letter API equivalent									
-	Full bore (largest practical orifice area for a given valve inlet size)								
Inlet x outlet, inches									
Main valve materials									
/S	SS body and trim								
/S1	CS body, SS trim								
/S2	CS body, high-temperature trim (Series 700 only)								
/S3	WC6 Alloy steel body, high-temperature trim (Series 700 only)								
/S1/N	CS body and SS trim compliance with NACE MR0175 (2015 edition) ^[3]								
/L1	Low temperature CS body, SS trim								
/S/N	SS body and trim compliance with NACE MR0175 (2015 edition) ^[3]								
/D	Duplex body and trim								
/P	Super Duplex body and trim								
/D/N	Duplex body and trim compliance with NACE MR0175 (2015 edition)								
/P/N	Super Duplex body and trim compliance with NACE MR0175 (2015 edition)								
/SPL	Special								
Configuration Options									
/HG	High Gain Option ^[2]								
/DS	Direct Spring A and B Dimensions Option ^[4]								

NOTES

- For a full lift valve, the area controlling the valve capacity is the main valve nozzle bore. For a restricted lift valve, the area controlling the valve capacity is the 'curtain area' between the main valve nozzle and the bottom of the lifted piston.
- Available for 400 Series pilots in Natural Gas applications.
- For Series 800, NACE 2002 edition available as standard.
- Available for Series 200, 400, 500 and 800.

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