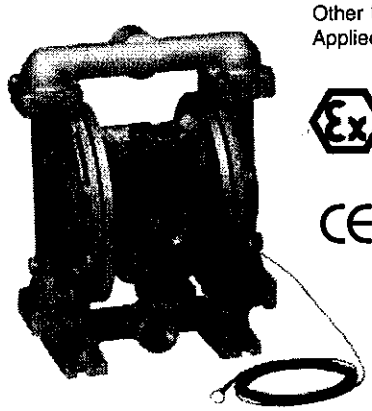
WARREN RUPP®

Quality System ISO9001 Certified

Environmental Management System ISO14001 Certified

IDEX CORPORATION



U.S. Patent # 5,996,627; 6,241,487 Other U.S. Patents Applied for

II 2GD b T5

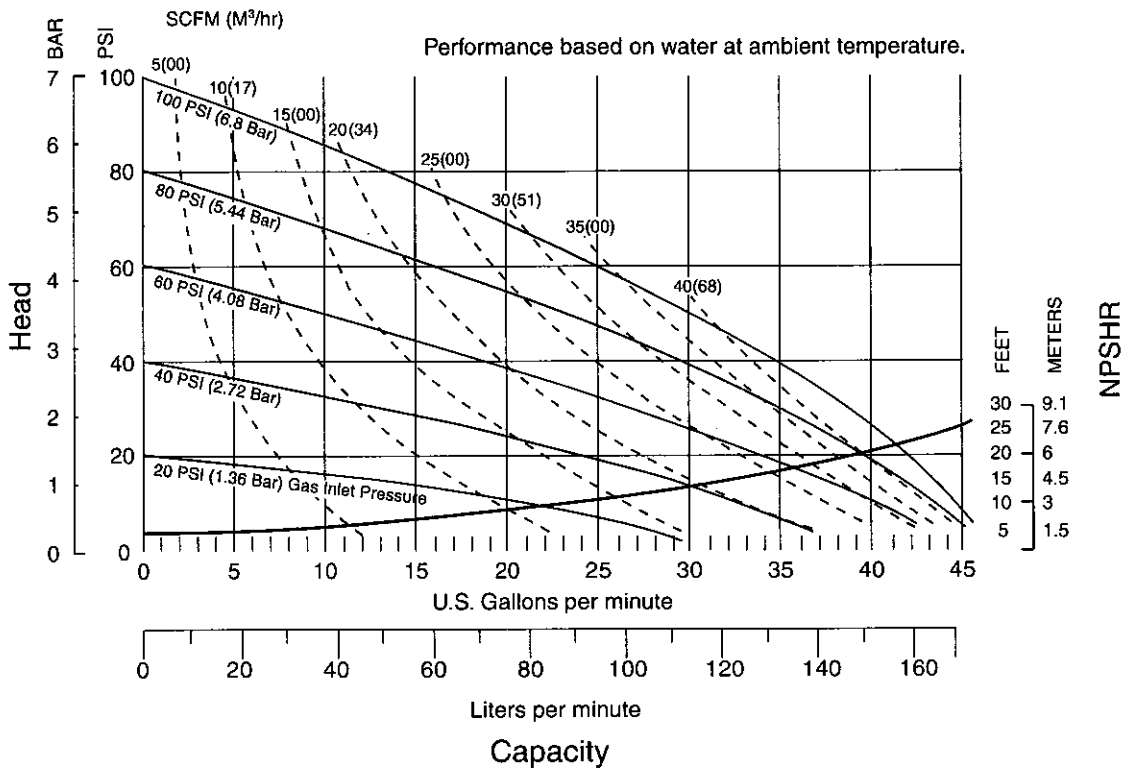
SANDPIPER®
A WARREN RUPP PUMP BRAND

G1F Metallic Design Level 1 Ball Valve

Natural Gas-Powered Double-Diaphragm Pump

ENGINEERING, PERFORMANCE & CONSTRUCTION DATA

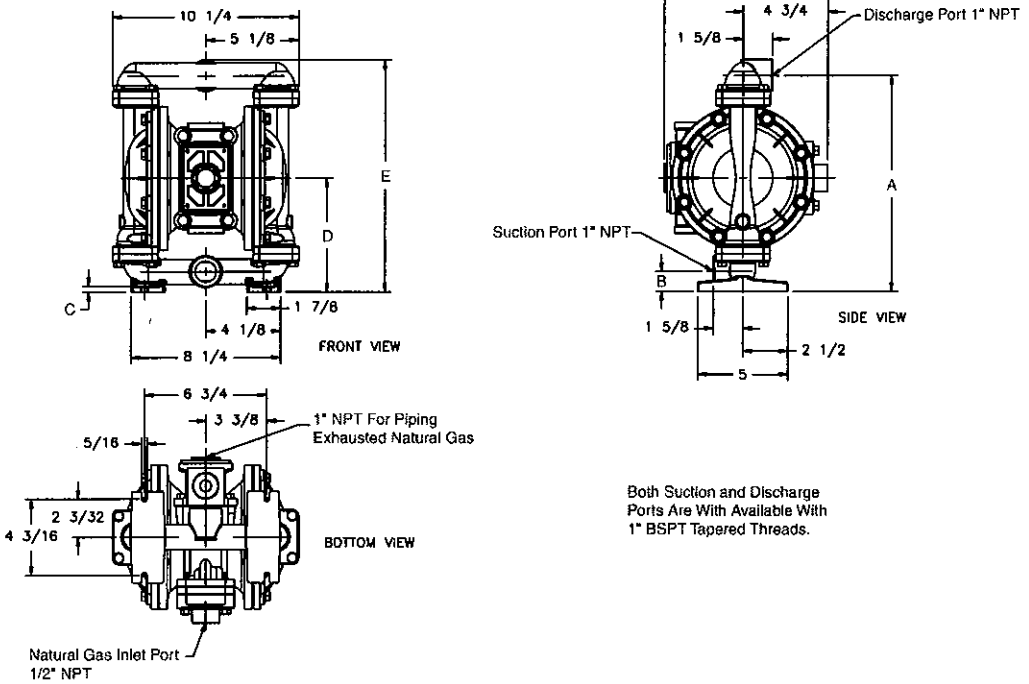
INTAKE/DISCHARGE PIPE SIZE	CAPACITY	AIR VALVE	SOLIDS-HANDLING	HEADS UP TO	DISPLACEMENT/STROKE
1" NPT (internal) 1" BSPT Tapered (internal)	0 to 45 gallons per minute (0 to 170 liters per minute)	No-lube, no-stall design	Up to .25 in. (6mm)	125 psi or 289 ft. of water (8.6 Kg/cm² or 86 meters)	.11 Gallon / .42 liter



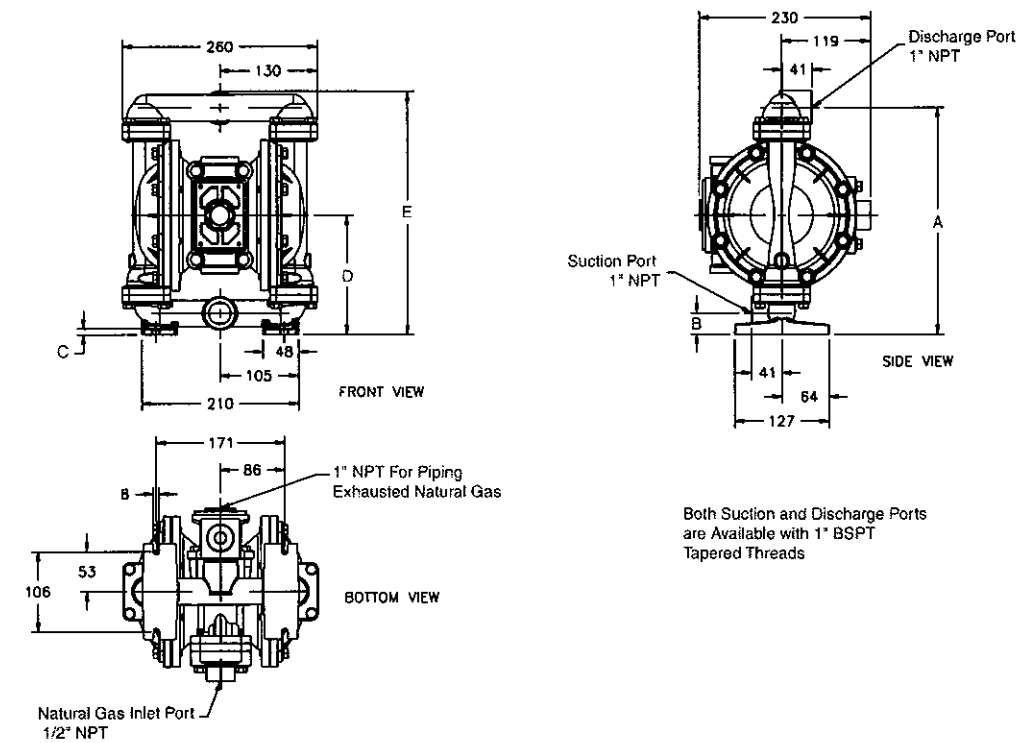
These SANDPIPER® models are designed to be powered only by natural gas.

Dimensions: G1F Metallic

Dimensions in Inches
Dimensional Tolerance:±1/8"



Dimensions in Millimeters
Dimensional Tolerance:± 3mm



Pressure Relief Valve Data Sheet

Date Prepared: 2007-05-30 13:28

General Job Data

Customer	Requisition #	Job #	Job Description
Capital Engineering 2007		+17947	

Prepared By	Checked By	Approved By	Job Status	Revision #
Rick Woitas			Sizing/Selecting	0

PSV Identification

Tag #	Tag Description	Tag Status	P / ID	Discharge To	Revision #
PSV-130 Rev 1		Valve Selected			0

Plant #	Drawing #	Index #	Issue For	Service	Inlet Line #	Outlet Line #

Sizing Basis

ASME Code	Cause of Over Pressure	Fluid State	Rupture Disk Coeff.	NACE
ASME Sec. VIII	-	Gas (Volume)	No Rupture Disk, 1	No

Process Parameters

MAWP	- PSIG	**Design Temp.**	- °F	**Constant Back P.**	0 PSIG
Operating Pressure	40 PSIG	**Operating Temp.**	300 °F	**Variable Back P.**	0 PSIG
Set Pressure	50 PSIG	**Relief Temp.**	300 °F	**Over Pressure**	5 PSIG
Atm Pressure	14.697 PSIA	**Relief Pressure**	69.697 PSIA		

Compressible State

Fluid Type	User Defined	**Molecular Weight**	44.034 Mol Wt	**Gas Flow Const.**	337
Req. Flow Cap.	360000. ft³/day	**Specific Gravity**	1.52 sp gr	**Compressibility**	1
Calculated Area	0.35889 in²	**Specific Heat Ratio**	1.2	**Fluid Name**	-

Resolved Area: **0.35889 in²** (Resolved by Maximum)

Model Selection

Manufacturer	Farris	**API Letter**	F	**Inlet Size**	1.5 in	**Outlet Size**	2.0 in
Model Number	26FA10-120	**API Area**	0.307 in²	**In. Rating**	150 #	**Out. Rating**	150 #
Valve Design	Conventional	**ASME Area**	0.371 in²	**In. Facing**	RF	**Out. Facing**	RF
Cap Constrn	Screwed Cap	**Max. Cap.**	258.44 std ft³/min	**Test Gag**	No	**Quantity**	1
React. Force	16.591 lbs	**Noise**	95.686 dBa				

Model Materials

Body	Carbon Steel	**Bonnet**	Carbon Steel	**Nozzle**	316 ss
Disc	316 ss	**Guide**	316 ss	**Spring**	Chrome Alloy
Bellows	N/A				

Sizing Scenarios

Scenario	Resolve By	Fluid State	Cause of Over P.	Relief Load Capacity	Set P.	Relief T.	Required Area
Case A	Max	Gas	Unknown	360000. ft³/day	50 PSIG	300 °F	0.35889 in²

Scenario: Case A / Gas Volume

Required Flow Capacity	V_{gas}	360000. ft³/day
Relief Temperature	T_{relief}	300 °F
Compressibility	Z	1
Gas Flow Constant	C	337
Discharge Coeff. (0.9 x K_d)	K^{Gas}	0.8577
Rupture Disk Coefficient	K_{CCF}	1
Relief Pressure	P_{relief}	69.697 PSIA
Molecular Weight	M_{vapor}	44.034 Mol Wt
Vapor Flow Factor	K_b	1
Vapor Flow Factor	K_v	-

$$A_{conven} = \frac{V_{gas}\sqrt{G_{gas}T_{relief}Z}}{1.175\,C\,K^{Gas}\,K_{CCF}\,P_{relief}\,K_b}$$

$$A_{bellow} = \frac{V_{gas}\sqrt{G_{gas}T_{relief}Z}}{1.175\,C\,K^{Gas}\,K_{CCF}\,P_{relief}\,K_v}$$

$$A_{pilot} = \frac{V_{gas}\sqrt{G_{gas}T_{relief}Z}}{1.175\,C\,K^{Gas}\,K_{CCF}\,P_{relief}\,K_b}$$

Fluid Type (User Defined)		-
Specific Gravity	G_{gas}	1.52 sp gr
Ratio of Specific Heats	k	1.2
Discharge Coefficient	K_d	0.953
ASME Area (Actual)		0.35889 in²

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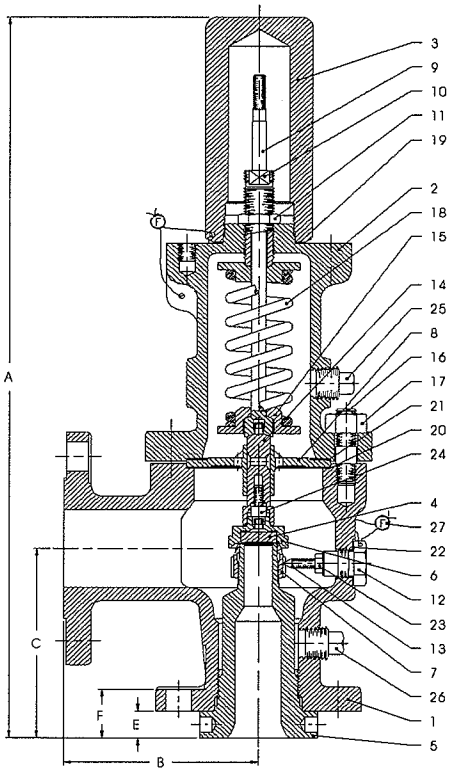
End of PSV-130 Rev 1 Data Sheet

Pressure Relief Valve Reference Drawing

Date Prepared: 2007-05-30 13:28

PSV Identification

Customer	Requisition #	Job #	Job Description	
Capital Engineering 2007		+17947		
Tag #	**Tag Description**		**Tag Status**	**P / ID**
PSV-130 Rev 1			Valve Selected	
ASME Code	**Fluid State**	**Resolved Area**	**Rupture Disk Coeff.**	**NACE**
ASME Sec. VIII	Gas (Volume)	0.35889 in²	No Rupture Disk, 1	No
Operating Pressure	**Set Pressure**	**Constant Back P.**	**Variable Back P.**	**Cold Diff. Test P.**
40 PSIG	50 PSIG	0 PSIG	0 PSIG	50 PSIG
Operating Temp.	**Relief Temp.**	**Operating to Set %**	**Over Pressure**	**Percent Over P.**
300 °F	300 °F	80 %	5 PSIG	10 %



Farris
26FA10-120

API Letter	API Area	ASME Area
F	0.307 in²	0.371 in²

	Size	Rating	Facing
Inlet:	1.5 in	150 #	RF
Outlet:	2.0 in	150 #	RF

Valve Design	Cap Constrn	Test Gag
Conventional	Screwed Cap	No
Max. Rel. Cap.	**React. Force**	**Noise**
258.44 std ft³/min	16.591 lbs	95.686 dBa

Dimensions

Weight	Dimension A	Dimension B
44 lb	19 1/2 in	4 3/4 in
Dimension C	**Dimension E**	**Dimension F**
4 7/8 in	11/16 in	1 1/4 in

Materials

Body (1)	Bonnet (2)
Carbon Steel	Carbon Steel
Nozzle (5)	**Disc (4)**
316 ss	316 ss
Guide (8)	**Spring (18)**
316 ss	Chrome Alloy
Bellows (15)	
N/A	

Pressure Relief Valve Data Sheet

Date Prepared: 2007-05-30 16:00

General Job Data

Customer	Requisition #	Job #	Job Description
Capital Engineering 2007		+17947	

Prepared By	Checked By	Approved By	Job Status	Revision #
Rick Woitas			Sizing/Selecting	0

PSV Identification

Tag #	Tag Description	Tag Status	P / ID	Discharge To	Revision #
PSV-150A	Job # 5252	Valve Selected			0

Plant #	Drawing #	Index #	Issue For	Service	Inlet Line #	Outlet Line #

Sizing Basis

ASME Code	Cause of Over Pressure	Fluid State	Rupture Disk Coeff.	NACE
ASME Sec. VIII	-	Gas (Volume)	No Rupture Disk, 1	No

Process Parameters

MAWP	- PSIG	**Design Temp.**	- °F	**Constant Back P.**	0 PSIG
Operating Pressure	40 PSIG	**Operating Temp.**	65 °F	**Variable Back P.**	0 PSIG
Set Pressure	100 PSIG	**Relief Temp.**	122 °F	**Over Pressure**	10 PSIG
Atm Pressure	14.697 PSIA	**Relief Pressure**	124.7 PSIA		

Compressible State

Fluid Type	User Defined	**Molecular Weight**	17.382 Mol Wt	**Gas Flow Const.**	337
Req. Flow Cap.	24000. ft³/day	**Specific Gravity**	0.6 sp gr	**Compressibility**	1
Calculated Area	0.007186 in²	**Specific Heat Ratio**	1.2	**Fluid Name**	-

Resolved Area: **0.007186 in²** (Resolved by Maximum)

Model Selection

Manufacturer	Farris	**API Letter**		**Inlet Size**	0.75 in	**Outlet Size**	1.00 in
Model Number	27CA23-M20	**API Area**		**In. Rating**		**Out. Rating**	
Valve Design	Conventional	**ASME Area**	0.068 in²	**In. Facing**	MNPT	**Out. Facing**	FNPT
Cap Constrn	Plain	**Max. Cap.**	157.71 std ft³/min	**Test Gag**	No	**Quantity**	1
React. Force	5.5663 lbs	**Noise**	93.881 dBa				

Model Materials

Body	316 ss	**Bonnet**	Carbon Steel	**Nozzle**	316 ss
Disc	316 ss	**Guide**	316 ss	**Spring**	316 ss

Sizing Scenarios

Scenario	Resolve By	Fluid State	Cause of Over P.	Relief Load Capacity	Set P.	Relief T.	Required Area
Case A	Max	Gas	Unknown	24000. ft³/day	100 PSIG	122 °F	0.007186 in²

Scenario: Case A / Gas Volume

Required Flow Capacity	V_{gas}	24000. ft³/day
Relief Temperature	T_{relief}	122 °F
Compressibility	Z	1
Gas Flow Constant	C	337
Discharge Coeff. (0.9 x K_d)	K^{Gas}	0.8775
Rupture Disk Coefficient	K_{CCF}	1
Relief Pressure	P_{relief}	124.7 PSIA
Molecular Weight	M_{vapor}	17.382 Mol Wt
Vapor Flow Factor	K_b	1
Vapor Flow Factor	K_v	-

$$A_{conven} = \frac{V_{gas}\sqrt{G_{gas}T_{relief}Z}}{1.175\,C\,K^{Gas}\,K_{CCF}\,P_{relief}\,K_b}$$

$$A_{bellow} = \frac{V_{gas}\sqrt{G_{gas}T_{relief}Z}}{1.175\,C\,K^{Gas}\,K_{CCF}\,P_{relief}\,K_v}$$

$$A_{pilot} = \frac{V_{gas}\sqrt{G_{gas}T_{relief}Z}}{1.175\,C\,K^{Gas}\,K_{CCF}\,P_{relief}\,K_b}$$

Fluid Type (User Defined)		-
Specific Gravity	G_{gas}	0.6 sp gr
Ratio of Specific Heats	k	1.2
Discharge Coefficient	K_d	0.975
ASME Area (Actual)		0.007186 in²

SizeMaster 4.2.1.12, DB: c:\fpm sizings

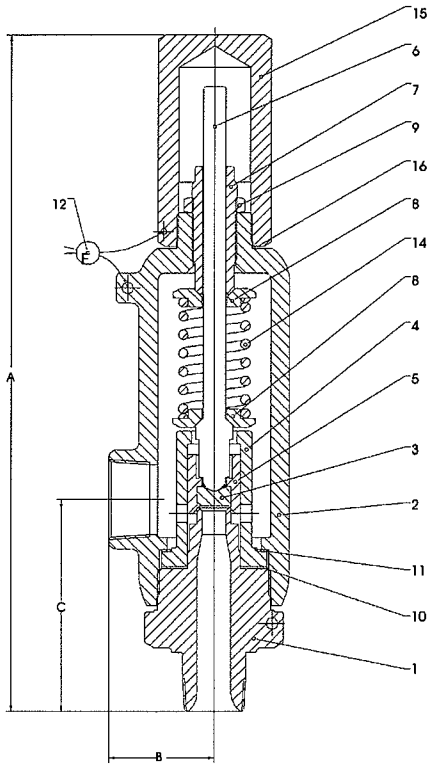
End of PSV-150A Data Sheet

Pressure Relief Valve Reference Drawing

Date Prepared: 2007-05-30 16:00

PSV Identification

Customer	Requisition #	Job #	Job Description	
Capital Engineering 2007		+17947		
Tag #	**Tag Description**		**Tag Status**	**P / ID**
PSV-150A	Job # 5252		Valve Selected	
ASME Code	**Fluid State**	**Resolved Area**	**Rupture Disk Coeff.**	**NACE**
ASME Sec. VIII	Gas (Volume)	0.007186 in²	No Rupture Disk, 1	No
Operating Pressure	**Set Pressure**	**Constant Back P.**	**Variable Back P.**	**Cold Diff. Test P.**
40 PSIG	100 PSIG	0 PSIG	0 PSIG	100 PSIG
Operating Temp.	**Relief Temp.**	**Operating to Set %**	**Over Pressure**	**Percent Over P.**
65 °F	122 °F	40 %	10 PSIG	10 %



Farris
27CA23-M20

API Letter	API Area	ASME Area
		0.068 in²

	Size	Rating	Facing
Inlet:	0.75 in		MNPT
Outlet:	1.00 in		FNPT

Valve Design	Cap Constrn	Test Gag
Conventional	Plain	No
Max. Rel. Cap.	**React. Force**	**Noise**
157.71 std ft³/min	5.5663 lbs	93.881 dBa

Dimensions

Weight	Dimension A	Dimension B
8 lb	11 1/4 in	1 3/4 in

Dimension C

3 9/16 in

Materials

Body (1)	Bonnet (2)
316 ss	Carbon Steel
Nozzle (1)	**Disc (3)**
316 ss	316 ss
Guide (4)	**Spring (13)**
316 ss	316 ss

CM2

Globe pattern, 3/16” (5mm) bore, 6000 psig - 414 barg hand valve

Product Overview

The CM2 (6000 psig - 414 barg) barstock construction needle valve is designed for multiple applications wherever throttling or bubble-tight shutoff is required. The CM2 is available in a wide variety of inlet & outlet configurations and materials. Specific CM2 models meet the requirements of NACE MR0175-2002.
The CM2 is available in both hard and soft seat configurations, and is available with Teflon® or Grafoil® packing or an O-ring seal. To simplify installation requirements the CM2 series can be factory configured with various manufacturers tube fittings.

Features:

- Available with either ball or needle stem ends, providing bubble-tight shutoff and ensuring long valve life. The non-rotating ball tip eliminates seat galling.
- All valves are available with a panel mount system option - consult factory.
- All valves are hydrostatically tested to rated pressure prior to factory shipment.
- Full material traceability is standard on each CM2. All valves are shipped standard with full material documentation for wetted components.
- Either the Teflon® or Grafoil® packing is easily adjustable in field.
- All packing is below the threads which ensures the valve's actuation threads are not contaminated by the process. This feature ensures smooth valve operation and long service life.
- All CM2's feature safety back seating ensuring the prevention of both accidental stem blowout and removal under pressure.
- Standard dust covers ensure long service life by preventing the elements (rain, snow, dirt, etc.) access to the bonnet assembly.

CM2 Ordering Code: **CM2 1 M44T D G SC**

Materials:

1: SS - 316/316L (meets NACE MR0175-2002)
2: CS/SS - A105 CS Body w/ SS Trim (meets NACE MR0175-2002)
3: CS - A108 CS
(Other construction materials available - consult factory)

Inlet / Outlet Connections:

Standard threaded connections:

M22T: 1/4” MNPT x 1/4” FNPT
F22T: 1/4” FNPT x 1/4” FNPT
M44T: 1/2” MNPT x 1/2” FNPT
F44T: 1/2” FNPT x 1/2” FNPT
M64T: 3/4” MNPT x 1/2” FNPT
Optional socketweld or buttweld connections available - consult factory.

Bonnet Assembly:

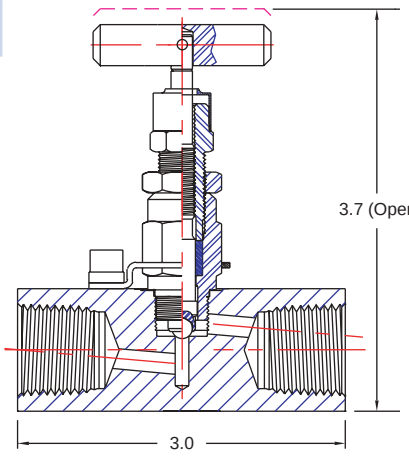
B: O-ring, Needle tipped stem end
D: Adjustable packing, Rotating ball tipped stem end
DN: Adjustable packing, Needle tipped stem end

Packing:

A: Aflas O-ring
V: Viton® O-ring
T: Teflon®, Adjustable packing
G: Grafoil®, Adjustable packing

Special Construction Options:

SC-L: Bonnet lock upgrade (in accordance with ANSI B31.1)
SG: Sour Gas (Valve to meet NACE MR0175-2002)
SC-O: Gaseous Oxygen Cleaned
SC: For other special requirements - consult factory



Design D4 Control Valve Assembly

The Design D4 control valve is a compact, rugged globe valve designed primarily for high-pressure throttling applications. This valve is ideal for use on pressure and flow control applications within the oil and gas production industry. The Design D4 is an excellent control valve for high-pressure separators, scrubbers, and other processing equipment. These valves are especially useful for either throttling or on/off control of liquids or gases which are gritty, sticky, or which have a tendency to build up on internal valve parts.

If the control valve requires maintenance, the trim and packing can be maintained by removing the patented deep-bore hammer nut and lifting the actuator/bonnet assembly off the valve without disassembling the actuator.

Note

Neither Emerson®, Emerson Process Management™, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

Figure 1. Design D4 Control Valve

Features

- **Safer Bonnet / Valve Body Connection—** Unique design provides additional protection if disassembly of bonnet/valve body connection is inadvertently started while there is still pressure in the valve body. Pins mounted in the valve bonnet help ensure the bonnet disengages from the valve body as the hammer nut is removed, while the threads are still engaged.

- **Heavy-Duty Guiding—**Massive guiding (figures 2 and 3) positively aligns the valve plug in the seat ring for reliable service. The screwed-in seat ring completely encloses the seat ring gasket.

- **Live-loaded Packing System—**The packing system provides an improved stem seal to help prevent the loss of valuable or hazardous process fluids or gases. It features Fisher® ENVIRO-SEAL® packing technology to provide reduced packing maintenance.

- **NACE Constructions—**NACE compatible trim is available with the Design D4 control valve. These constructions meet the metallurgical requirements of NACE MR0175 / ISO 15156.

- **Low Temperature Materials—**Valve construction materials allow use in applications as low as –46°C (–50°F).

- **Quick-Change Valve Plug—**Removable groove pin allows quick, easy valve plug replacement.

Features (continued)

- **Severe Service Capability with Tungsten Carbide Trim—**D4 valves are available with tungsten carbide trim for erosive service. This trim is designed specifically for severe service applications in the oil and gas industry. Durable tungsten carbide trim may benefit your application by wearing better and lasting longer.

- **Easy Installation—**Compact design allows installation where space is a premium. Screwed valve bodies feature compact face-to-face dimensions while flanged valve bodies conform to ISA-75 standards for maximum versatility.

- **Easy Maintenance—**Hammer nut bonnet/body joint allows repair or maintenance with a minimum of tools, without removing the valve body from the piping system. Seat ring can be removed with the same service tools used with a Fisher Design D valve.

- **Integral Bonnet Flange—** Bonnet has an integral flange that accepts hammer nut force when making the bonnet-to-body connection. There are no snap rings subject to possible failure in sour service or in atmospheric corrosion.

- **Standard Trim for Throttling or On-Off Service—** Micro-Form trim is standard for throttling or on-off service at no extra cost.

- **Application Flexibility—**Choices of port diameters up to 31.8 mm (1.25 inches), end connections, and trim materials suit these valves to many applications, including sour service.

Installation

Design D4 control valves may be installed in any position, but normally the actuator is vertical and above the valve. Install the control valve so the flow direction arrow on the side of the valve body indicates the direction of the process flow.

Dimensions are shown in tables 9 and 10 and figures 4 and 5.

Ordering Information

When ordering, specify:

Application Information

1. Type of application
   a. Throttling or on-off
   b. Reducing or relief (back pressure)
2. Controlled fluid
   a. Type (include chemical analysis, if available)
   b. Temperature (normal and maximum anticipated)
   c. Specific gravity
3. Range of flowing inlet pressures
4. Pressure drops
   a. Range of flowing pressure drops
   b. Maximum drop at shutoff
5. Flow rates
   a. Minimum controlled flow
   b. Normal flow
   c. Maximum flow
6. Input signal range to actuator

Control Valve Assembly Information

Refer to the Specifications and review the information under each specification.

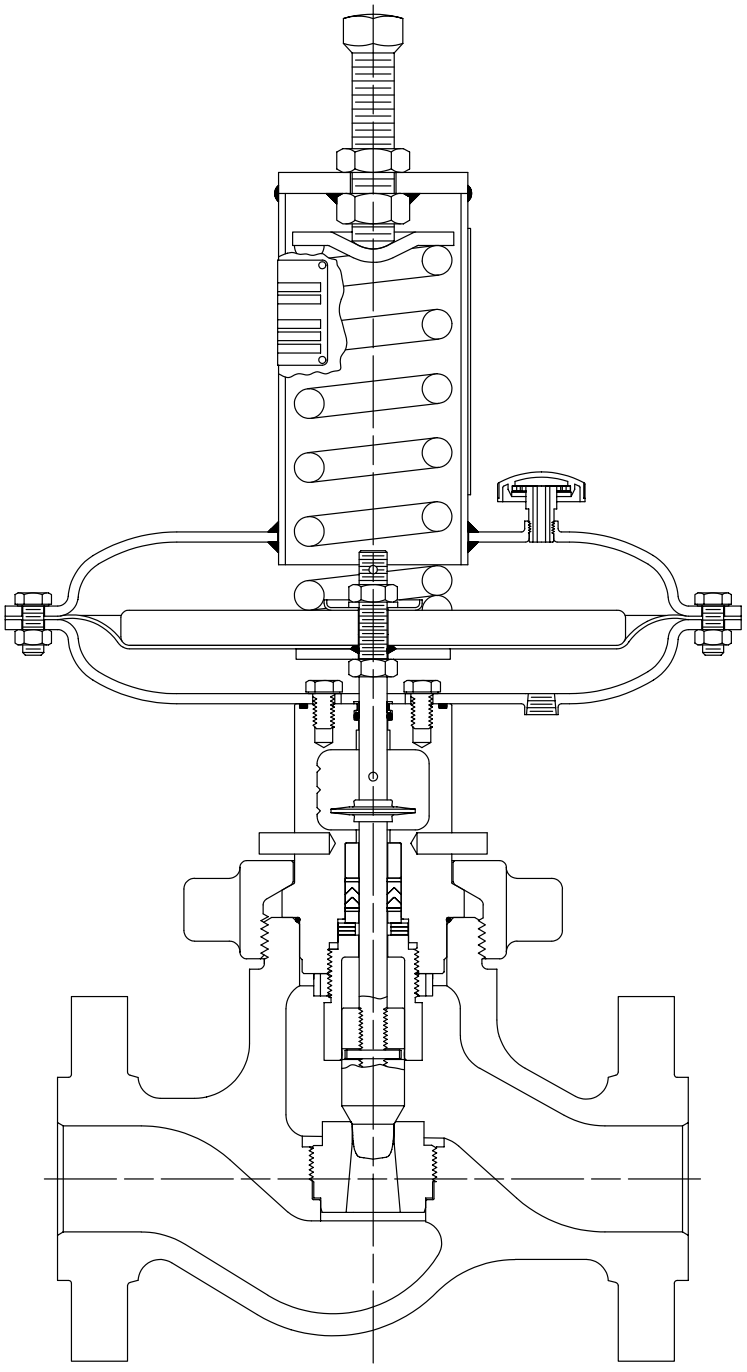


Figure 2. Design D4 Control Valve with Size 40 Actuator and 2-Inch Flanged Valve Body (Spring-To-Close Configuration)

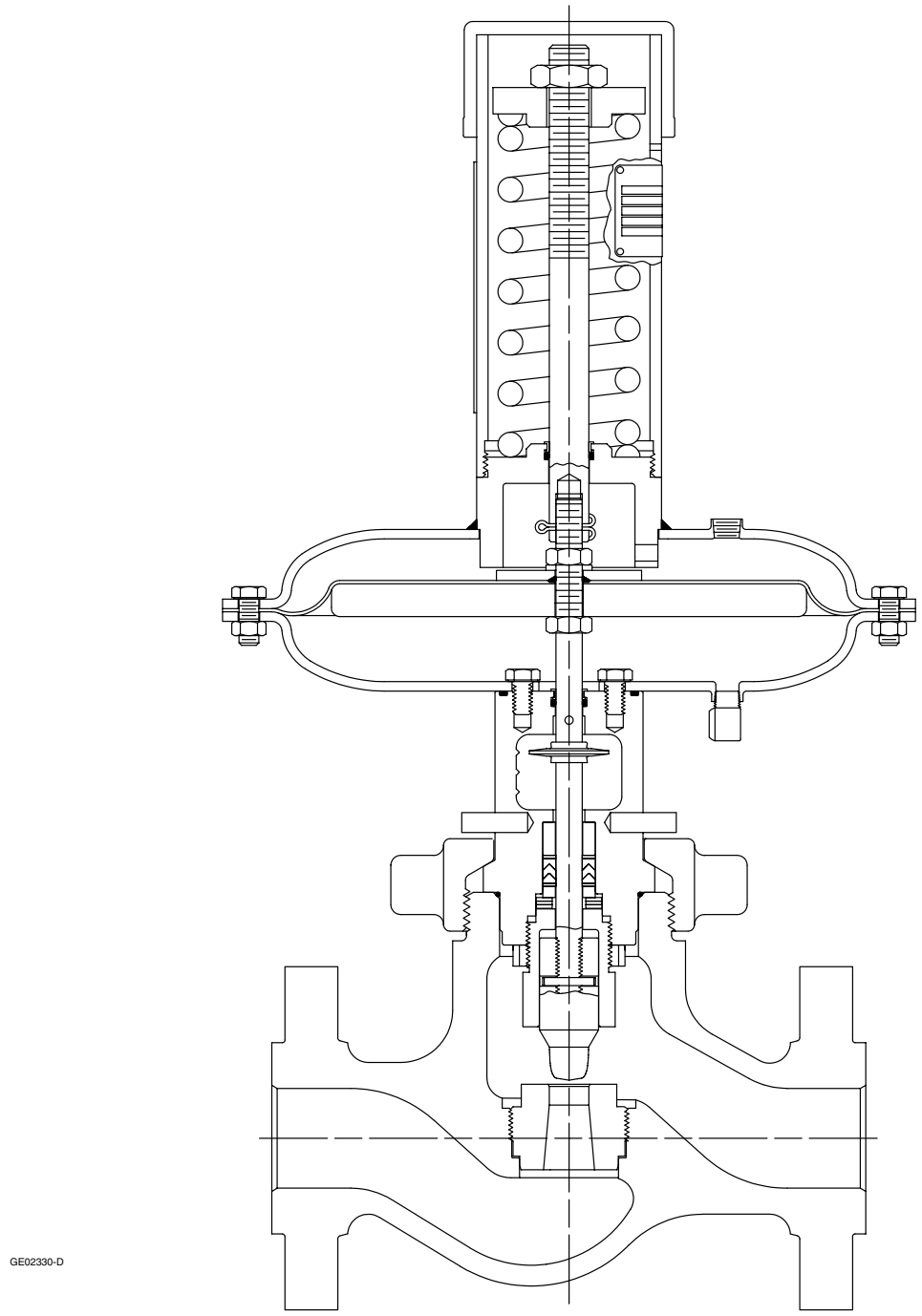


Figure 3. Design D4 Control Valve with Size 40 Actuator and 2-Inch Flanged Valve Body (Spring-To-Open Configuration)

Table 1. Valve Sizes and Connection Styles

VALVE SIZE, INCHES	PORT DIAMETER, (INCHES)	SCREWED	RAISED FACE (RF) FLANGED				RING TYPE JOINT (RTJ) FLANGED	
		4250 psi	Class 150	Class 300	Class 600	Class 900 and 1500	Class 600	Class 900 and 1500
1	0.25, 0.375, 0.5, 0.75	X	X	X	X	X	X	X
2	0.25, 0.375, 0.5, 0.75, 1, 1.25	X	X	X	X	X	X	X

X = Available construction.

Table 2. Design D4 Control Valves Approximate Weights, Kg (Pounds)

Valve Body Size, Inches	1	2
Screwed	32 (71)	39 (87)
Class 150	34 (74)	39 (86)
Class 300 and 600	37 (81)	48 (106)
Class 900 and 1500	50 (110)	66 (146)

Table 3. Typical Combinations of Metal Trim Parts

DESIGNATION	VALVE PLUG	SEAT RING
Standard	S41600 hardened to 38 HRC minimum	S17400
Sour	S17400 (NACE MR0175/ISO 15156)	S17400 (NACE MR0175/ISO 15156)
Tungsten Carbide	Tungsten carbide / S17400 (NACE MR0175/ISO 15156)	Tungsten carbide / S17400 (NACE MR0175/ISO 15156)

Table 4. Design D4 Environmental Limits for NACE MR0175/ISO 15156 with Sour Trim

MAXIMUM TEMPERATURE		MAXIMUM H_2S PARTIAL PRESSURE		COMPATIBLE WITH ELEMENTAL SULFUR?
°C	°F	MPa	psia	
204	400	1.4	200	No
199	390	2.3	330	No
191	375	2.5	360	No
149	300	2.8	400	No
135	275	No Limit		Yes

Table 5. Maximum Shutoff Pressure Drops[1] for Design D4 Control Valves (Spring-to-Close) When Used with Typical Control Instrumentation[2]

INPUT SIGNAL TO ACTUATOR		0 to 1.2 Bar (0 to 18 Psig)		0 to 1.4 Bar (0 to 20 Psig)		0 to 2.0 Bar (0 to 30 Psig)		0 to 2.3 Bar (0 to 33 Psig)		0 to 2.4 Bar (0 to 35 Psig)		0 to 3.4 Bar (0 to 50 Psig)	
SPRING		Light Rate				Heavy Rate							
INITIAL SPRING SETTING		0.77 Bar (11.2 Psig)		0.77 Bar (11.2 Psig)		0.85 Bar (12.4 Psig)		1.05 Bar (15.3 Psig)		1.18 Bar (17.1 Psig)		1.18 Bar (17.1 Psig)	
PORT DIAMETER		Maximum Pressure Drop											
mm	Inches	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi
6.4	0.25	293[3]	4250[3]	293[3]	4250[3]	293	4250	293	4250	293	4250	293	4250
9.5	0.375	293[3]	4250[3]	293[3]	4250[3]	293	4250	293	4250	293	4250	293	4250
12.7	0.5	191	2765	191	2765	219	3180	288	4180	293	4250	293	4250
19.1	0.75	80	1160	80	1160	92	1340	123	1785	143	2080	143	2080
25.4	1	42	610	42	610	49	715	67	965	78	1130	78	1130
31.8	1.25	25	365	25	365	30	430	41	590	48	700	48	700

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, use the column marked 0-1.4 bar (0-20 psig) for a 0.21-1.0 bar (3-15 psig) pneumatic controller with 1.4 bar (20 psig) supply pressure.
3. For applications with downstream pressure in excess of 196 bar (2845 psig), use 196 bar (2845 psig) for Maximum Shutoff Pressure.

Table 6. Maximum Shutoff Pressure Drops[1] for Design D4 Control Valves (Spring-to-Close) When Used with Instrumentation with Restricted Output Range[2]

INPUT SIGNAL TO ACTUATOR		0.4 to 2.0 Bar (6 to 30 Psig)		0.14 to 2.3 Bar (2 to 33 Psig)	
SPRING		Heavy Rate		Heavy Rate	
INITIAL SPRING SETTING		0.97 Bar (14.0 Psig)		1.17 Bar (17.0 Psig)	
PORT DIAMETER		Maximum Pressure Drop			
mm	Inches	Bar	Psi	Bar	Psi
6.4	0.25	293[3]	4250[3]	293	4250
9.5	0.375	210[3]	3045[3]	293	4250
12.7	0.5	113	1635	282	4095
19.1	0.75	45	655	120	1750
25.4	1	23	330	65	945
31.8	1.25	13	185	39	580

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, an Electro-Pneumatic Transducer calibrated for 0.4-2.0 bar (6-30 psig) output pressure.
3. For applications with downstream pressure in excess of 118 bar (1715 psig), use 118 bar (1715 psig) for Maximum Shutoff Pressure.

Table 7. Maximum Shutoff Pressure Drops(1) for Design D4 Control Valves (Spring-to-Open) When Used with Typical Control Instrumentation(2)

INPUT SIGNAL TO ACTUATOR		0 to 1.2 Bar (0 to 18 Psig)		0 to 1.4 Bar (0 to 20 Psig)		0 to 2.0 Bar (0 to 30 Psig)		0 to 2.3 Bar (0 to 33 Psig)		0 to 2.4 Bar (0 to 35 Psig)		0 to 3.4 Bar (0 to 50 Psig)	
SPRING		Light Rate				Heavy Rate							
INITIAL SPRING SETTING		0.23 Bar (3.4 Psig)		0.23 Bar (3.4 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)	
PORT DIAMETER		Maximum Pressure Drop											
mm	Inches	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi
6.4	0.25	293(3)	4250(3)	293(3)	4250(3)	293	4250	293	4250	293	4250	293	4250
9.5	0.375	293(3)	4250(3)	293(3)	4250(3)	293	4250	293	4250	293	4250	293	4250
12.7	0.5	187	2715	233	3380	293	4250	293	4250	293	4250	293	4250
19.1	0.75	78	1135	99	1430	147	2130	178	2575	198	2875	293	4250
25.4	1	41	600	53	765	80	1160	97	1410	109	1575	195	2830
31.8	1.25	24	355	32	465	49	715	60	875	68	985	123	1785

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, use the column marked 0-1.4 bar (0-20 psig) for a 0.21-1.0 bar (3-15 psig) pneumatic controller with 1.4 bar (20 psig) supply pressure.
3. For applications with downstream pressure in excess of 190 bar (2760 psig), use 190 bar (2760 psig) for Maximum Shutoff Pressure.

Table 8. Maximum Shutoff Pressure Drops(1) for Design D4 Control Valves (Spring-to-Open) When Used with Instrumentation with Restricted Output Range(2)

INPUT SIGNAL TO ACTUATOR		0.4 to 2.0 Bar (6 to 30 Psig)		0.14 to 2.3 Bar (2 to 33 Psig)	
SPRING		Heavy Rate		Heavy Rate	
INITIAL SPRING SETTING		0.69 Bar (10.0 Psig)		0.42 Bar (6.1 Psig)	
PORT DIAMETER		Maximum Pressure Drop			
mm	Inches	Bar	Psi	Bar	Psi
6.4	0.25	293(3)	4250(3)	293	4250
9.5	0.375	293(3)	4250(3)	293	4250
12.7	0.5	196	2845	293	4250
19.1	0.75	82	1195	156	2265
25.4	1	43	630	85	1235
31.8	1.25	26	380	52	765

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, an Electro-Pneumatic Transducer calibrated for 0.4-2.0 bar (6-30 psig) output pressure.
3. For applications with downstream pressure in excess of 202 bar (2925 psig), use 202 bar (2925 psig) for Maximum Shutoff Pressure.

Table 9. Dimensions(1)

END CONNECTION STYLE	1-INCH VALVE BODY						2-INCH VALVE BODY					
	A		D		G		A		D		G	
	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches
Screwed	155	6.12	209	8.24	46	1.81	230	9.00	215	8.47	70	2.75
Class 150 RF Flg	184	7.25	209	8.24	46	1.81	254	10.00	215	8.47	70	2.75
Class 300 RF Flg	197	7.75	209	8.24	46	1.81	267	10.50	215	8.47	70	2.75
Class 600 RF Flg	210	8.25	209	8.24	46	1.81	286	11.25	215	8.47	70	2.75
Class 600 RTJ Flg	210	8.25	209	8.24	46	1.81	289	11.38	215	8.47	70	2.75
Class 900/1500 RF Flg	273	10.75	209	8.24	46	1.81	340	13.38	215	8.47	70	2.75
Class 900/1500 RTJ Flg	273	10.75	209	8.24	46	1.81	343	13.50	215	8.47	70	2.75

1. Also see figures 4 and 5.

Table 10. Dimensions(1)

FAIL ACTION	C		E		F	
	mm	Inches	mm	Inches	mm	Inches
Fail Down, Spring-To-Close	333	13.12	312	12.30	241	9.47
Fail Up, Spring-To-Open	333	13.12	324	12.74	- - -	- - -

1. Also see figures 4 and 5.

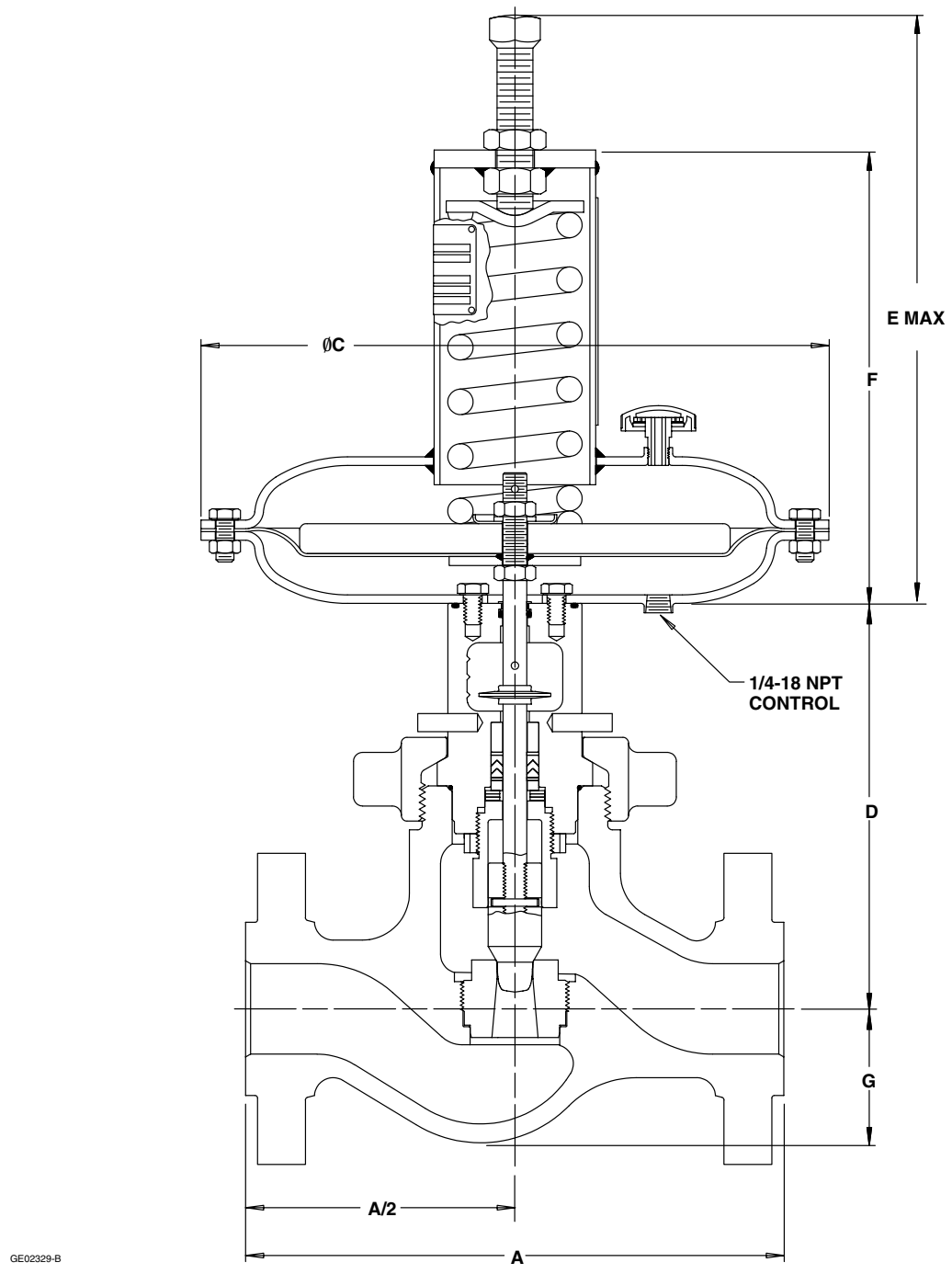


Figure 4. Design D4 Valve Dimensions, Spring-To-Close (also see tables 9 and 10)

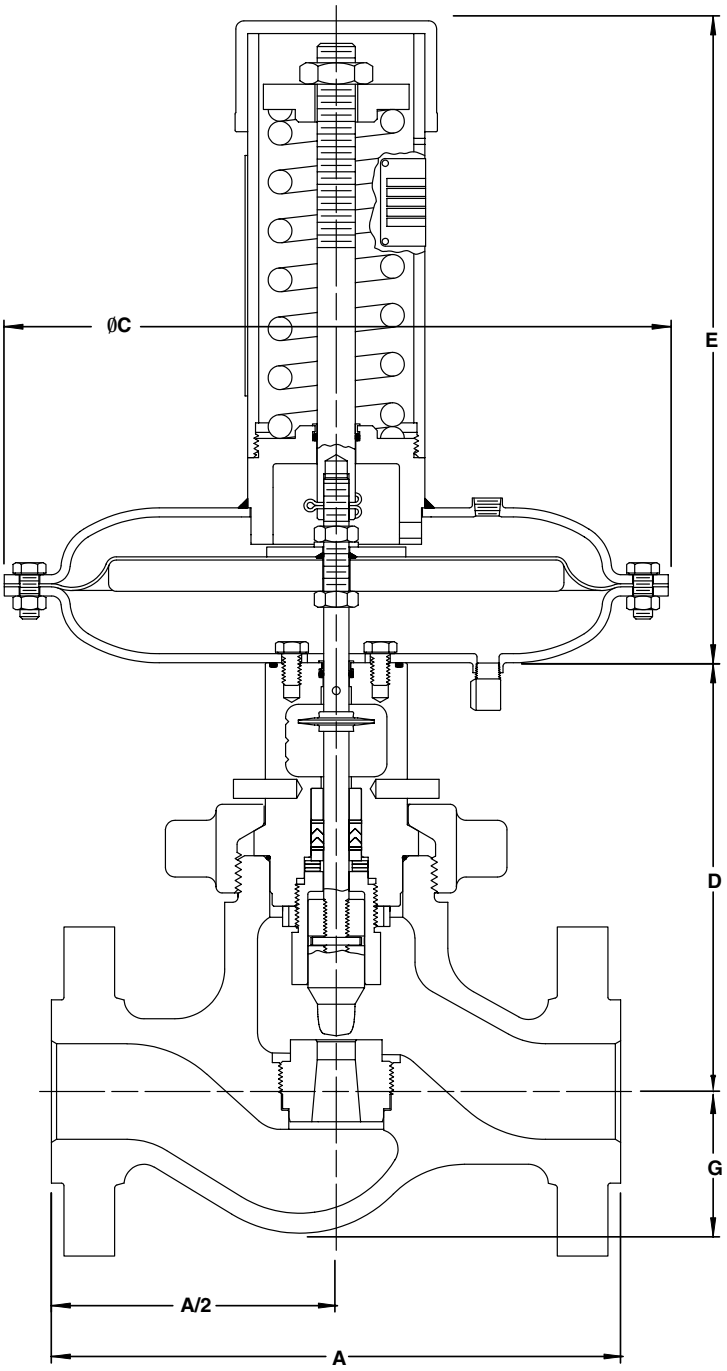


Figure 5. Design D4 Valve Dimensions, Spring-To-Open (also see tables 9 and 10)

Coefficients

Table 11. Design D4, Micro-Form Valve Plugs

Micro-Form - Flow Up — **Equal Percentage Characteristic**

Valve Size	Port Diameter		Total Travel		Flow Coefficient	Valve Opening—Percent of Total Travel											F_L[1]
	mm	Inches	mm	Inches		5	10	20	30	40	50	60	70	80	90	100	
1 Inch	6.4	0.25	19	0.75	C_v	0.0679	0.0858	0.122	0.167	0.231	0.325	0.458	0.646	0.905	1.25	1.76	0.96
					K_v	*0.0587*	*0.0742*	*0.106*	*0.144*	*0.200*	*0.281*	*0.396*	*0.559*	*0.783*	*1.08*	*1.52*	- - -
					X_T	0.705	0.623	0.620	0.631	0.585	0.565	0.578	0.569	0.555	0.588	0.569	- - -
	9.5	0.375	19	0.75	C_v	0.114	0.132	0.205	0.298	0.426	0.590	0.834	1.21	1.75	2.45	3.53	0.95
					K_v	*0.099*	*0.114*	*0.177*	*0.258*	*0.368*	*0.510*	*0.721*	*1.05*	*1.51*	*2.12*	*3.05*	- - -
					X_T	0.776	0.848	0.656	0.673	0.626	0.608	0.589	0.582	0.575	0.588	0.691	- - -
	12.7	0.5	19	0.75	C_v	0.185	0.235	0.357	0.523	0.752	1.07	1.50	2.13	3.05	4.30	5.87	0.96
					K_v	*0.160*	*0.203*	*0.309*	*0.452*	*0.650*	*0.926*	*1.30*	*1.84*	*2.64*	*3.72*	*5.08*	- - -
					X_T	0.718	0.674	0.640	0.596	0.575	0.592	0.593	0.568	0.569	0.599	0.755	- - -
	19.1	0.75	19	0.75	C_v	0.324	0.358	0.571	0.900	1.30	1.91	3.04	5.08	7.75	9.56	11.2	0.94
					K_v	*0.280*	*0.310*	*0.494*	*0.779*	*1.13*	*1.65*	*2.63*	*4.39*	*6.70*	*8.27*	*9.69*	- - -
					X_T	0.561	0.684	0.645	0.594	0.605	0.614	0.592	0.594	0.613	0.696	0.783	- - -
2 Inch	6.4	0.25	19	0.75	C_v	0.0679	0.0858	0.122	0.167	0.231	0.325	0.458	0.646	0.905	1.25	1.76	0.96
					K_v	*0.0587*	*0.0742*	*0.106*	*0.144*	*0.200*	*0.281*	*0.396*	*0.559*	*0.783*	*1.08*	*1.52*	- - -
					X_T	0.705	0.623	0.620	0.631	0.585	0.565	0.578	0.569	0.555	0.588	0.569	- - -
	9.5	0.375	19	0.75	C_v	0.114	0.132	0.205	0.298	0.426	0.590	0.834	1.21	1.75	2.45	3.53	0.95
					K_v	*0.099*	*0.114*	*0.177*	*0.258*	*0.368*	*0.510*	*0.721*	*1.05*	*1.51*	*2.12*	*3.05*	- - -
					X_T	0.776	0.848	0.656	0.673	0.626	0.608	0.589	0.582	0.575	0.588	0.691	- - -
	12.7	0.5	19	0.75	C_v	0.186	0.244	0.359	0.540	0.784	1.09	1.52	2.25	3.20	4.49	6.27	0.95
					K_v	*0.161*	*0.211*	*0.311*	*0.467*	*0.678*	*0.943*	*1.32*	*1.95*	*2.77*	*3.88*	*5.42*	- - -
					X_T	0.814	0.699	0.799	0.685	0.593	0.560	0.573	0.531	0.536	0.547	0.612	- - -
	19.1	0.75	19	0.75	C_v	0.305	0.367	0.583	0.892	1.31	2.02	3.14	5.18	8.01	10.6	13.4	0.92
					K_v	*0.264*	*0.317*	*0.504*	*0.772*	*1.13*	*1.75*	*2.72*	*4.48*	*6.93*	*9.17*	*11.6*	- - -
					X_T	0.697	0.513	0.477	0.481	0.478	0.447	0.400	0.432	0.465	0.512	0.640	- - -
	25.4	1	19	0.75	C_v	0.734	0.922	1.35	1.79	2.38	3.65	5.50	9.04	13.6	17.3	21.6	0.95
					K_v	*0.635*	*0.798*	*1.17*	*1.55*	*2.06*	*3.16*	*4.76*	*7.82*	*11.8*	*15.0*	*18.7*	- - -
					X_T	0.501	0.684	0.658	0.548	0.648	0.548	0.577	0.525	0.513	0.632	0.745	- - -
	31.8	1.25	19	0.75	C_v	1.08	1.22	1.65	2.26	3.24	5.14	8.90	15.2	22.6	26.9	33.2	0.94
					K_v	*0.934*	*1.06*	*1.43*	*1.96*	*2.80*	*4.45*	*7.70*	*13.1*	*19.5*	*23.3*	*28.7*	- - -
					X_T	0.587	0.686	0.636	0.638	0.649	0.520	0.706	0.687	0.680	0.767	0.761	- - -

1. At 100% travel.

Specifications

Available Configurations

Spring-To-Close
Spring-To-Open

Valve Sizes and End Connection Styles(1)

See table 1

Dimensions

See tables 9 and 10 and figures 4 and 5.

Face-to-face dimensions for flanged valves conform to ISA-75.03 (Class 150-600) and ANSI/ISA-75.16 Short (Class 900/1500)

Maximum Inlet Pressures and Temperatures(1)

Flanged connections are consistent with the ASME B16.34 pressure-temperature class, subject to Material Temperature Capabilities for the Valve Body Assembly (see following specification). For NPT end connections, the valve body rating is 4250 psig.

Maximum Pressure Drops(1)

See tables 5, 6, 7, and 8

Input Signal to Actuator

See tables 5, 6, 7, and 8

Actuator Maximum Casing Pressure

3.4 bar (50 psig)

Shutoff Classification per ANSI/FCI 70-2 and IEC 60534-4

Class IV

Flow Characteristic

Equal percentage

Flow Direction

Flow up only

Flow Coefficients

See the section titled Coefficients in this bulletin or Fisher Catalog 12

Port Diameters

See table 1

Construction Materials

Valve Body and Bonnet: ASME SA 352 LCC
Valve Plug and Seat: See table 3.
Valve Stem: S20910
Actuator O-Rings: (HNBR) Hydrogenated Nitrile
Bonnet O-Ring:
Standard: HNBR
Optional: Fluoroelastomer
Packing: PTFE/Carbon PTFE
Packing Springs: N07718
Packing Retainer: S17400
Actuator Diaphragm: Chloroprene
Actuator Spring: Painted steel
Seat Ring Gasket: S31600 (316 SST)
Spring Cover (Fail Up): PVC

Valve Plug Travel

19 mm (0.75 inch)

Valve Plug Style

Micro-Form valve plug

Actuator Diaphragm Effective Area

452 cm^2 (69 $inches^2$)

Actuator Pressure Connection Size

1/4 inch NPT female

Material Temperature Capabilities

Actuator Assembly:
Fail Down, Spring-to-Close: –40 to 93°C (–40 to 200°F)
Fail Up, Spring-to-Open: –40 to 77°C (–40 to 170°F)

Valve Body Assembly:
Standard Bonnet O-Ring: –46 to 149°C (–50 to 300°F)
Optional Bonnet Fluoroelastomer O-Ring: –23 to 204°C (–10 to 400°F)

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.

D4 Valve

Note

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Series 2600

Pressure Relief Valves

Farris Engineering Products and Services

Process Pressure Relief Valves

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Series 3800	ASME NB Certified for Air, Steam, and Water
Series 2700	ASME NB Certified for Air, Steam, and Water
Series 1890/1896M	ASME NB Certified for Air, Steam, and Water
Series 2850/2856	ASME NB Certified for Air and Steam

Steam Safety Valves

Series 4200	ASME NB Certified for Steam – Section I & VIII
Series 6400/6600	ASME NB Certified for Steam – Section I & VIII

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- Application and Sizing & Selection Support

The following is a list of Farris approvals currently on record:

- ASME "V", "UV" and "NV" approvals
- National Board "NB" approval
- ISO 9001-2000
- US Coast Guard approval
- PED 97/23/EC (European Pressure Equipment Directive)
- ATEX 94/9/EC (European Potentially Explosive Atmospheres)
- Canadian TSSA Registration
- China Safety Quality License
- Russian GOSH-R and GGNT (Russian Certification and Permits)
- First Point Assessment Limited

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Introduction

This catalog covers Series 2600, 2600S and 2600L Pressure Relief Valves including the latest information available to assist you in the sizing and selection of the proper valves for your application.

Farris pressure relief valves have over a half century of proven performance providing automatic and positive protection against overpressure in thousands of industrial plants and facilities worldwide. Our earned reputation as "the First Line of Safety" is the result of countless Farris innovations combined with progressive engineering, sound design and high quality production.

Our headquarters and manufacturing facility located in Brecksville, Ohio, oversees the production of these superior valves at plants in the United States, Canada and the United Kingdom. Our associated facility in Australia is also equipped with precision machinery and controlled by rigid inspection and standards to produce quality pressure relief valves to meet your needs. The Brecksville facility is also responsible for research and development, engineering, manufacturing technology, and sales and marketing. We offer the services of our engineering sales representatives throughout the world as well as our Farris Authorized Service Teams (FAST Centers) and headquarters staff to extend you every possible customer service.

Guarantee

All products manufactured by Farris Engineering, a division of Curtiss-Wright Flow Control Corporation, are guaranteed free of defects in material and workmanship for a period of one year when used within the recommended range. When authorized, any defective product may be returned to the Factory, and if found defective, will be repaired or replaced free of charge, F.O.B. our Factory. No charge for labor or other expense incurred will be allowed as the liability of Farris Engineering is measured by the refund price of the defective product only.

Table of Contents

Farris pressure relief valves are designed to automatically protect your equipment against excessive overpressure. Every care is taken in the development, design and production of these valves to ensure complete dependability in performance. Our constant objective is to provide a superior valve that will assure ultimate protection at the lowest cost, both initially and throughout its service life.

What is the Farris Advantage?

- Easy sizing and selection of valves using Farris catalogs and/or SizeMaster™ Sizing and Selection software.
- A method of specification and ordering that is simple, accurate and complete.
- Accurate and timely shipments in accordance with our computerized inventories.
- Factory-trained engineering/sales staff to assist you in solving your pressure relief valve problems.
- Streamlined design to allow you maximum flexibility in the use and repair of your Farris pressure relief valves.
- Assurance of the utmost safety of your equipment when protected by a Farris valve.
- Maximum seat tightness in accordance with stringent inspection and testing.
- Complete repair and maintenance information that affords you repairs in your own maintenance shop.
- Maximum interchangeability of parts.
- Continuous availability of replacement parts at our plants and authorized service centers for immediate shipment to meet your emergency requirements.
- Long service life of a soundly-designed pressure relief valve made from materials suited to your service.
- Twenty-four hour/seven-day customer support is achieved via our FAST Centers and our Web-based CW Commerce Program accessible to all Farris Representatives.

Valve Selection

This catalog simplifies the sizing and selection of Series 2600 process pressure relief valves. The pressure relief valves are presented here in an easy-to-understand format. Unless otherwise stated, references made to the Code refer specifically to ASME Section VIII, Division 1.

Certified Capacity Code Compliance

The Series 2600 pressure relief valves have been carefully constructed and tested in accordance with the requirements of the ASME Pressure Vessel Code, Section VIII. Their capacity rating for the applicable fluids is certified by the National Board of Boiler and Pressure Vessel Inspectors.

Range of Service Application

Series 2600 pressure relief valves are designed to function equally well on air, gases and steam or in liquid service. For specific Code applications in liquid service, Farris 2600L relief valves offer superior performance. This catalog covers orifice ranges “D” through “Z”.

Nozzle Design

The Farris full nozzle pressure relief valve design (Fig 1) incorporates a nozzle shape to provide:

1. A high stable flow coefficient.
2. Greater strength to resist possible discharge piping strains.
3. Wrenching provisions on raised face nozzles where they will not interfere with the flow path.

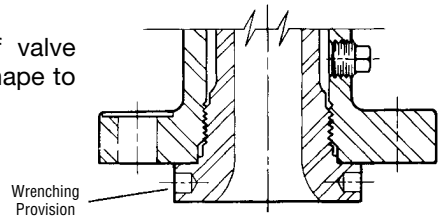


Figure No. 1

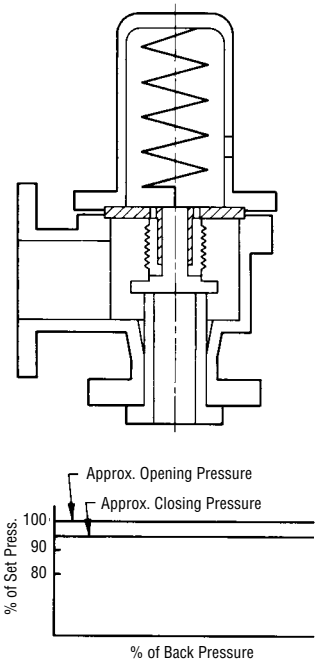
The superior design allows easy maintenance by simplifying nozzle removal and assembly.

Balanced Bellows Design

Both the Farris BalanSeal balanced bellows (Fig 2A) and the BalanSeal/Piston pressure relief valve provide consistent capacity, set pressure and blow down at elevated backpressure encountered when valves discharge into headers or where other devices produce variable backpressure in the relief manifold system. Nozzle can be removed from Body with the Blowdown Ring attached.

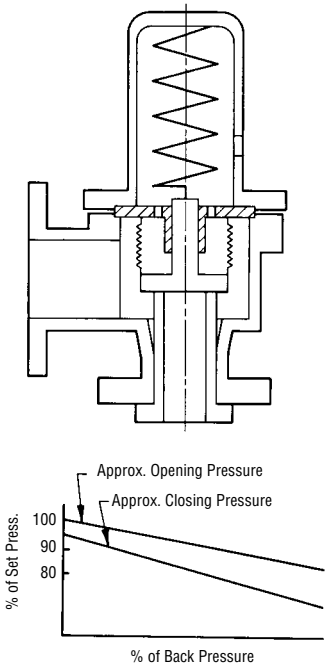
The Farris BalanSeal design permits simple conversion of conventional construction valves to BalanSeal balanced bellows construction by adding a bellows and bellows gasket for orifice sizes “F” through “T”.

The “D” and “E” orifices are available with balanced bellows through the class 600 inlet, with higher class valves available in an unbalanced bellows design (Fig 2B). The unbalanced bellows is used for corrosion isolation applications, and can also be used where constant backpressure is encountered. Spring setting compensation is made for constant backpressure applications.



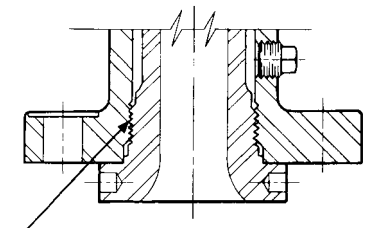
Balanced Farris Bellows

Figure No. 2A



Unbalanced Bellows

Figure No. 2B



Threaded connection of nozzle located in inlet flange to avoid distortion on the nozzle seating surface.

Figure No. 3

If connected to a closed system, specific care should be taken to keep piping strains away from the pressure relief valve under all conditions of process operation.

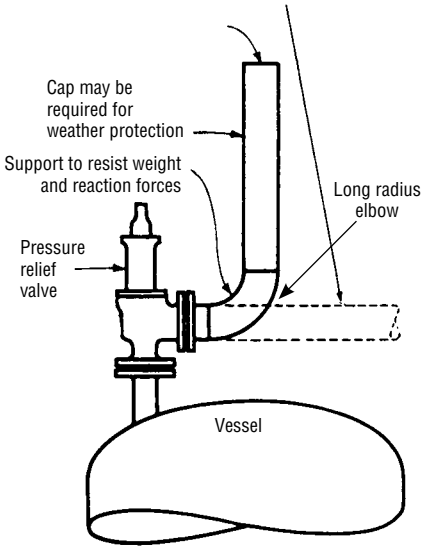


Figure No. 4

Resistance to Discharge Piping Strains

For most pressure relief valves, and particularly for those from which the discharge must be piped away to a remote location, it is almost impossible to keep piping strains away from the valve. The superior Farris pressure relief valve design incorporates several features which allow this valve to take a maximum amount of piping strain without hampering the functional characteristics of the valve or contributing to serious leakage.

1. The threaded connection between the valve nozzle and the valve inlet flange is located low in the flange so that any distortion which may take place at the inlet neck of the body is not transmitted to the valve nozzle. This eliminates the effect of the distortion on the nozzle seating surface and the subsequent serious leakage through the valve (Fig 3).

2. The accurate guiding in the Farris design, using the double universal ball joint construction above and below the sleeve guide, will allow the disc seat to align itself positively with the nozzle seat in cases where the discharge piping strains cannot be avoided and have forced the upper portion of the valve out of exact alignment (Fig 4 & 5).

3. The superior strength built into the body of the Farris pressure relief valve to resist these discharge piping strains materially reduces the deflection and distortion in the valve and reduces the leakage encountered, when at times discharge piping strains become excessive.

In spite of these features, however, it is advisable to minimize the discharge piping strain on any pressure relief valve. It is our recommendation that piping engineers eliminate these discharge piping strains as much as possible under all operating conditions. Additional information on allowable external loads is provided in the Farris Technical Recommendations publication.

Isolation of Bonnet Spring Chamber

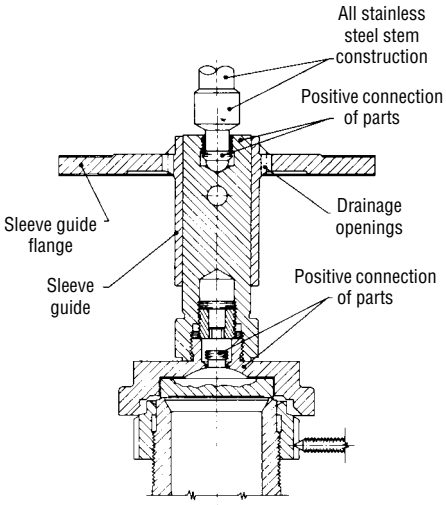
The Farris pressure relief valve huddling chamber is engineered to extract the flow forces required to overcome the force of the spring as well as the forces resulting from the body and bonnet pressure when the valve is open. In other designs, the use of eductor tubes, venting the guide directly into the valve body, or other techniques are used in an attempt to keep the huddling chamber or body pressure away from the topside of the disc to obtain full lift and capacity. These designs may have undesirable effects on valve performance, life and maintenance. Special attention should be given in the following cases:

1. **High Temperature.** In Farris pressure relief valves on high temperature service, there is no induced or forced flow of the hot lading fluid into the bonnet spring chamber, so relaxation of the spring due to high temperature does not occur as rapidly as it does in other valve designs. As a result, blow down in the Farris valve is stabilized for longer flowing periods than in competitive designs.
2. **Corrosive Service.** In Farris pressure relief valves on corrosive service, there is no induced or forced flow of the corrosive lading fluid past the guiding surfaces during valve operation. This reduces the corrosive effect of the lading fluid on the guiding surfaces and valve spring, so lowering the frequency of galling and spring failure with the accompanying reduction of maintenance costs and unscheduled downtime.
3. **Dirty Service.** Where small foreign particles can be carried in the gas or vapor stream, there is no induced or forced flow in the Farris design carrying these small particles between the guiding surfaces. Galling of the guide surfaces, which frequently causes the valve to “hang” or “freeze” in either an open or closed position, is eliminated.

The Farris design avoids all these difficulties by discharging directly from the huddling chamber into the valve body without inducing flow past the guiding surfaces into the spring chamber or forcing flow past the guiding surfaces because of the large pressure drop between the huddling chamber and the valve body.

Integral Sleeve Guide

The Farris pressure relief valve design incorporates an integral sleeve guide (Fig 5), assuring continual positive alignment after the part has been manufactured, and including the same high corrosion resistant properties in the guide flange that are present in the sleeve portion of the guide. The sleeve guide is extended above the top of the guide flange, minimizing the possibility of corrosive or other foreign particles washing onto the guiding surfaces when the valve is relieving or when it is "breathing" as a result of atmospheric temperature changes. Openings are provided in the guide flange to allow these solid particles to leave the bonnet, preventing them from passing between the guiding surfaces and causing galling.



Integral Sleeve Guide

Figure No. 5

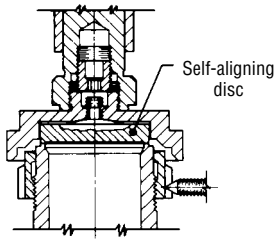
Tightness

In a spring loaded pressure relief valve, the force exerted by the system pressure under the valve disc approaches the opposing spring force on top of the valve disc as the system operating pressure nears the set pressure of the valve. Since the operating pressure of the system is often 90% of the valve set pressure, the differential force holding the seats together is quite small.

There are several factors which affect the tightness of the spring loaded pressure relief valve, including alignment, disc strength, thermal distortion, and preparation of seating surfaces. The Farris valve is engineered for exceptional tightness because of positive alignment, a high strength disc design, the elimination of thermal distortion and optimum seating surface finish.

Positive Alignment. Using the double universal joint, 2½ to 1 guiding ratio, and self-aligning disc, positive alignment of internal parts is achieved. Misalignment is avoided, improving tightness and eliminating other undesirable effects such as long blow down.

High Strength Disc Design. In the Farris valve, the thickness of the self-aligning disc (Fig 6) is no greater than necessary; however, the same thickness is maintained for all catalog materials. For purposes of strength, the disc is strong enough in bending moment for all materials shown in the catalog. Valves constructed with hardened discs are exceptional in withstanding the effects of impact, an advantage where installation or process conditions may cause chatter.



High Strength Disc

Figure No. 6

Elimination of Thermal Distortion. In a pressure relief valve, especially on high or low temperature service, a single large disc, with its top surface exposed to atmospheric temperature when the valve is closed, has a temperature gradient between the surface contacted by the lading fluid and the surface contacted by the ambient temperature in the valve body or bonnet. This temperature gradient induces thermal stresses in a heavy disc that can cause deformation of the seating surfaces and consequent leakage of the valve.

The Farris self-aligning disc is essentially encased in a disc holder with contact at only one central point, so that the conduction or convection of heat around the disc is quite low. As a result, the thermal stresses at the seating surface practically disappear. This gives further assurance of tightness over the range of temperatures used in various operations.

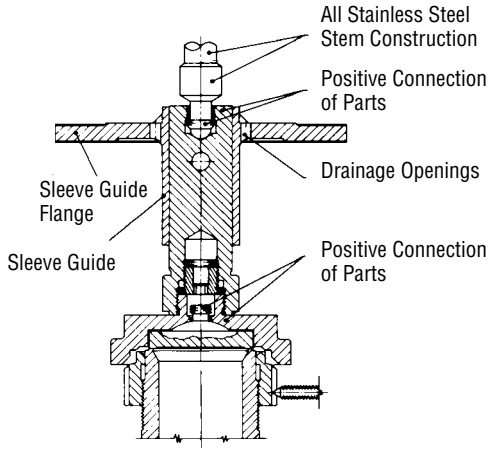
Optimum Seating Surface Finish. Seat surfaces are machine lapped and polished to produce flatness (as measured with optical flats) that deviates less than eleven millionths of an inch from a true plane, with a surface finish of five micro inches or less. Regardless of the seating surfaces, maximum tightness will not be achieved unless positive alignment and elimination of thermal distortion are integral design features of the valve.

All Stainless Steel Stem Construction

The Farris pressure relief valve design features an all stainless steel stem. This construction cost-effectively eliminates dangerous sticking due to galvanic corrosion at the upper guiding point in the spring adjusting screw. The careful design of this upper bearing also ensures proper alignment and optimum freedom from galling and erratic popping.

Positive Connection of Parts

The Farris design incorporates a positive connection between the valve stem and the stem retainer as well as between the disc and disc holder (Fig 7). These connections are made with a male threaded head which threads into a portion of a female socket through which it drops free into an undercut chamber to make bearing contact on a spherical surface. This allows complete freedom of action for alignment purposes while retaining the positive connection of the threads. It also eliminates the need to use snap ring connections which, in some cases, are not sufficiently positive during valve operations and may be inadvertently left out during maintenance.



Positive Connection of Parts

Figure No. 7

The Farris two-piece design of disc holder and stem retainer features a positive locking device called the disc holder lock screw. Any attempt to disassemble these parts causes the lock screw to lock tighter, unless first disengaged. The lock screw provides a positive lock between these two parts that makes them equivalent to a single part but without the associated disadvantages. The two-piece assembly allows conversion to bellows construction at a minimal investment. The two-piece design also allows the stem retainer to be constructed of less corrosion-resistant material than the disc holder, when a bellows is installed to isolate the moving parts. When maintenance requires parts replacement, the entire assembly will not need replacement if only one piece is damaged.

Convertibility of Design

The Farris pressure relief valve is available as a conventional valve and as a BalanSeal (balanced bellows) valve. The conversion of this valve from conventional to BalanSeal, or vice versa, requires only the addition or removal of the balanced bellows and bellows gasket in the valve, and the coincidental removal or replacement of a pipe plug in the valve bonnet vent. No other parts are required and all other parts are completely interchangeable. This unique feature is offered in orifices “F” through “T”.

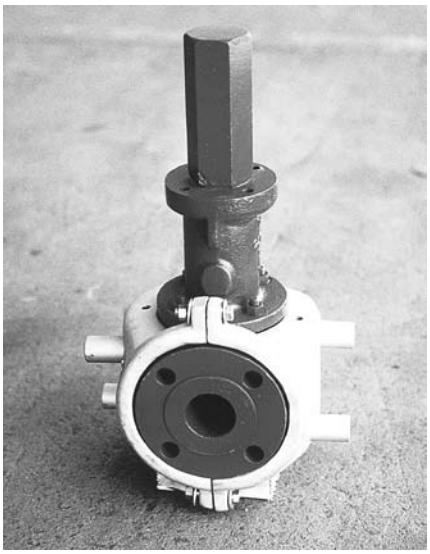
In addition, the bonnet of the valve is constructed so that all valves can be equipped with a plain screwed cap, bolted cap, an open lever or packed lifting lever without changing any other valve parts or fully disassembling the valve.

Body and Bonnet of Equal Materials

Although the Farris pressure relief valve does not induce circulation of the lading fluid through the bonnet, the bonnet and the valve body are made of the same high quality steel. It is important that both the body and bonnet be made of materials suitable for the service in which the valve will be used, especially in the case of high temperature services.

Steam Jacketing for Better Heat Transfer

In modern process plants, it is necessary to keep some valves and lines warm at all times to avoid solidification of the lading fluid and to guarantee the safety of equipment. Farris offers a steam jacket (Fig 8) to substantially increase the rate of heat transfer into the valve and, at the same time, simplify the problem of removing or dismantling the valve for maintenance. This design offers a separate two-piece jacket that installs on a standard valve body. See details on page 71.



Steam Jacketed Body

Figure No. 8

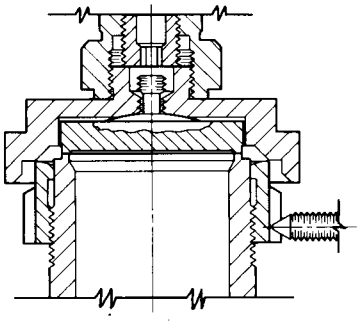
Simple, Accurate Adjustments

The single Blow Down Ring construction of the Farris pressure relief valve allows simple shop or field setting, something not possible with multiple ring valve types.

In most process plants, it is not possible or economical to test the pressure relief valve in place on the process equipment, so the valve is tested while mounted on a maintenance shop test stand where the pressure and volume for testing are often limited. With the Farris design, the single Blow Down Ring is adjusted in the maintenance shop so that the set pressure point can be observed. After the set pressure is established, the Blow Down Ring is adjusted to a lower empirically predetermined or field established position depending on set pressure, size and lading fluid (Figs 9A, 9B). Blow Down Ring settings and test equipment recommendations are detailed in maintenance manuals published by Farris Engineering.

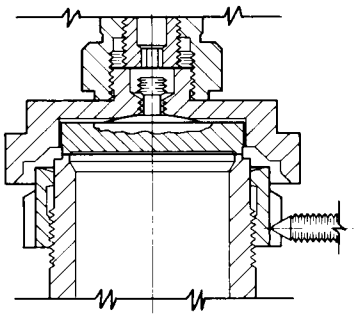
Interchangeability of Parts

In the Farris pressure relief valve design, maximum interchangeability of parts is maintained in order to reduce the number of spare parts needed and keep spare parts inventories to a minimum.



Blow Down Ring Adjustment
For Set Pressure Test

Figure No. 9A



Blow Down Ring Adjustment
For Service Operation – Vapors

Figure No. 9B

Standard Flanged Connections

1. All steel raised face flanges are supplied with a serrated spiral finish with 45 to 55 grooves per inch and a finish between 125 and 160 AARH.
2. All ring joint flanged facings are supplied for octagonal or oval gaskets.
3. Facings other than raised face or large male can be supplied at additional cost.
4. Flange ratings that conform to ANSI B16.5 are indicated on each Orifice Selection Table. Heavier outlet flanges can be supplied at additional cost. For flange dimensions, see ANSI Dimension Table, page 77.
5. Drilling of all flanges always straddles the valve center line.

Valve Trim

Trim is a term that generally refers to internal parts of a pressure relief valve. Unless noted, valve trim in a Farris pressure relief valve specifically includes the nozzle and disc only. Standard bills of materials for all 2600 Series valves are located on pages 12 and 13. For low temperature and corrosive service materials, see pages 17 through 21. If other than standard trim or metallurgy is required, this must be specified.

Differential Between Operating and Set Pressure

For best performance in process applications, we recommend pressure relief valves be set to open at a minimum of 10% or 25 psig above the operating pressure. A suitable margin above the operating pressure should be provided in order to prevent any unintended operation of the pressure relief valve. Refer to ASME Section VIII Pressure Vessel Code, Appendix M, Paragraph M-10, Pressure Differentials for Pressure Relief Valves as well as to Farris Technical Recommendations for complete information.

In the case of pump and compressor discharge lines, a greater differential is recommended if possible, since pulsations within the system can result in faulty valve operation. Consequently, the pressure relief valve should be set as high above the discharge line pressure as possible.

Set Pressure Compensation for Temperature

An increase in temperature causes a reduction of valve set pressure as a result of the direct effect of temperature on the spring and expansion of body and bonnet which reduces spring loading. Since pressure relief valves are invariably tested at atmospheric temperature, it is customary to adjust the set pressure at ambient conditions to compensate for higher operating temperatures as indicated in the following table.

All Service Fluids

Operating Temperature	% Increase in Set Pressure At Atmospheric Temperature
-450° F to 300° F	None
301° F to 600° F	1%
601° F to 900° F	2%
901° F to 1200° F	3%

Steam service valves are tested on steam by the manufacturer and require no additional temperature compensation. Where the set pressure is above the production steam test facility limits, Section VIII steam valves may be tested on air. When steam valves are tested on air, compensation shown in the All Service Fluids Table should be used.

Low Pressure Settings

Low set pressure limits are indicated in the following table. These limits apply to both metal-to-metal and O-ring seat construction. Low pressure settings may be governed by valve design and performance and/or Code application limits. Pressure vessels having operating pressures not exceeding 15 psig are not considered within the scope of the ASME Code, Section VIII. Accordingly, pressure relief valve requirements for such applications are governed by other Codes and Standards that should be consulted.

The sizing equations for compressible fluids provided herein are valid for sonic flow conditions and should not be used to size pressure relief valves for applications in which subsonic (below 15 psig) flow conditions may exist. Low pressure applications can be reviewed by the Factory and special valves provided to meet those requirements.

Valve Series	Construction	Low Set Pressure Limit (psig)
2600 2600S 2600L	Conventional	15
2600 2600S 2600L 2600 Bal/Piston	BalanSeal BalanSeal/Piston	15*

**Low set pressure limit for "D" and "E" orifice BalanSeal (balanced bellows) valves are 50 psig and 25 psig respectively.*

SAFETY VALVE – an automatic pressure relieving device actuated by the static pressure upstream of the valve, and characterized by rapid full opening or pop action. Used for steam, gas or vapor service.

RELIEF VALVE – an automatic pressure relieving device actuated by the static pressure upstream of the valve, which opens in proportion to the increase in pressure over the opening pressure.

SAFETY RELIEF VALVE – an automatic pressure actuated relieving device suitable for use as either a safety or relief valve, depending on the application.

PRESSURE RELIEF VALVE – a pressure relief device designed to re-close and prevent the further flow of fluid after normal conditions have been restored.

SET PRESSURE – in pounds per square inch gage, the inlet pressure at which the pressure relief valve is adjusted to open under service conditions. In a safety or safety relief valve in gas, vapor or steam service, the set pressure is the inlet pressure at which the valve pops under service conditions. In a relief or safety relief valve in liquid service, the set pressure is the inlet pressure at which the first steady steam flows from the valve perpendicular to the outlet.

DIFFERENTIAL SET PRESSURE – the pressure differential, in pounds per square inch between the set pressure and the constant superimposed back pressure. It is applicable only when a conventional type safety relief valve is being used in service against a constant superimposed back pressure.

COLD DIFFERENTIAL TEST PRESSURE – in pounds per square inch gage is the inlet static pressure at which the pressure relief valve is adjusted to open on the test stand. This pressure includes the corrections for service conditions of back pressure or temperature, or both.

OPERATING PRESSURE – the pressure, in pounds per square inch gage to which the vessel is usually subjected in service. A vessel is usually designed for a maximum allowable working pressure, in pounds per square inch gage, which will provide a suitable margin above the operating pressure in order to prevent any undesirable operation of the relief device. It is suggested that this margin be as great as possible consistent with economical vessel and other equipment design, system operation and the performance characteristics of the pressure relieving device.

MAXIMUM ALLOWABLE WORKING PRESSURE– the maximum gage pressure permissible in the top of a completed vessel in its operating position for a designated temperature. This pressure is based on calculations for each element in a vessel using nominal thicknesses, exclusive of allowances for corrosion and thicknesses required for loadings other than pressure. It is the basis for the pressure setting of the pressure relieving devices protecting the vessel. The design pressure may be used in place of maximum allowable working pressure in cases where calculations are not made to determine the value of the latter.

OVERPRESSURE – a pressure increase over the set pressure of a pressure relief valve, usually expressed as a percentage of the set pressure.

ACCUMULATION – the pressure increase over the maximum allowable working pressure of the vessel during discharge through the pressure relief valve, expressed as a percent of that pressure or in pounds per square inch.

BLOW DOWN – the difference between actual popping pressure of a pressure relief valve and actual reseating pressure, expressed as a percentage of set pressure or in pressure units.

LIFT – the actual travel of the disc away from closed position when a valve is relieving.

BACK PRESSURE – the static pressure existing at the outlet of a pressure relief device due to pressure in the discharge system.

CONSTANT BACK PRESSURE – back pressure that does not change appreciably under any condition of operation whether the pressure relief valve is closed or open.

VARIABLE BACK PRESSURE – refer to the discussion on BalanSeal valves on page 85.

BUILT-UP BACK PRESSURE – pressure existing at the outlet of a pressure relief device occasioned by the flow through that particular device into a discharge system.

SUPERIMPOSED BACK PRESSURE – the static pressure existing at the outlet of a pressure relief device at the time the device is required to operate. It is the result of pressure in the discharge system from other sources.

Prefix
(if applicable)

H
Designates high pressure versions. Used for "Q", "R", & "T" orifices only.

26
Series Number

Designates Series 2600 cast steel flanged pressure relief valves

D
Orifice Areas

Orifice Letter	Area, Sq. In.		Area, Sq. mm*	
	API	Actual	API	Actual
D	0.110	0.150	71	97
E	0.196	0.225	126	145
F	0.307	0.371	198	239
G	0.503	0.559	325	361
H	0.785	0.873	506	563
J	1.287	1.430	830	923
K	1.838	2.042	1186	1317
L	2.853	3.170	1841	2045
M	3.60	4.000	2323	2581
N	4.34	4.822	2800	3111
P	6.38	7.087	4116	4572
Q	11.05	12.27	7129	7916
R	16.0	17.78	10323	11471
T	26.0	28.94	16774	18671
U	—	31.5	—	203.2
W	—	63.62	—	410.2
W2	—	104.0	—	670.8
X	—	113.1	—	729.5
Y	—	143.1	—	923.0
Z	—	176.7	—	1139.7

Note: The "U" through "Z" orifices are not API Standard Sizes.
* "U" through "Z" metric areas in square centimeters.

A
Construction

A
Conventional construction

B
BalanSeal construction

C
Conventional with O-ring seat pressure seal

D
BalanSeal with O-ring seat pressure seal

E
BalanSeal with auxiliary balancing piston

F
BalanSeal with auxiliary balancing piston and O-ring seat pressure seal

T
Teflon seat, conventional

U
Teflon seat, BalanSeal

1
Temperatures & Materials

Designation	Inlet Temperature Range °F	Material	
		Body & Bonnet	Spring
1	-20 to 800	Carbon Steel	Chrome Alloy
2**	451 to 800	Carbon Steel	Chrome Alloy
3	801 to 1000	Chrome Moly Steel	High Temp. Alloy
4*	1001 to 1200	—	—
5*	1201 to 1500	—	—
1	-21 to -75	Use "S3" Trim Options	
1	-76 to -450	Use "S4" Trim Options	

* Temperature ranges 4 and 5 are beyond the scope of this catalog. Consult the Factory.

** Temperature range 2 is no longer used as the standard range valve handles temperatures to 800°F.

Our type numbering system simplifies the selection and specifying of Farris pressure relief valves because the digits that comprise a specific type number have a distinct significance. The digits describe the basic valve series, orifice, seat and internal construction, inlet temperature range, body, bonnet and spring material, inlet flange class and Code liquid design.

Ordering Information

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

1. Quantity*
2. Inlet and outlet size
3. Farris type number*
4. Inlet and outlet flange class and facing
5. Materials of construction, if other than standard
6. O-ring seat pressure seal material, if required
7. Set pressure*
8. Maximum inlet temperature*
9. Allowable overpressure*
10. Fluid and fluid state*
11. Back pressure, superimposed constant and/or variable and built-up*
12. Required capacity*
13. Accessories
    (a) Bolted cap, open or packed lever
    (b) Test gag
    (c) Remoter
14. Code requirements, if any

*As a customer service, we verify your selection and sizing. If you want this service, you must include this information.

Parts Replacement

Valves – If an exact replacement valve is required, then the valve type, size and serial number must be specified to ensure proper dimensions and material being supplied. If a specific valve is obsolete, a recommendation of the current equivalent will be made if possible.

Spare Parts – When ordering parts, use part names as listed in the bills of materials. Specify valve type, size and serial number. If the serial number is not available, the original Farris factory order number will help us supply the proper part and material.

Springs – Order as an assembly to include spring with upper and lower spring buttons. Specify valve type, size, serial number, set pressure and backpressure, if any.

Note: If valve modification or set pressure changes are required, consideration must be given to correct the nameplate and other data.

2	L	-	1	2	0	/S4
Inlet Class	Special Construction* (if applicable)		Inlet Facing	Cap Construction	Test Gag	Special Material

Designation	ANSI Nominal Inlet Flange Class
0	150
1	300 lightweight valve
2	300 heavyweight valve
3	600
4	900
5	1500
6	2500

A– Expanded API sizes: air, steam and gas service
B– Expanded API sizes: ASME liquid valve
C– Expanded API sizes: ASME Code Section VIII exposed spring design
D– Valve suitable for heat transfer service-vapor
E– Valve suitable for heat transfer service-liquid
F– Expanded API size valves suitable for heat transfer service-vapor
G– Expanded API size valves suitable for heat transfer service-liquid
L– ASME Code certified for liquid service only
S– ASME Code Section VIII exposed spring design

*Letter suffixes for expanded API sizes where 2 1/2" inlet or outlet has been replaced.

Special (Note 2) 0
Raised Face, ANSI Std. (125 to 160 AARH) 1
Large Female, ANSI Std. 2
Small Male, ANSI Std. 3
Small Female, ANSI Std. 4
Large Tongue, ANSI Std. 5
Large Groove, ANSI Std. 6
Small Tongue, ANSI Std. 7
Small Groove, ANSI Std. 8
Ring Joint (octagonal), ANSI Std. 9
63-83 AARH Smooth Finish RF ..... H

Although not applicable to the Inlet facing only, the following first digit letters are also used:
63 to 83 AARH (outlet only) ..... J
63 to 83 AARH (inlet & outlet) ..... K

Screwed Cap 2
Bolted Cap 3
Packed Lever 4
Open Lever 7
Remoter (with Packed Lever) 8

Without Gag 0
With Gag 1

See Materials for Corrosive Service Table below.

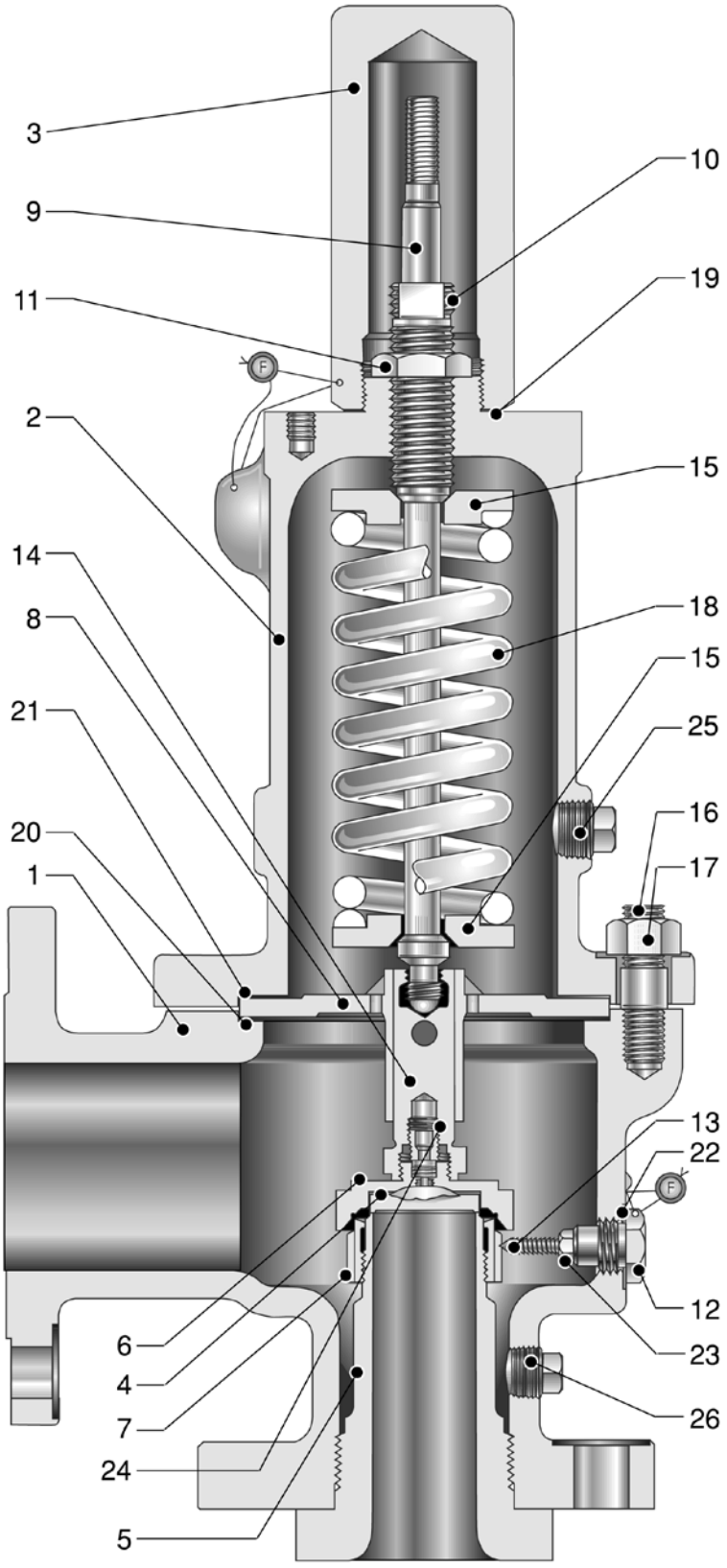
Materials for Corrosive Service

Designation	Special Material Description			
	Body Bonnet, Cap	Internal Parts		
		Nozzle & Disc	Other	Springs & Buttons
/S1	Standard	316	316*	316 buttons, Chrome Alloy or High Temperature Alloy Nickel Plated spring
/S3	316	316	316	316 buttons, Chrome Alloy or High Temperature Alloy Nickel Plated spring
S4	316	316	316	316
/H1	Standard	Hastelloy C	Standard	Standard
/H2	Standard	Hastelloy C	Hastelloy C & Monel	316 buttons, Chrome Alloy or High Temperature Alloy Nickel Plated spring
/H3	Hastelloy C	Hastelloy C	Hastelloy C	316 buttons, Chrome Alloy or High Temperature Alloy Nickel Plated spring
/H4	Hastelloy C	Hatelloy C	Hastelloy C	Hastelloy C
/M1	Standard	Monel	Standard	Standard
/M2	Standard	Monel	Monel	316 buttons, Chrome Alloy or High Temperature Alloy Nickel Plated spring
/M3	Monel	Monel	Monel	316 buttons, Chrome Alloy or High Temperature Alloy Nickel Plated spring
/M4	Monel	Monel	Monel	Inconel spring, Monel buttons
/N1	Carbon Steel (NACE)	316 (NACE)	316*	Standard[3]
/N4	316 (NACE)	316 (NACE)	316*	316[3]

* Spring adjusting screw in standard material

General Notes:

1. Other special materials, such as 316L stainless steel and Alloy 20, as well as non-standard outlet flange classes are available upon request. In these instances, suffix code "/SP" is used with a brief description of the special requirements.
2. Special inlet facings include, but are not limited to, socket or butt weld ends, lens joint and Grayloc® fittings. Grayloc is a registered trademark of Grayloc Products, a division of ABB Vetco Gray Inc.
3. The springs shown assumes bellows construction. For conventional construction, use Inconel X750.®



Built in conformance to ASME Code Section VIII, capacity certified by National Board (air, gas, steam[6])

UV

Bill of Materials–Conventional

Item	Part Name		Material
1	Body	26( )A10 thru 26( )A16	SA-216 GR. WCB Carbon Steel
		26( )A32 thru 26( )A36	SA-217 GR. WC6, Alloy St. (1¼ CR–½ Moly)
2	Bonnet	26( )A10 thru 26( )A16	SA-216 GR. WCB Carbon Steel
		26( )A32 thru 26( )A36	SA-217 GR. WC6, Alloy St. (1¼ CR–½ Moly)
3	Cap. Plain Screwed		Carbon Steel
4	Disc		316 St. St.
5	Nozzle		316 St. St.
6	Disc Holder		316 St. St.
7	Blow Down Ring		316 St. St.
8	Sleeve Guide		316 St. St.
9	Stem		316 St. St.
10	Spring Adjusting Screw		Stainless Steel
11	Jam Nut (Spr. Adj. Screw)		316 St. St.
12	Lock Screw (B.D.R.)		316 St. St.
13	Lock Screw Stud		316 St. St.
14	Stem Retainer*		17-4-PH St. St.
15	Spring Button		Carbon St., Rust proofed or 316 St. St
16	Body Stud		ASME SA-193 GR. B7 Alloy St.
17	Hex Nut (Body)		ASME SA-194 GR. 2H Alloy St.
18	Spring	26( )A10 thru 26( )A16	Chrome Alloy Rust Proofed
		26( )A32 thru 26( )A36	High Temperature Alloy Rust Proofed
19	Cap Gasket		316 St. St.
20	Body Gasket		316 St. St.
21	Bonnet Gasket		316 St. St.
22	Lock Screw Gasket		316 St. St.
23	Hex Nut (B.D.R.L.S.)		Stainless Steel
24	Lock Screw (D.H.)		Stainless Steel
25	Pipe Plug (Bonnet)		Steel
26	Pipe Plug (Body)		Steel

General Notes:

1. Parentheses in type number indicate orifice designation, as in 26FA10.
2. For corrosive and low temperature materials, see pages 17 through 21.
3. For open and packed lever materials and test gags, see accessories on pages 68 & 69.
4. For capacities, see pages 39-42 U.S. Units, 57-60 Metric Units.
5. For dimensions and weights, see pages 72-75.
6. Also suitable for liquid service where ASME Code Certification is not required. For ASME Code Certified liquid service, use the 2600L Series as illustrated on page 14.

*For 316 Stem Retainer add S1 suffix to Type #.

Built in conformance to ASME Code Section VIII, capacity certified by National Board (air, gas, steam[6])

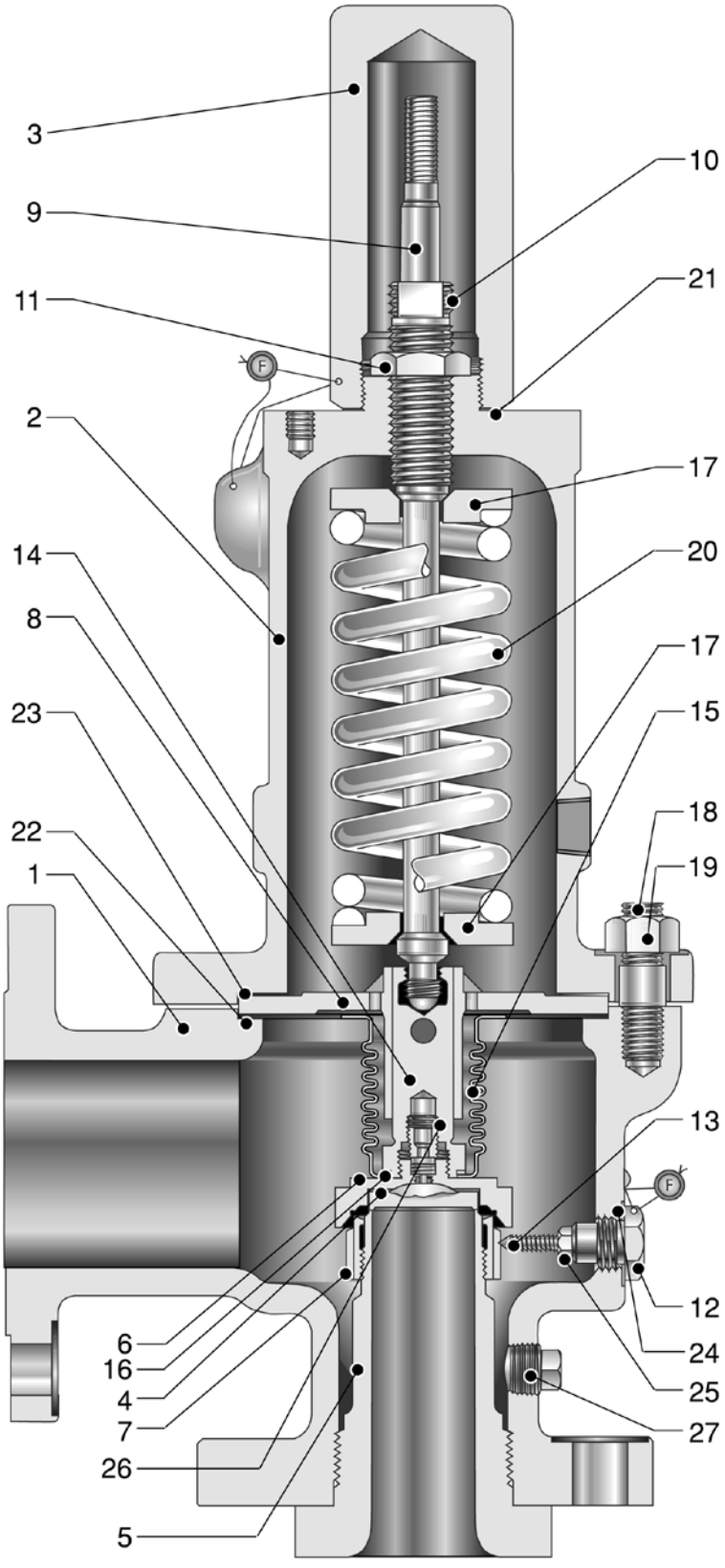
UV

Bill of Materials–BalanSeal

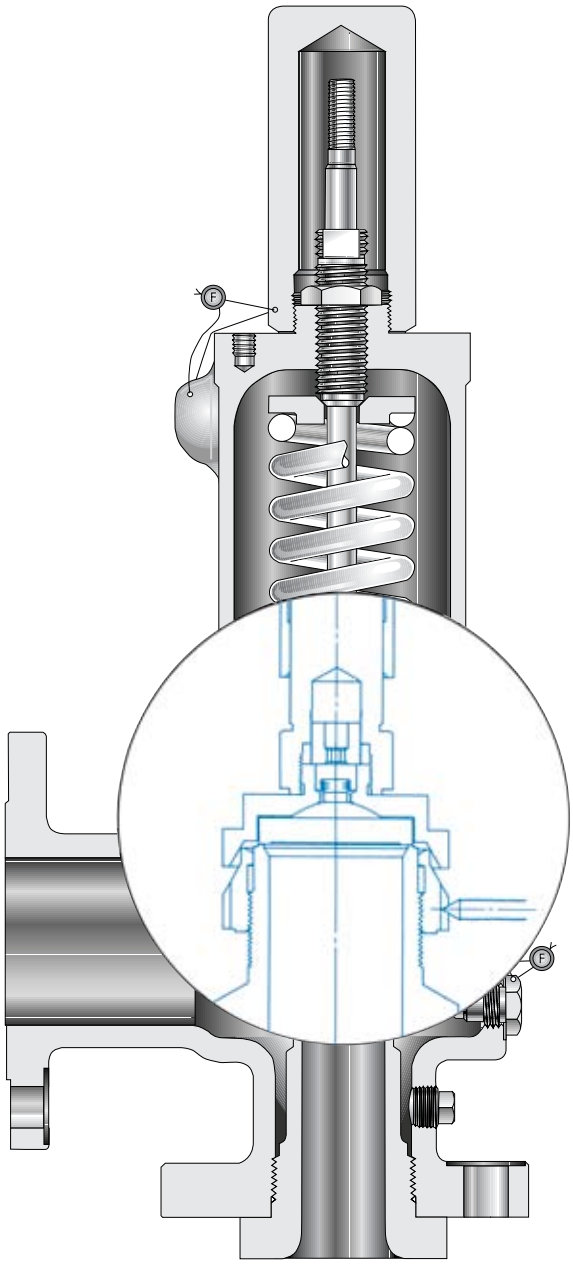
Item	Part Name		Material
1	Body	26( )B10 thru 26( )B16	SA-216 GR. WCB Carbon Steel
		26( )B32 thru 26( )B36	SA-217 GR. WC6, Alloy St. (1¼ CR–½ Moly)
2	Bonnet	26( )B10 thru 26( )B16	SA-216 GR. WCB Carbon Steel
		26( )B32 thru 26( )B36	SA-217 GR. WC6, Alloy St. (1¼ CR–½ Moly)
3	Cap. Plain Screwed		Carbon Steel
4	Disc		316 St. St.
5	Nozzle		316 St. St.
6	Disc Holder		316 St. St.
7	Blow Down Ring		316 St. St.
8	Sleeve Guide		316 St. St.
9	Stem		316 St. St.
10	Spring Adjusting Screw		Stainless Steel
11	Jam Nut (Spr. Adj. Screw)		316 St. St.
12	Lock Screw (B.D.R.)		316 St. St.
13	Lock Screw Stud		316 St. St.
14	Stem Retainer		17-4-PH St. St.
15	Bellows		Inconel Composite
16	Bellows Gasket		Non-Asbestos
17	Spring Button		Carbon St., Rust proofed or 316 St. St
18	Body Stud		ASME SA-193 GR. B7 Alloy St.
19	Hex Nut (Body)		ASME SA-194 GR. 2H Alloy St.
20	Spring	26( )B16 thru 26( )B26	Chrome Alloy Rust Proofed
		26( )B32 thru 26( )B36	High Temperature Alloy Rust Proofed
21	Cap Gasket		316 St. St.
22	Body Gasket		316 St. St.
23	Bonnet Gasket		316 St. St.
24	Lock Screw Gasket		316 St. St.
25	Hex Nut (B.D.R.L.S.)		Stainless Steel
26	Lock Screw (D.H.)		Stainless Steel
27	Pipe Plug (Body)		Steel

General Notes:

1. Parentheses in type number indicate orifice designation, as in 26FB10.
2. For corrosive and low temperature materials, see pages 17 through 21.
3. For open and packed lever materials and test gags, see accessories on pages 68 & 69.
4. For capacities, see pages 39-42 U.S. Units, 57-60 Metric Units.
5. For dimensions and weights, see pages 72-75.
6. Also suitable for liquid service where ASME Code Certification is not required. For ASME Code Certified liquid service, use the 2600L Series as illustrated on page 14.



Built in conformance to ASME Code Section VIII, capacity certified by National Board



The 2600L Series liquid relief valves are for use on ASME Section VIII Code applications and offer a superior valve with greater capacity at 10% overpressure than the traditional 2600 Series.

The 2600L Series complements a full line of pressure relief valves in orifices “D” through “T” to meet the ASME Code requirements for incompressible fluid services. The Code stamped construction requires liquid relief valves that have been capacity certified on water at 10% overpressure to carry the ASME UV and National Board NB symbols.

For compressible fluid services, the standard 2600 Series should be used. Liquid service applications that do not require the use of Code stamped liquid relief valves can still be satisfied with the standard 2600 series line. In most cases the standard 2600 should only be used in liquid service where an existing installation pipe size / orifice combination does not match the 2600L design.

The 2600L Series is also certified under ASME Code Section VIII for use in air, gas, steam, and vapor services. It may be used in those applications or where two phase or flashing fluid service is anticipated. The 2600L is certified as a fixed blow down design whether used in compressible or non-compressible services.

The type number is differentiated from the existing 2600 Series design by adding the letter “L” as a suffix. The letter “L” is used to specify all liquid trim type numbers and always appears in the seventh position of the type number, just before the three-digit option code for inlet facing/cap construction/test gag. Example: 26GA10L-120.

Optional trim material classes and other accessories are available, as with the 2600 Series, with the exceptions of the H2600. All types within the 2600L Series follow the size, pressure-temperature ratings, and center-to-face dimensions of the 2600 Series (API Std. 526).

Traditional Farris convertibility between conventional and bellows is maintained, as is the interchange-ability of parts.

The 2600S Series safety valves with exposed springs represent an enhancement of the standard 2600 Series and are designed to offer improved performance in steam service. They are built in conformance to Section VIII of the ASME Code and have capacities certified at 10% overpressure by the National Board of Boiler and Pressure Vessel Inspectors. Series 2600S is available in the same “D” through “Z” orifices and flange classes as the standard 2600 Series, and have the same center-to-face dimensions (API Std. 526).

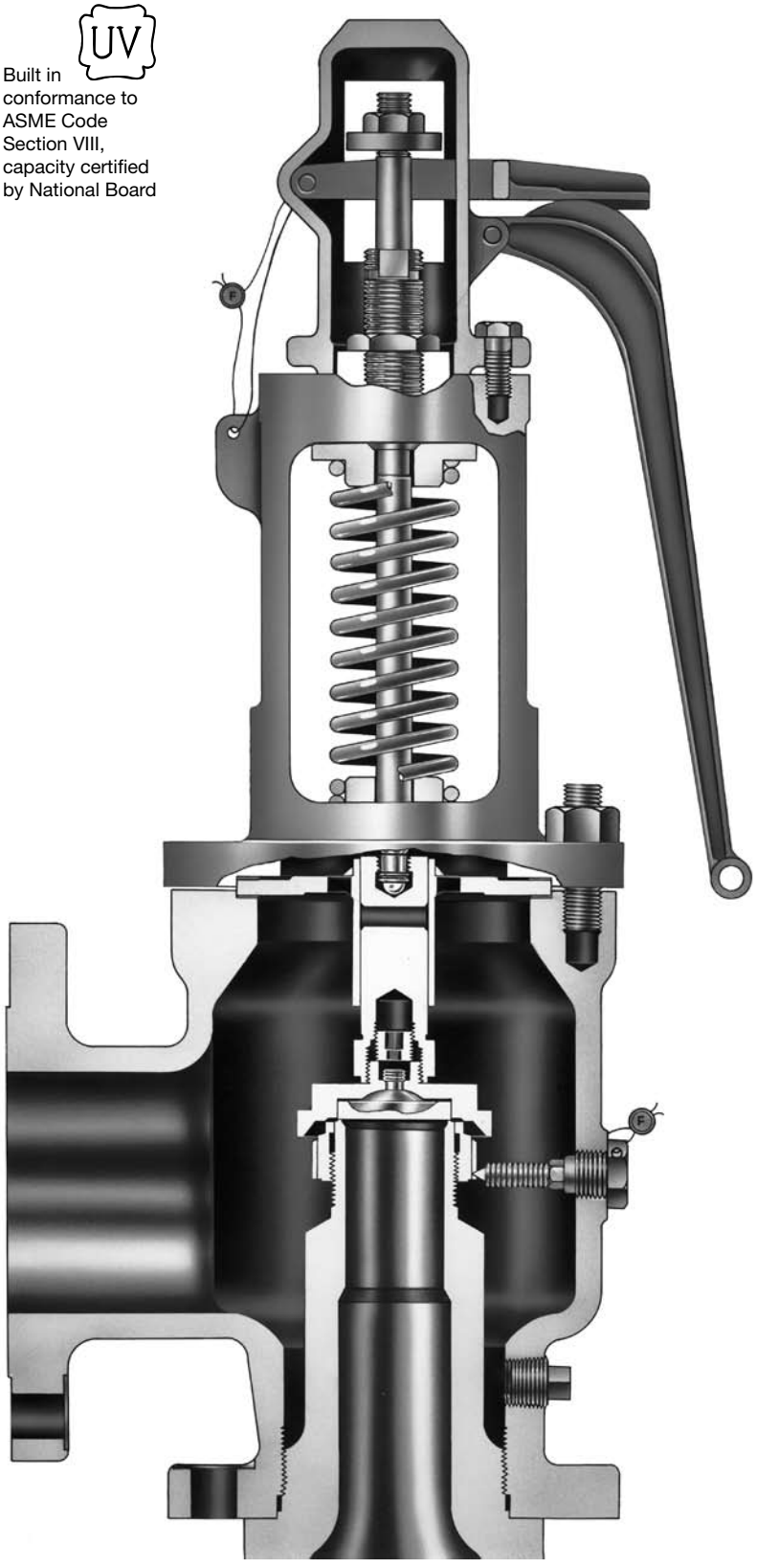
In steam service, you can encounter galling of the guiding surfaces. To minimize this problem, the guide and stem retainer are made from different materials: 316 stainless steel for the guide and hardened stainless steel for the stem retainer. Since the open bonnet is made from a standard 2600 Series bonnet, all other parts are identical to the 2600 Series to provide maximum interchangeability of parts and to reduce inventory costs.

An open lifting lever, required by ASME Code for steam and air service, is standard with the 2600S Series. Chrome alloy springs are used to 1000° F. They can also be used on air service or on other clean gases. Most other 2600 Series options can be supplied, including O-ring seats and bellows. For weather protection of the spring, use the stardard 2600 vapor service valve with open lever.

The type number is differentiated from the 2600 Series by the addition of the suffix letter “S” in the seventh digit of the type number. Example: 26JA10S-170.

UV

Built in conformance to ASME Code Section VIII, capacity certified by National Board



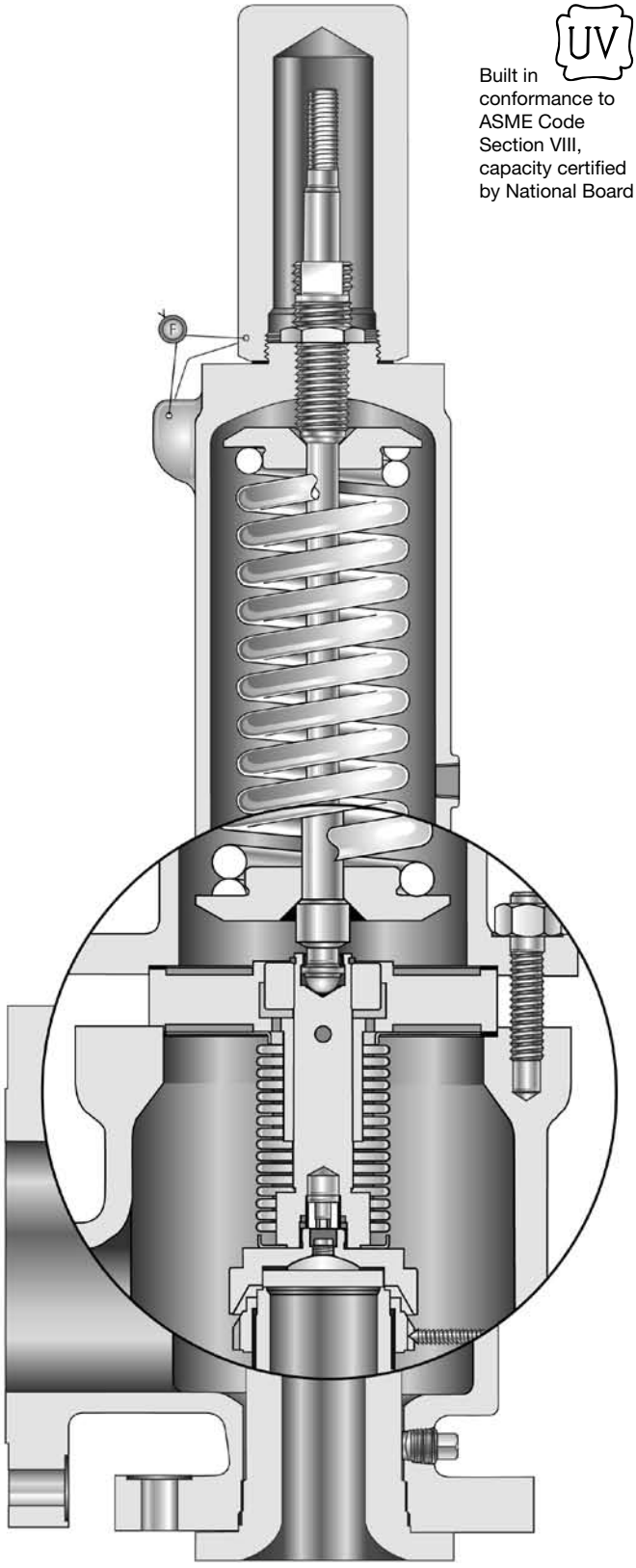
Balanced Bellows with Auxiliary Balancing Piston

Under back pressure conditions, rupture of the bellows can cause an increase in set pressure of the pressure relief valve. Consistent with safety, Farris Engineering offers a BalanSeal/piston design to compensate for a broken or ruptured bellows. The valve features a piston guide that has an inside diameter equal to the average diameter of the bellows convolutions.

If the bellows fails, the effect of the back pressure is nullified by the use of the piston. Since there is a slight diametrical clearance between the piston and the guide, a small amount of lading fluid is permitted to pass through the bonnet vent, indicating a bellows rupture. Although the valve will continue to function as a Farris bellows pressure relief valve, the damaged bellows should be replaced to avoid further product loss.

When the proper orifice and corresponding letter designation have been determined, refer to the selection charts and choose the conventional pressure and temperature required. Sizes, set pressure, back pressure, temperature ratings and capacity data are the same as the BalanSeal construction.

To convert the conventional valve type number to the catalog number for balanced bellows valve with auxiliary balancing piston, insert the letter “E” in place of “A”. Example: 26FA12-120 conventional valve becomes 26FE12-120.



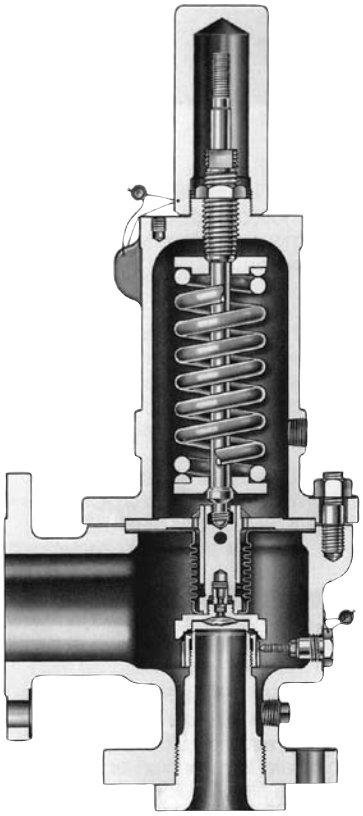
Built in conformance to ASME Code Section VIII, capacity certified by National Board

The inherent features of engineering design in the Farris nozzle pressure relief valve make it ideal for heat transfer fluid service. Heat transfer fluids form solid on relief to atmosphere and exhibit non-lubricating qualities. Consequently the valve requires the ultimate in tightness and perfect guiding beyond that of a valve used in other services.

The Farris design includes a 2½-to-1 guiding ratio, self-aligning, flat, easily replaceable disc and double universal joint for exact alignment. These valves have been proven in thousands of installations and are accepted as the industry standard for heat transfer fluid service.

For additional protection against deposit build-up on the guiding surfaces, a BalanSeal bellows can be provided to isolate internal working parts.

All heat transfer fluid service valves receive particular attention in the Farris assembly and testing departments. Special lapping, gasketing and sealing compounds are used to assure maximum tightness for this hard-to-hold service.



UV

Built in conformance to ASME Code Section VIII, capacity certified by National Board

Materials for Corrosive and Low Temperature Service

Standard materials of construction for corrosive service and low temperature service are listed on pages 18-21. Our selection of these materials is a result of many years of research in metallurgy and, while not all-inclusive, covers the most frequently used construction materials. In the case of a special application that requires materials not listed in this catalog, consult the Farris Factory.

Note that Farris Engineering cannot guarantee valve service life, as there are many factors that can affect the life of any material and that are beyond our control.

Corrosive Service. A pressure relief valve is not expected to operate frequently; therefore, standard materials should prove satisfactory. Where severe corrosive conditions exist, the nozzle and disc, which are always exposed to the lading fluid, are available in more corrosive-resistant materials such as Monel (/M1) and Hastelloy C (/H1).

Where specific applications require complete internals to be more corrosion resistant due to frequent valve operation and where parts beyond the nozzle and disc are exposed to corrosive lading fluid, complete internals and the complete valve are available in 316, Monel and Hastelloy (/S3, /S4, /N1, /N4, /M2, /M3, /M4, /H2, /H3, /H4).

Low Temperature Service. For low temperature applications, Farris offers S3 and S4 trim categories, depending on the degree of sub-zero temperatures involved. Materials cover special metallurgy to maintain adequate impact resistance on all stressed parts at sub-zero temperatures.

Standard Material for Corrosive Service
316 St. St. [6]

Part Name	S3 COMPLETE VALVE EXCEPT SPRING ASSEMBLY		S4 COMPLETE VALVE	
	-75°F TO 800°F		-450°F TO 450°F (Note 3)	
	Conventional	BalanSeal	Conventional	BalanSeal
Body	SA-351 Gr. CF8M St. St. (316 St. St.)	SA-351 Gr. CF8M St. St. (316 St. St.)	SA-351 Gr. CF8M St. St. (316 St. St.)	SA-351 Gr. CF8M St. St. (316 St. St.)
Bonnet	SA-351 Gr. CF8M St. St. (316 St. St.)	SA-351 Gr. CF8M St. St. (316 St. St.)	SA-351 Gr. CF8M St. St. (316 St. St.)	SA-351 Gr. CF8M St. St. (316 St. St.)
Cap, Plain Screwed	316 St. St.	316 St. St.	316 St. St.	316 St. St.
Disc	—	—	—	—
Nozzle	—	—	—	—
Disc Holder	—	—	—	—
Blow Down Ring	—	—	—	—
Sleeve Guide	—	—	—	—
Stem	—	—	—	—
Spring Adj. Screw	316 St. St.	316 St. St.	316 St. St.	316 St. St.
Jam Nut (Spr. Adj. Scr.)	—	—	—	—
Blow Down Ring Lock Screw	—	—	—	—
Lock Screw Stud	—	—	—	—
Stem Retainer	316 St. St.	316 St. St.	316 St. St.	316 St. St.
Bellows	None	—	None	—
Bellows Gasket	None	Teflon Composite	None	Teflon Composite
Spring Button	316 St. St.	316 St. St.	316 St. St.	316 St. St.
Body Stud	ASTM A193 Gr. B8M St. St.	ASTM A193 Gr. B8M St. St.	ASTM A193 Gr. B8M St. St.	ASTM A193 Gr. B8M St. St.
Body Hex Nut	ASTM A194 Gr. 8M St. St.	ASTM A194 Gr. 8M St. St.	ASTM A194 Gr. 8M St. St.	ASTM A194 Gr. 8M St. St.
Spring	Chrome Alloy, Nickel Plated	Chrome Alloy, Nickel Plated	316 St. St.	316 St. St.
Cap Gasket	—	—	—	—
Bonnet Gasket	—	—	—	—
Body Gasket	—	—	—	—
Lock Screw Gasket	—	—	—	—
Hex. Nut (Lock Screw)	—	—	—	—
Disc Holder Lock Screw	—	—	—	—
Pipe Plug (Bonnet)	316 St. St.	None	316 St. St.	None
Pipe Plug (Body)	316 St. St.	316 St. St.	316 St. St.	316 St. St.

General Notes:

1. Any part denoted with a dash is standard material.
2. Maximum set pressures for S1 trim are equal to the carbon steel valves in the selection tables.
3. Maximum set and back pressures for the S3 and S4 trim are equal to the 316 stainless valve limits shown on pages 24-37, 43-56, 79 and 80.
4. To designate valves with 316 stainless construction, add the appropriate suffix to the type number. Example: 26FA10-120 becomes 26FA10-120/S4.
5. For open and packed lever materials, see page 68.
6. Specify S1 trim to select a valve with a 316 St. St. stem retainer and standard carbon steel body and bonnet.

Standard Material for Corrosive Service
Monel

PART NAME	M1 NOZZLE & DISC		M2 INTERNAL PARTS EXCEPT SPRING ASSEMBLY		M3 COMPLETE VALVE EXCEPT SPRING ASSEMBLY		M4 COMPLETE VALVE	
	-20°F TO 800°F (Note 2)		-20°F TO 800°F (Note 2)		-75°F TO 800°F (Note 3)		-325°F TO 900°F (Note 3)	
	Convent'l	BalanSeal	Convent'l	BalanSeal	Convent'l	BalanSeal	Convent'l	BalanSeal
Body	—	—	—	—	Monel	Monel	Monel	Monel
Bonnet	—	—	—	—	Monel	Monel	Monel	Monel
Cap, Plain Screwed	—	—	—	—	Monel	Monel	Monel	Monel
Disc	Monel	Monel	Monel	Monel	Monel	Monel	Monel	Monel
Nozzle	Monel	Monel	Monel	Monel	Monel	Monel	Monel	Monel
Disc Holder	—	—	Monel	Monel	Monel	Monel	Monel	Monel
Blow Down Ring	—	—	Monel	Monel	Monel	Monel	Monel	Monel
Sleeve Guide	—	—	Monel	—	Monel	Monel	Monel	Monel
Stem	—	—	Monel	—	Monel	Monel	Monel	Monel
Spring Adj. Screw	—	—	Monel	—	Monel	Monel	Monel	Monel
Jam Nut (Spring Adj. Screw)	—	—	Monel	—	Monel	Monel	Monel	Monel
Blow Down Ring Lock Screw	—	—	Monel	Monel	Monel	Monel	Monel	Monel
Lock Screw Stud	—	—	Monel	Monel	Monel	Monel	Monel	Monel
Stem Retainer	—	—	Monel	Monel	Monel	Monel	Monel	Monel
Bellows	None	—	None	Monel	None	Monel	None	Monel
Bellows Gasket	None	—	None	Teflon Composite	None	Teflon Composite	None	Teflon Composite
Spring Button	—	—	316 St. St.	—	316 St. St.	316 St. St.	Monel	Monel
Body Stud	—	—	—	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Body Hex Nut	—	—	—	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Spring	—	—	Chrome Alloy Nickel Plated	—	Chrome Alloy Nickel Plated	Chrome Alloy Nickel Plated	Inconel X	Inconel X
Cap Gasket	—	—	Monel	—	Monel	Monel	Monel	Monel
Bonnet Gasket	—	—	Monel	—	Monel	Monel	Monel	Monel
Body Gasket	—	—	Monel	Monel	Monel	Monel	Monel	Monel
Lock Screw Gasket	—	—	Monel	Monel	Monel	Monel	Monel	Monel
Hex Nut (Lock Screw)	—	—	Monel	Monel	Monel	Monel	Monel	Monel
Disc Holder Lock Screw	—	—	Monel	Monel	Monel	Monel	Monel	Monel
Pipe Plug (Bonnet)	—	None	—	None	Monel	None	Monel	None
Pipe Plug (Body)	—	—	—	—	Monel	Monel	Monel	Monel

General Notes:

1. Any part denoted with a dash is standard material.
2. Maximum set pressures for M1 and M2 trim are equal to the Monel flange limits as shown on page 83. Consult the factory for higher pressures.
3. Maximum set and back pressures for the M3 and M4 trim are equal to the Monel valve limits as shown on page 83.
4. To designate valves with Monel construction, add the appropriate suffix to the type number. Example: 26FA10-120 becomes 26FA10-120/M1.
5. For open and packed lever materials, see page 68.
6. Monel, Inconel and Inconel X are registered trademarks of Inco Alloys International. We reserve the right to substitute comparable materials from other manufacturers.

Standard Material for Corrosive Service
Hastelloy C

PART NAME	H1 NOZZLE & DISC		H2 INTERNAL PARTS EXCEPT SPRING ASSEMBLY		H3 COMPLETE VALVE EXCEPT SPRING ASSEMBLY		H4 COMPLETE VALVE	
	-20°F TO 500°F (Note 2)		-20°F TO 500°F (Note 2)		-75°F TO 500°F (Note 3)		-325°F TO 500°F (Note 3)	
	Convent'l	BalanSeal	Convent'l	BalanSeal	Convent'l	BalanSeal	Convent'l	BalanSeal
Body	—	—	—	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Bonnet	—	—	—	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Cap, Plain Screwed	—	—	—	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Disc	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Nozzle	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Disc Holder	—	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Blow Down Ring	—	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Sleeve Guide	—	—	Hastelloy C	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Stem	—	—	Monel	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Spring Adj. Screw	—	—	Monel	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Jam Nut (Spring Adj. Screw)	—	—	Monel	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Blowdown Ring Lock Screw	—	—	Monel	Monel	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Lock Screw Stud	—	—	Monel	Monel	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Stem Retainer	—	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Bellows (See Note 5)	None	—	None	Inconel Composite Teflon Coated	None	Inconel Composite Teflon Coasted	None	Inconel Composite Teflon Coated
Bellows Gasket	None	—	None	Teflon Composite	None	Teflon Composite	None	Teflon Composite
Spring Button	—	—	316 St. St.	—	316 St. St.	316 St. St.	Hastelloy C	Hastelloy C
Body Stud	—	—	—	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Body Hex Nut	—	—	—	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Spring	—	—	Chrome Alloy Nickel Plated	—	Chrome Alloy Nickel Plated	Chrome Alloy Nickel Plated	Hastelloy C	Hastelloy C
Cap Gasket	—	—	Monel	—	Teflon Composite	Teflon Composite	Teflon Composite	Teflon Composite
Bonnet Gasket	—	—	Monel	—	Teflon Composite	Teflon Composite	Teflon Composite	Teflon Composite
Body Gasket	—	—	Monel	Monel	Teflon Composite	Teflon Composite	Teflon Composite	Teflon Composite
Lock Screw Gasket	—	—	Monel	Monel	Teflon Composite	Teflon Composite	Teflon Composite	Teflon Composite
Hex Nut (Lock Screw)	—	—	Monel	Monel	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Disc Holder Lock Screw	—	—	Monel	Monel	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Pipe Plug (Bonnet)	—	None	—	None	Hastelloy C	None	Hastelloy C	None
Pipe Plug (Body)	—	—	—	—	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C

General Notes:

1. Any part denoted with a dash is standard material.
2. Maximum set pressures for H1 and H2 trim are equal to the carbon steel valves in the Selection Tables.
3. Maximum set and back pressures for the H3 and H4 trim are equal to the Hastelloy C valve limits shown on pages 81 and 82.
4. To designate valves with Hastelloy C construction, add the appropriate suffix to the type number. Example: 26FA10-120 becomes 26FA10-120/H1.
5. For open and packed lever materials, see page 68.
6. Hastelloy and Hastelloy C are registered trademarks of Haynes International. We reserve the right to substitute comparable materials from other manufacturers.

NACE International (formerly The National Association of Corrosion Engineers) publishes two standards covering the use of equipment in environments containing H_2S (Hydrogen Sulfide). The standards are: MR0103, Standard Material Requirements – Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments; and MR0175/ISO 15156, Petroleum and natural gas industries – Materials for use in H_2S-containing Environments in oil and gas production.

The material requirements of the NACE Standards have resulted in various constructions. 2600 Series valves constructed of standard carbon steel (SA216 Grade WCB) and 316 stainless steel (SA351 Grade CF8M or SA479 Type 316) will be dual certified to NACE MR0103 and NACE MR0175/ISO 15156. For non-standard materials, Farris Engineering will have to review the materials on a case-by-case basis to determine NACE compliance.

The customer must decide whether his application requires a valve in compliance with NACE standards. Farris Engineering is responsible for supplying materials in compliance with the applicable NACE specification. As part of the order requirement, Farris will verify that material hardness values are in compliance with the NACE standard on the body, bonnet, nozzle and disc as applicable. Additionally, we will offer bolting and springs (for conventional and pilot operated valves only) in compliance with NACE specifications.

To specify a valve with materials compliant to NACE specifications, add the suffix /N1 or /N4 to the standard type number. Example: 26LB12-120/N1.

Part Name	N1 Suffix		N4 Suffix	
	Conventional	Bellows	Conventional	Bellows
Body	SA216 Gr. WCB (NACE)	SA216 Gr. WCB (NACE)	SA351 Gr. CF8M (NACE)	SA351 Gr. CF8M (NACE)
Bonnet	SA216 Gr. WCB (NACE)	SA216 Gr. WCB (NACE)	SA351 Gr. CF8M (NACE)	SA351 Gr. CF8M (NACE)
Cap, Plain Screwed	—	—	—	—
Disc	316 Stainless Steel (NACE)	316 Stainless Steel (NACE)	316 Stainless Steel (NACE)	316 Stainless Steel (NACE)
Nozzle	316 Stainless Steel (NACE)	316 Stainless Steel (NACE)	316 Stainless Steel (NACE)	316 Stainless Steel (NACE)
Disc Holder	—	—	—	—
Blow Down Ring	—	—	—	—
Sleeve Guide	—	—	—	—
Stem	—	—	—	—
Spring Adj. Screw	—	—	—	—
Jam Nut (Spr. Adj. Scr.)	—	—	—	—
Blow Down Ring	—	—	—	—
Lock Screw	—	—	—	—
Lock Screw Stud	—	—	—	—
Stem Retainer	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel	316 Stainless Steel
Bellows	—	—	—	—
Bellows Gasket	—	—	—	—
Spring Button	—	—	—	—
Body Stud	ASME SA-193 Gr. B7M Alloy Steel	ASME SA-193 Gr. B7M Alloy Steel	ASME SA-193 Gr. B7M Alloy Steel	ASME SA-193 Gr. B7M Alloy Steel
Body Hex Nut	ASME SA-194 Gr. 2HM Alloy Steel	ASME SA-194 Gr. 2HM Alloy Steel	ASME SA-194 Gr. 2HM Alloy Steel	ASME SA-194 Gr. 2HM Alloy Steel
Spring	Inconel	—	Inconel	—
Cap Gasket	—	—	—	—
Bonnet Gasket	—	—	—	—
Body Gasket	—	—	—	—
Lock Screw Gasket	—	—	—	—
Hex. Nut (Lock Screw)	—	—	—	—
Disc Holder Lock Screw	—	—	—	—
Pipe Plug (Bonnet)	None	—	None	—
Pipe Plug (Body)	—	—	—	—

Notes:

1. Any part denoted with a dash is standard material.
2. For open and packed lever materials, see page 68.
3. For a valve with complete Inconel bellows, use “N1/SP” type number suffix. Example: 26JB10-120/N1/SP.
4. For a valve in complete stainless steel, add “N4” to suffix. Example: 26HB10-120/N4. For optional complete Inconel bellows, add “N4/SP”. Example: 26HB10-120/N4/SP.

Farris O-Ring Seat Pressure Seal for Conventional or BalanSeal

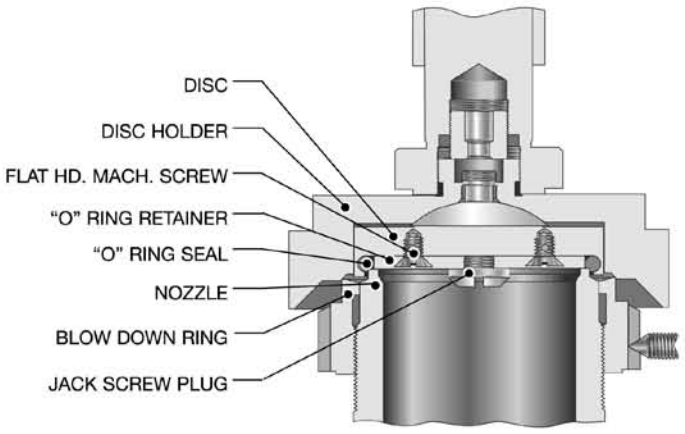
The O-ring seat pressure seal minimizes leakage and costly product loss as well as reduces downtime and maintenance on troublesome applications such as:

- Operation too close to set pressure
- Light, hard-to-hold fluids
- Entrained foreign particles and solids
- Vibratory applications
- Corrosive fluids
- Nozzle icing conditions
- Discharge piping strains

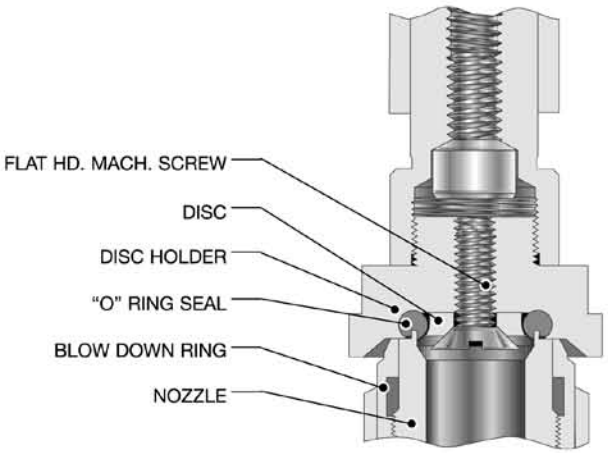
Recognizing the need for a resilient seat in a pressure relief valve for extreme tightness, Farris Engineering first produced an O-ring seat in early 1950. The O-ring design received and continues to receive phenomenal acceptance and use because it makes possible complete tightness at pressures much closer to valve set pressure. This tightness is not possible with the standard metal-to-metal seat.

The present Farris O-ring seat seal permits set pressure as high as 1500 psig. Equally important, the spring load is carried solely by the metal-to-metal portion of the seat with the O-ring becoming a pressure seal within its recessed chamber, assuring maximum tightness.

The O-ring seat seal option is available for the 2600/2600L/2600S Series of flanged pressure relief valves in the conventional, BalanSeal, and BalanSeal/piston constructions. Refer to the Selection Tables on pages 24 through 37. Substitute a “C” for the fourth digit “A” in the type number for the conventional valve, a “D” for the fourth digit “B” in the type number for a BalanSeal valve, and an “F” for the fourth digit in the type number for the BalanSeal/piston construction when an O-ring seat seal is required. Valves with Teflon seat seals are available on application.



2600 L Through T Orifice O-Ring Details



2600 D Through K Orifice O-Ring Details

The same type number changes apply to the 2600L Series. Examples:

26FA10 becomes 26FC10 (conventional).
26FB10 becomes 26FD10 (BalanSeal).
26FA10L becomes 26FC10L (conventional–liquid service).
26FE10L becomes 26FF10L (BalanSeal/piston–liquid service).

The set pressure limits of the conventional, BalanSeal, and BalanSeal/piston valves covered in the Selection Tables are the same for the O-ring design in all type numbers and orifices with the class 150, 300, and 600 inlet flanges. Above class 600 inlet flanges, 1500 psig is the limit for the O-ring design, not the conventional limit shown in the Selection Charts and Tables. Refer to the O-Ring Material Selection Chart on page 23 for temperature and pressure ratings of the various elastomeric O-ring materials available.

Why use an O-ring seat pressure seal?

In the normal operation of a pressure relief valve, the disc must lift off the nozzle very slightly to simmer, allowing pressure build-up within the secondary orifice (huddling chamber), causing the valve to pop fully open. Simmering occurs many times in the process industries where, as a result of process changes, minor upsets, etc., operating pressure fluctuates higher than normal, causing pressure relief valves to simmer but not fully open. This can cause serious misalignment in the valve, and after the pressure drops, the valve will very often continue to leak below the normal operating pressure. The leaking can be overcome by actually popping the valve, but sometimes this is not possible. Use of a Farris O-ring seat pressure seal will always correct this problem.

Frequently operating pressures are too close to valve set pressures. As the operating pressure nears the set pressure, seat loading is diminished, reducing the force that affects tightness. The Farris O-ring seat pressure seal ensures that tightness is achieved at relatively higher operating pressures, much more so than with metal-to-metal or other soft seat pressure relief valves.

On light, hard-to-hold fluids such as hydrogen, helium, light hydrocarbon, anhydrous ammonia, and others, metal-to-metal seats are often penetrated, causing leakage problems. The Farris O-ring seat pressure seal overcomes leakage on these hard-to-hold fluids.

In applications where heavy vibrations occur such as barges, tankers, pumps, and compressors, leakage of metal-to-metal seats develops. This occurs because, as the set pressure nears, the spring force is equalized and the vibration reduces the effect of seat loading, causing leakage. The Farris O-ring seat pressure seal maintains tightness because the spring force is not a factor in the tightness of the O-ring design.

Where occasional minute foreign particles are carried in the flowing medium, metal-to-metal seats are usually marred or scratched when the valve is blowing. This creates leakage problems after the valve closes. The Farris O-ring seat pressure seal absorbs the impact of these particles without damage, and eliminates disc separation from the mating metal seating surface on the nozzle as the valve closes. This reduces the incidence of leakage on most process units. When necessary, simply replace the Farris O-ring to maintain tightness.

Due to corrosion, metal-to-metal seats can eventually leak. With the proper selection of the Farris O-ring seat pressure seal, tightness can be improved and maintained.

Nozzle icing results from the refrigerant effect of the flowing media when a valve relieves. Ice actually forms on the seat, causing leakage. The Farris O-ring seat pressure seal reduces this type of leakage.

"O" RING MATERIAL SELECTION TABLE

Material	Temperature Range °F	D to K Orifice		L to T Orifice	
		Set Pressure (psig)	Durometer (Shore A)	Set Pressure (psig)	Durometer (Shore A)
Viton[4]	-20 to 450	15 to 100	50	15 to 150	50
	-20 to 450	101 to 650	75	150 to 450	75
	-20 to 125	650 to 950	75	450 to 750	75
	125 to 450		90		90
	-20 to 450	950 to 1500	90	750 to 1500	90
Ethylene Propylene	0 to 350	15 to 100	50	15 to 150	50
	0 to 350	101 to 650	70	150 to 450	70
	0 to 125	650 to 950	70	450 to 750	70
	125 to 350		80		80
	0 to 350	950 to 1500	80	750 to 1500	80
Buna N	0 to 200	15 to 100	50	15 to 100	50
	0 to 200	101 to 650	70	100 to 450	70
	0 to 125	650 to 950	70	150 to 750	70
	125 to 200		90		90
	0 to 200	950 to 1500	90	750 to 1500	90
Silicone	-150 to 450	15 to 100	50	15 to 100	50
	-150 to 0	101 to 600	50	100 to 200	50
	0 to 450		70		70
	-150 to 450	600 to 850	70	200 to 450	70
	-150 to 125	850 to 1100	70	450 to 750	70
	125 to 450		80		80
	-150 to 450	1100 to 1500	80	750 to 1500	80
Kalrez[4]	-20 to 550	15 to 200	65	15 to 150	65
	-20 to 550	201 to 650	80	150 to 450	80
	-20 to 200	650 to 950	80	450 to 750	80
	200 to 550		90		90
	-20 to 550	950 to 1500	90	750 to 1500	90
Neoprene	-45 to 300	50 to 750	70	50 to 750	70
	-45 to 300	751 to 1500	80	751 to 1500	80

General Notes:

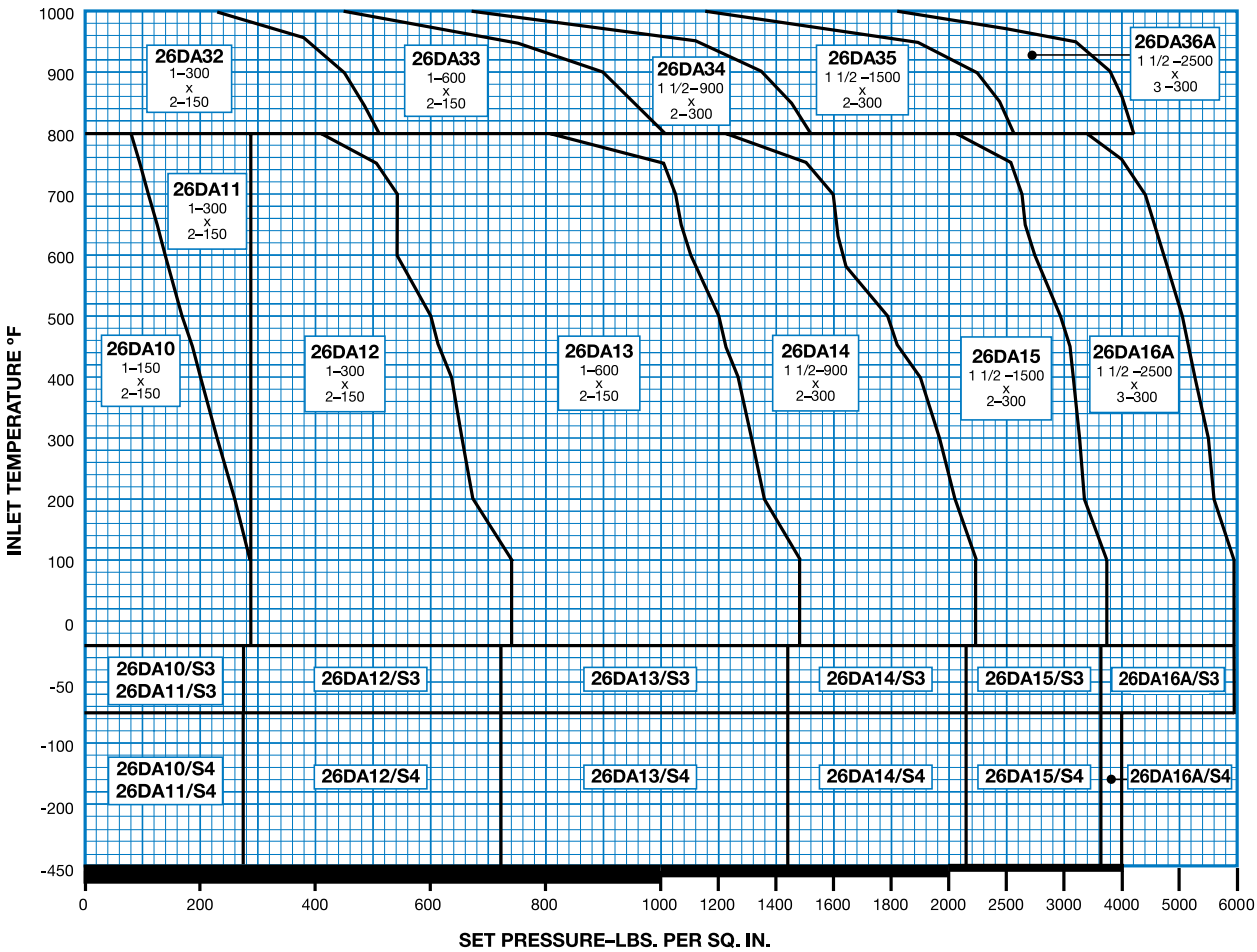
1. Standard seat tightness for "O" ring valves is no bubbles at 90% of set pressure for both conventional and bellows valves. At set pressures of 50 psig and below, leakage test shall be made at 5 psig below set pressure.
2. Ethylene Propylene is acceptable for steam service up to 350°F.
3. Teflon seat seats available on an application basis. Consult the factory.
4. Viton and Kalrez are registered trademarks of E. I. Dupont. We reserve the right to substitute comparable materials from other manufacturers.
5. Teflon seat seals are available on application. Consult the factory.

D Orifice

API Area: 0.110 sq. in.
Actual Area: 0.150 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26DA10	26DB10	1 x 2	150#	150#	—	—	285	185	80	—	285	230	CARBON STEEL	CHROME ALLOY	-20°F to 800°F
26DA11	26DB11	1 x 2	300#	150#	—	—	285	285	285	—	285	230			
26DA12	26DB12	1 x 2	300#	150#	—	—	740	615	410	—	285	230			
26DA13	26DB13	1 x 2	600#	150#	—	—	1480	1235	825	—	285	230			
26DA14	—	1 1/2 x 2	900#	300#	—	—	2220	1845	1235	—	600	500			
26DA15	—	1 1/2 x 2	1500#	300#	—	—	3705	3080	2060	—	600	500			
26DA16A	—	1 1/2 x 3	2500#	300#	—	—	6000	5135	3430	—	740	500			
26DA32	26DB32	1 x 2	300#	150#	—	—	—	—	510	225	285	230	CHROME MOLY STEEL	HIGH TEMP. ALLOY	801°F to 1000°F
26DA33	26DB33	1 x 2	600#	150#	—	—	—	—	1015	445	285	230			
26DA34	—	1 1/2 x 2	900#	300#	—	—	—	—	1525	670	600	500			
26DA35	—	1 1/2 x 2	1500#	300#	—	—	—	—	2540	1115	600	500			
26DA36A	—	1 1/2 x 3	2500#	300#	—	—	—	—	4230	1860	740	500			
26DA10/S3	26DB10/S3	1 x 2	150#	150#	—	275	—	—	—	—	275	230	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-21°F to -75°F
26DA11/S3	26DB11/S3	1 x 2	300#	150#	—	275	—	—	—	—	275	230			
26DA12/S3	26DB12/S3	1 x 2	300#	150#	—	720	—	—	—	—	275	230			
26DA13/S3	26DB13/S3	1 x 2	600#	150#	—	1440	—	—	—	—	275	230			
26DA14/S3	—	1 1/2 x 2	900#	300#	—	2160	—	—	—	—	600	500			
26DA15/S3	—	1 1/2 x 2	1500#	300#	—	3600	—	—	—	—	600	500			
26DA16A/S3	—	1 1/2 x 3	2500#	300#	—	6000	—	—	—	—	720	500			
26DA10/S4	26DB10/S4	1 x 2	150#	150#	275	—	—	—	—	—	275	230	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26DA11/S4	26DB11/S4	1 x 2	300#	150#	275	—	—	—	—	—	275	230			
26DA12/S4	26DB12/S4	1 x 2	300#	150#	720	—	—	—	—	—	275	230			
26DA13/S4	26DB13/S4	1 x 2	600#	150#	1440	—	—	—	—	—	275	230			
26DA14/S4	—	1 1/2 x 2	900#	300#	2160	—	—	—	—	—	600	500			
26DA15/S4	—	1 1/2 x 2	1500#	300#	3600	—	—	—	—	—	600	500			
26DA16A/S4	—	1 1/2 x 3	2500#	300#	4000	—	—	—	—	—	720	500			

Selection Chart



General Notes:

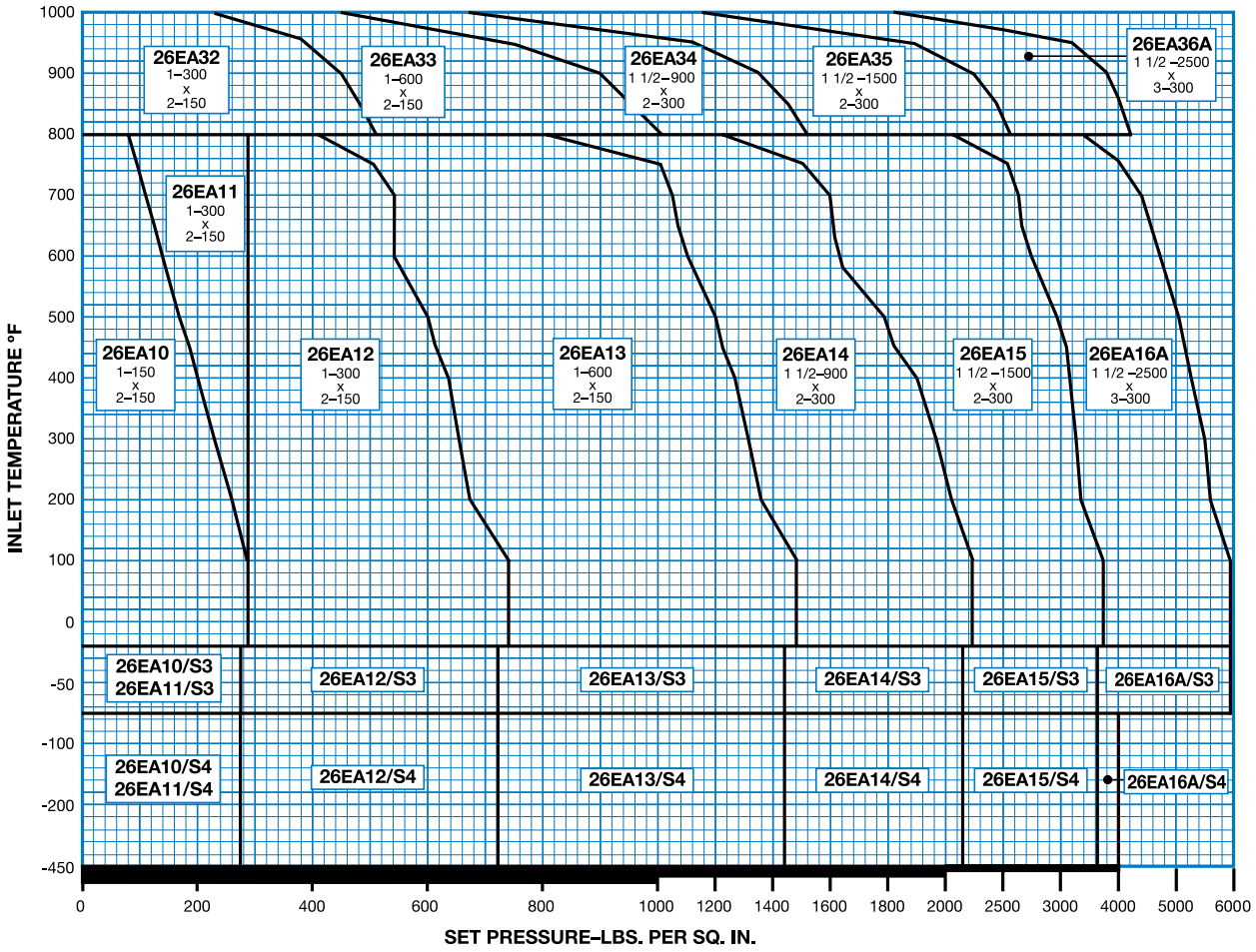
1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

E Orifice

API Area: 0.196 sq. in.
Actual Area: 0.225 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26EA10	26EB10	1 x 2	150#	150#	—	—	285	185	80	—	285	230			
26EA11	26EB11	1 x 2	300#	150#	—	—	285	285	285	—	285	230			
26EA12	26EB12	1 x 2	300#	150#	—	—	740	615	410	—	285	230	CARBON	CHROME	- 20°F
26EA13	26EB13	1 x 2	600#	150#	—	—	1480	1235	825	—	285	230	STEEL	ALLOY	to
26EA14	—	1 1/2 x 2	900#	300#	—	—	2220	1845	1235	—	600	500			800°F
26EA15	—	1 1/2 x 2	1500#	300#	—	—	3705	3080	2060	—	600	500			
26EA16A	—	1 1/2 x 3	2500#	300#	—	—	6000	5135	3430	—	740	500			
26EA32	26EB32	1 x 2	300#	150#	—	—	—	—	510	225	285	230			
26EA33	26EB33	1 x 2	600#	150#	—	—	—	—	1015	445	285	230	CHROME	HIGH TEMP.	801°F
26EA34	—	1 1/2 x 2	900#	300#	—	—	—	—	1525	670	600	500	MOLY	ALLOY	to
26EA35	—	1 1/2 x 2	1500#	300#	—	—	—	—	2540	1115	600	500	STEEL		1000°F
26EA36A	—	1 1/2 x 3	2500#	300#	—	—	—	—	4230	1860	740	500			
26EA10/S3	26EB10/S3	1 x 2	150#	150#	—	275	—	—	—	—	275	230			
26EA11/S3	26EB11/S3	1 x 2	300#	150#	—	275	—	—	—	—	275	230		CHROME	
26EA12/S3	26EB12/S3	1 x 2	300#	150#	—	720	—	—	—	—	275	230	316	ALLOY	-21°F
26EA13/S3	26EB13/S3	1 x 2	600#	150#	—	1440	—	—	—	—	275	230	ST. ST.	NICKEL	to
26EA14/S3	—	1 1/2 x 2	900#	300#	—	2160	—	—	—	—	600	500		PLATED	-75°F
26EA15/S3	—	1 1/2 x 2	1500#	300#	—	3600	—	—	—	—	600	500			
26EA16A/S3	—	1 1/2 x 3	2500#	300#	—	6000	—	—	—	—	720	500			
26EA10/S4	26EB10/S4	1 x 2	150#	150#	275	—	—	—	—	—	275	230			
26EA11/S4	26EB11/S4	1 x 2	300#	150#	275	—	—	—	—	—	275	230			
26EA12/S4	26EB12/S4	1 x 2	300#	150#	720	—	—	—	—	—	275	230	316	316	-76°F
26EA13/S4	26EB13/S4	1 x 2	600#	150#	1440	—	—	—	—	—	275	230	ST. ST.	ST. ST.	to
26EA14/S4	—	1 1/2 x 2	900#	300#	2160	—	—	—	—	—	600	500			-450°F
26EA15/S4	—	1 1/2 x 2	1500#	300#	3600	—	—	—	—	—	600	500			
26EA16A/S4	—	1 1/2 x 3	2500#	300#	4000	—	—	—	—	—	720	500			

Selection Chart



General Notes:

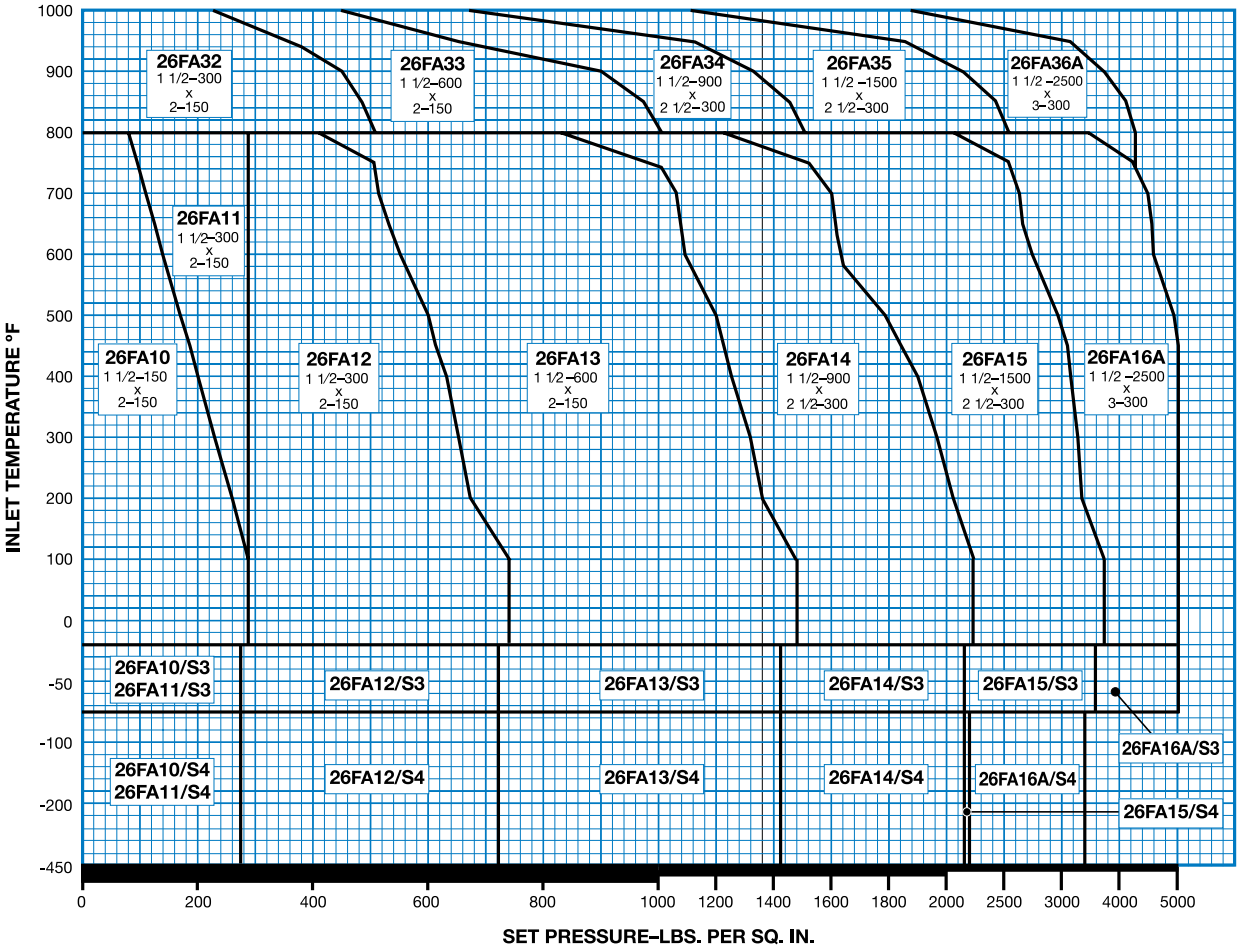
1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

F Orifice

API Area: 0.307 sq. in.
Actual Area: 0.371 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26FA10	26FB10	1 1/2 x 2	150#	150#	—	—	285	185	80	—	285	230			
26FA11	26FB11	1 1/2 x 2	300#	150#	—	—	285	285	285	—	285	230			
26FA12	26FB12	1 1/2 x 2	300#	150#	—	—	740	615	410	—	285	230	CARBON	CHROME	- 20°F
26FA13	26FB13	1 1/2 x 2	600#	150#	—	—	1480	1235	825	—	285	230	STEEL	ALLOY	to
26FA14A	26FB14A	1 1/2 x 3	900#	300#	—	—	2220	1845	1235	—	740	500			800°F
26FA15A	26FB15A	1 1/2 x 3	1500#	300#	—	—	3705	3080	2060	—	740	500			
26FA16A	26FB16A	1 1/2 x 3	2500#	300#	—	—	5000	5000	3430	—	740	500			
26FA32	26FB32	1 1/2 x 2	300#	150#	—	—	—	—	510	225	285	230			
26FA33	26FB33	1 1/2 x 2	600#	150#	—	—	—	—	1015	445	285	230	CHROME	HIGH	801°F
26FA34A	26FB34A	1 1/2 x 3	900#	300#	—	—	—	—	1525	670	740	500	MOLY	TEMP.	to
26FA35A	26FB35A	1 1/2 x 3	1500#	300#	—	—	—	—	2540	1115	740	500	STEEL	ALLOY	1000°F
26FA36A	26FB36A	1 1/2 x 3	2500#	300#	—	—	—	—	4230	1860	740	500			
26FA10/S3	26FB10/S3	1 1/2 x 2	150#	150#	—	275	—	—	—	—	275	230			
26FA11/S3	26FB11/S3	1 1/2 x 2	300#	150#	—	275	—	—	—	—	275	230		CHROME	
26FA12/S3	26FB12/S3	1 1/2 x 2	300#	150#	—	720	—	—	—	—	275	230	316	ALLOY	-21°F
26FA13/S3	26FB13/S3	1 1/2 x 2	600#	150#	—	1440	—	—	—	—	275	230	ST. ST.	NICKEL	to
26FA14A/S3	26FB14A/S3	1 1/2 x 3	900#	300#	—	2160	—	—	—	—	720	500		PLATED	-75°F
26FA15A/S3	26FB15A/S3	1 1/2 x 3	1500#	300#	—	3600	—	—	—	—	720	500			
26FA16A/S3	26FB16A/S3	1 1/2 x 3	2500#	300#	—	5000	—	—	—	—	720	500			
26FA10/S4	26FB10/S4	1 1/2 x 2	150#	150#	275	—	—	—	—	—	275	230			
26FA11/S4	26FB11/S4	1 1/2 x 2	300#	150#	275	—	—	—	—	—	275	230			
26FA12/S4	26FB12/S4	1 1/2 x 2	300#	150#	720	—	—	—	—	—	275	230	316	316	-76°F
26FA13/S4	26FB13/S4	1 1/2 x 2	600#	150#	1440	—	—	—	—	—	275	230	ST. ST.	ST. ST.	to
26FA14A/S4	26FB14A/S4	1 1/2 x 3	900#	300#	2160	—	—	—	—	—	720	500			-450°F
26FA15A/S4	26FB15A/S4	1 1/2 x 3	1500#	300#	2200	—	—	—	—	—	720	500			
26FA16A/S4	26FB16A/S4	1 1/2 x 3	2500#	300#	3400	—	—	—	—	—	720	500			

Selection Chart



General Notes:

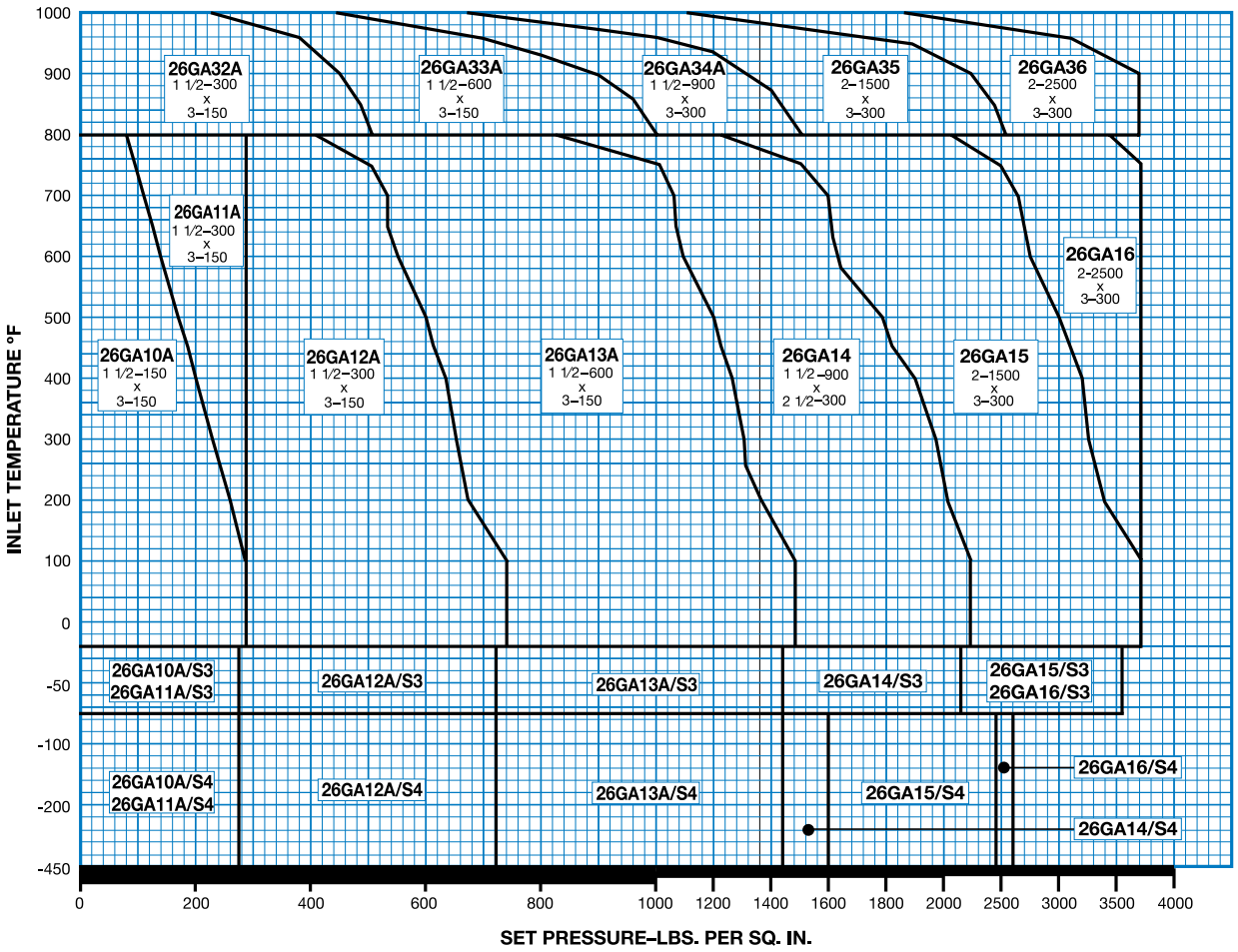
1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

G Orifice

API Area: 0.503 sq. in.
Actual Area: 0.559 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26GA10A	26GB10A	1 1/2 x 3	150#	150#	—	—	285	185	80	—	285	230	CARBON STEEL	CHROME ALLOY	- 20°F to 800°F
26GA11A	26GB11A	1 1/2 x 3	300#	150#	—	—	285	285	285	—	285	230			
26GA12A	26GB12A	1 1/2 x 3	300#	150#	—	—	740	615	410	—	285	230			
26GA13A	26GB13A	1 1/2 x 3	600#	150#	—	—	1480	1235	825	—	285	230			
26GA14A	26GB14A	1 1/2 x 3	900#	300#	—	—	2220	1845	1235	—	740	470			
26GA15	26GB15	2 x 3	1500#	300#	—	—	3705	3080	2060	—	740	470			
26GA16	26GB16	2 x 3	2500#	300#	—	—	3705	3705	3430	—	740	470			
26GA32A	26GB32A	1 1/2 x 3	300#	150#	—	—	—	—	510	225	285	230	CHROME MOLY STEEL	HIGH TEMP. ALLOY	801°F to 1000°F
26GA33A	26GB33A	1 1/2 x 3	600#	150#	—	—	—	—	1015	445	285	230			
26GA34A	26GB34A	1 1/2 x 3	900#	300#	—	—	—	—	1525	670	740	470			
26GA35	26GB35	2 x 3	1500#	300#	—	—	—	—	2540	1115	740	470			
26GA36	26GB36	2 x 3	2500#	300#	—	—	—	—	3705	1860	740	470			
26GA10A/S3	26GB10A/S3	1 1/2 x 3	150#	150#	—	275	—	—	—	—	275	230	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-21°F to -75°F
26GA11A/S3	26GB11A/S3	1 1/2 x 3	300#	150#	—	275	—	—	—	—	275	230			
26GA12A/S3	26GB12A/S3	1 1/2 x 3	300#	150#	—	720	—	—	—	—	275	230			
26GA13A/S3	26GB13A/S3	1 1/2 x 3	600#	150#	—	1440	—	—	—	—	275	230			
26GA14A/S3	26GB14A/S3	1 1/2 x 3	900#	300#	—	2160	—	—	—	—	720	470			
26GA15/S3	26GB15/S3	2 x 3	1500#	300#	—	3600	—	—	—	—	720	470			
26GA16/S3	26GB16/S3	2 x 3	2500#	300#	—	3600	—	—	—	—	720	470			
26GA10A/S4	26GB10A/S4	1 1/2 x 3	150#	150#	275	—	—	—	—	—	275	230	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26GA11A/S4	26GB11A/S4	1 1/2 x 3	300#	150#	275	—	—	—	—	—	275	230			
26GA12A/S4	26GB12A/S4	1 1/2 x 3	300#	150#	720	—	—	—	—	—	275	230			
26GA13A/S4	26GB13A/S4	1 1/2 x 3	600#	150#	1440	—	—	—	—	—	275	230			
26GA14A/S4	26GB14A/S4	1 1/2 x 3	900#	300#	1600	—	—	—	—	—	600	470			
26GA15/S4	26GB15/S4	2 x 3	1500#	300#	2450	—	—	—	—	—	600	470			
26GA16/S4	26GB16/S4	2 x 3	2500#	300#	2600	—	—	—	—	—	720	470			

Selection Chart



General Notes:

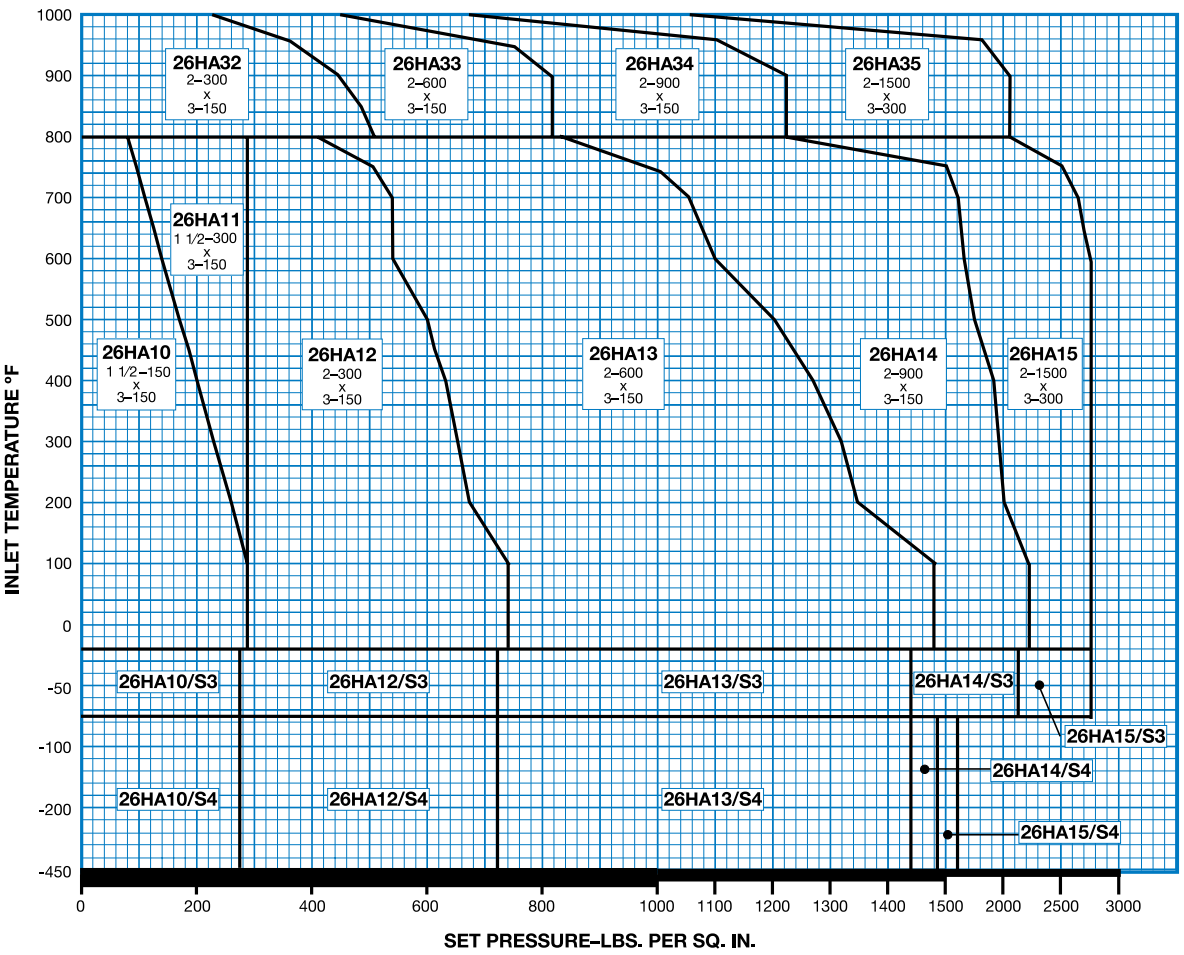
1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

H Orifice

API Area: 0.785 sq. in.
Actual Area: 0.873 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26HA10	26HB10	1 1/2 x 3	150#	150#	—	—	285	185	80	—	285	230	CARBON STEEL	CHROME ALLOY	- 20°F to 800°F
26HA11	26HB11	1 1/2 x 3	300#	150#	—	—	285	285	285	—	285	230			
26HA12	26HB12	2 x 3	300#	150#	—	—	740	615	410	—	285	230			
26HA13	26HB13	2 x 3	600#	150#	—	—	1480	1235	825	—	285	230			
26HA14	26HB14	2 x 3	900#	150#	—	—	2220	1845	1235	—	285	230			
26HA15	26HB15	2 x 3	1500#	300#	—	—	2750	2750	2060	—	740	415			
26HA32	26HB32	2 x 3	300#	150#	—	—	—	—	510	225	285	230	CHROME MOLY STEEL	HIGH TEMP. ALLOY	801°F to 1000°F
26HA33	26HB33	2 x 3	600#	150#	—	—	—	—	815	445	285	230			
26HA34	26HB34	2 x 3	900#	150#	—	—	—	—	1225	670	285	230			
26HA35	26HB35	2 x 3	1500#	300#	—	—	—	—	2040	1115	740	415			
26HA10/S3	26HB10/S3	1 1/2 x 3	150#	150#	—	275	—	—	—	—	275	230	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-21°F to -75°F
26HA11/S3	26HB11/S3	1 1/2 x 3	300#	150#	—	275	—	—	—	—	275	230			
26HA12/S3	26HB12/S3	2 x 3	300#	150#	—	720	—	—	—	—	275	230			
26HA13/S3	26HB13/S3	2 x 3	600#	150#	—	1440	—	—	—	—	275	230			
26HA14/S3	26HB14/S3	2 x 3	900#	150#	—	2160	—	—	—	—	275	230			
26HA15/S3	26HB15/S3	2 x 3	1500#	300#	—	2750	—	—	—	—	720	415			
26HA10/S4	26HB10/S4	1 1/2 x 3	150#	150#	275	—	—	—	—	—	275	230	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26HA11/S4	26HB11/S4	1 1/2 x 3	300#	150#	275	—	—	—	—	—	275	230			
26HA12/S4	26HB12/S4	2 x 3	300#	150#	720	—	—	—	—	—	275	230			
26HA13/S4	26HB13/S4	2 x 3	600#	150#	1440	—	—	—	—	—	275	230			
26HA14/S4	26HB14/S4	2 x 3	900#	150#	1485	—	—	—	—	—	275	230			
26HA15/S4	26HB15/S4	2 x 3	1500#	300#	1600	—	—	—	—	—	720	415			

Selection Chart



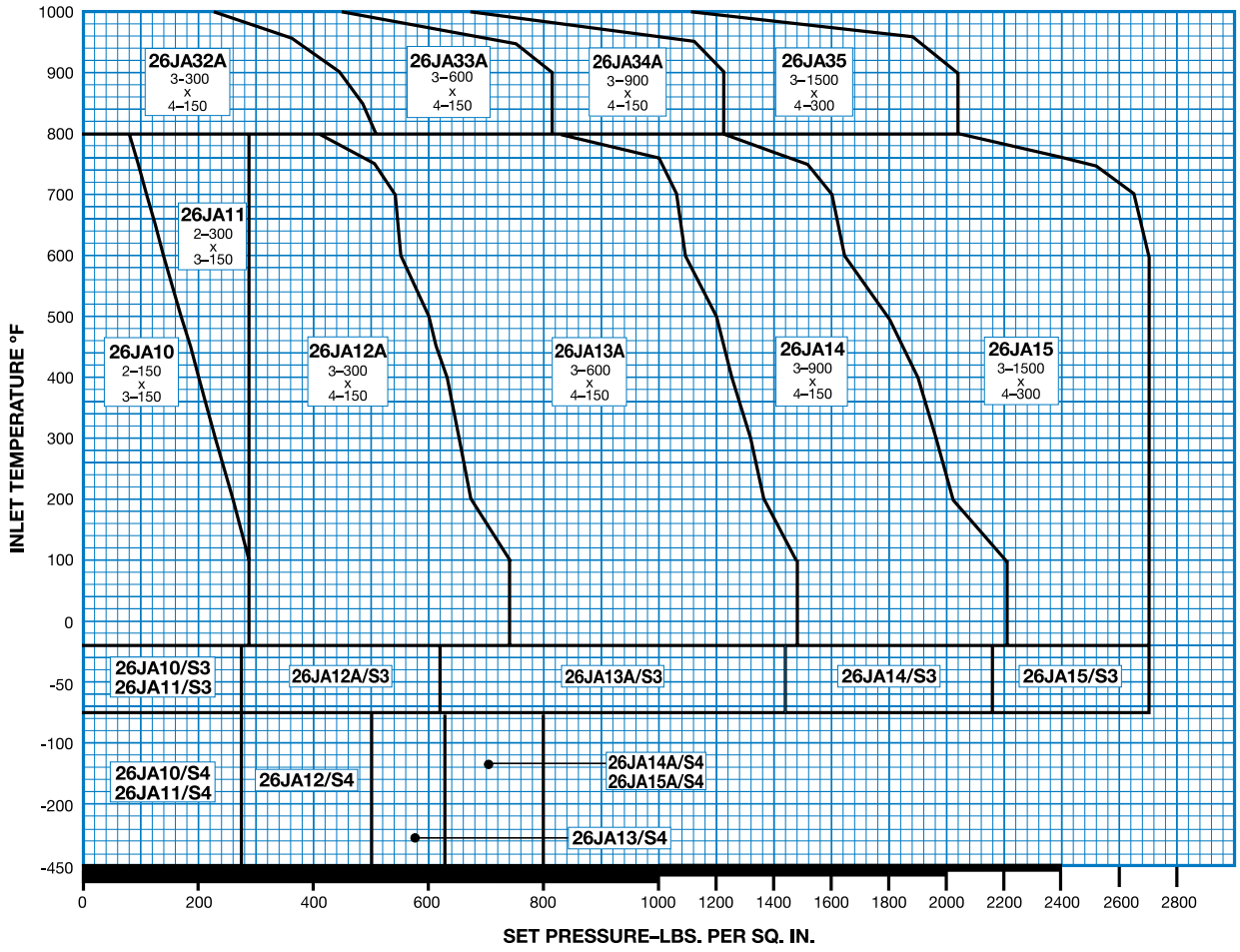
General Notes:

1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

J Orifice

API Area: 1.287 sq. in.
Actual Area: 1.430 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26JA10	26JB10	2 x 3	150#	150#	—	—	285	185	80	—	285	230	CARBON STEEL	CHROME ALLOY	-20°F to 800°F
26JA11	26JB11	2 x 3	300#	150#	—	—	285	285	285	—	285	230			
26JA12A	26JB12A	3 x 4	300#	150#	—	—	740	615	410	—	285	230			
26JA13A	26JB13A	3 x 4	600#	150#	—	—	1480	1235	825	—	285	230			
26JA14	26JB14	3 x 4	900#	150#	—	—	2220	1845	1235	—	285	230			
26JA15	26JB15	3 x 4	1500#	300#	—	—	2700	2700	2060	—	600	230			
26JA32A	26JB32A	3 x 4	300#	150#	—	—	—	—	510	225	285	230	CHROME MOLY STEEL	HIGH TEMP. ALLOY	801°F to 1000°F
26JA33A	26JB33A	3 x 4	600#	150#	—	—	—	—	815	445	285	230			
26JA34A	26JB34A	3 x 4	900#	150#	—	—	—	—	1225	670	285	230			
26JA35	26JB35	3 x 4	1500#	300#	—	—	—	—	2040	1115	600	230			
26JA10/S3	26JB10/S3	2 x 3	150#	150#	—	275	—	—	—	—	275	230	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-21°F to -75°F
26JA11/S3	26JB11/S3	2 x 3	300#	150#	—	275	—	—	—	—	275	230			
26JA12A/S3	26JB12A/S3	3 x 4	300#	150#	—	720	—	—	—	—	275	230			
26JA13A/S3	26JB13A/S3	3 x 4	600#	150#	—	1440	—	—	—	—	275	230			
26JA14/S3	26JB14/S3	3 x 4	900#	150#	—	2160	—	—	—	—	275	230			
26JA15/S3	26JB15/S3	3 x 4	1500#	300#	—	2700	—	—	—	—	600	230			
26JA10/S4	26JB10/S4	2 x 3	150#	150#	275	—	—	—	—	—	275	230	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26JA11/S4	26JB11/S4	2 x 3	300#	150#	275	—	—	—	—	—	275	230			
26JA12A/S4	26JB12A/S4	3 x 4	300#	150#	500	—	—	—	—	—	275	230			
26JA13A/S4	26JB13A/S4	3 x 4	600#	150#	625	—	—	—	—	—	275	230			
26JA14/S4	26JB14/S4	3 x 4	900#	150#	800	—	—	—	—	—	275	230			
26JA15/S4	26JB15/S4	3 x 4	1500#	300#	800	—	—	—	—	—	600	230			



Selection Chart

General Notes:

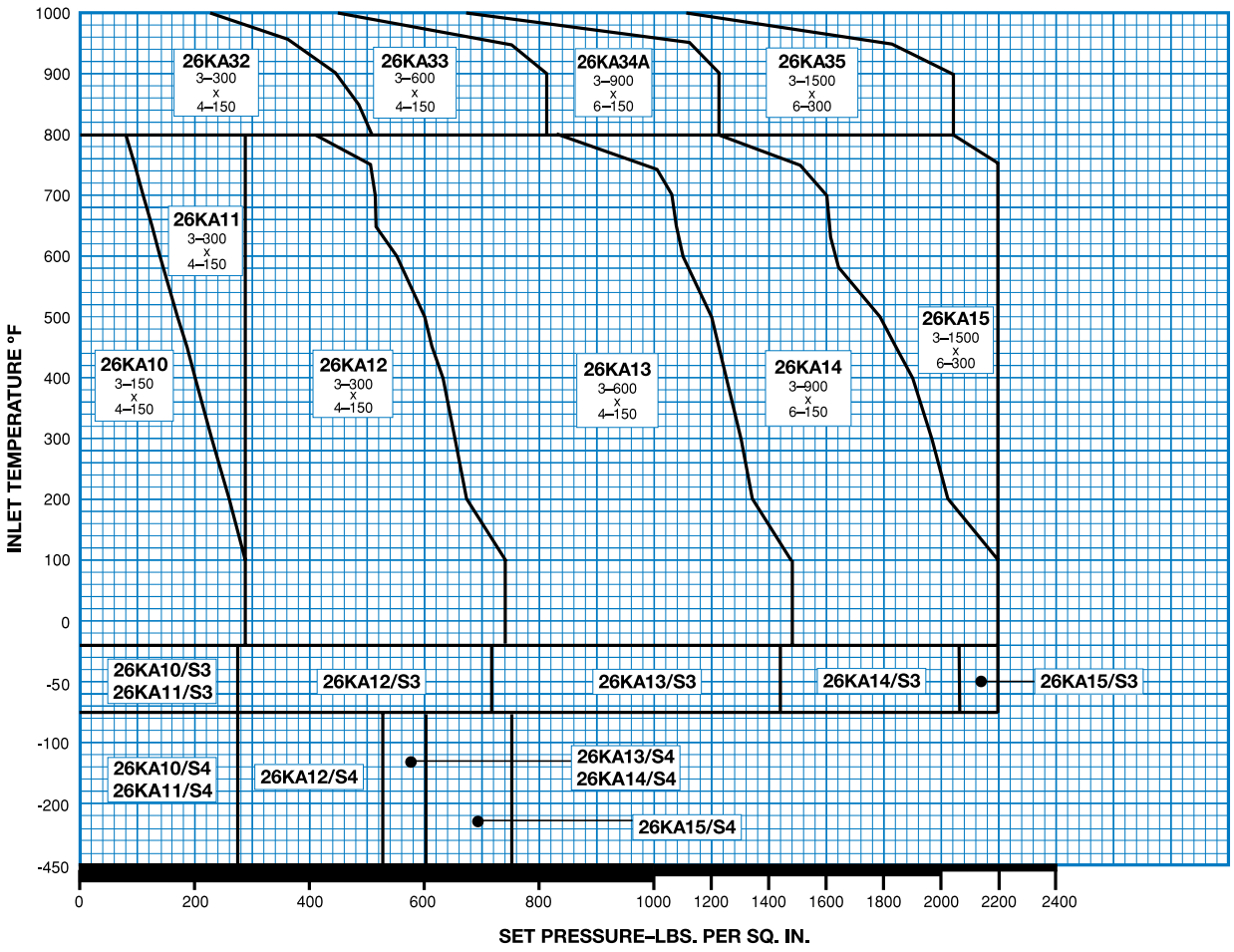
1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

K Orifice

API Area: 1.838 sq. in.
Actual Area: 2.042 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26KA10	26KB10	3 x 4	150#	150#	—	—	285	185	80	—	285	150	CARBON STEEL	CHROME ALLOY	-20°F to 800°F
26KA11	26KB11	3 x 4	300#	150#	—	—	285	285	285	—	285	150			
26KA12	26KB12	3 x 4	300#	150#	—	—	740	615	410	—	285	150			
26KA13	26KB13	3 x 4	600#	150#	—	—	1480	1235	825	—	285	200			
26KA14	26KB14	3 x 6	900#	150#	—	—	2220	1845	1235	—	285	200			
26KA15	26KB15	3 x 6	1500#	300#	—	—	2220	2220	2060	—	600	200			
26KA32	26KB32	3 x 4	300#	150#	—	—	—	—	510	225	285	150	CHROME MOLY STEEL	HIGH TEMP. ALLOY	801°F to 1000°F
26KA33	26KB33	3 x 4	600#	150#	—	—	—	—	815	445	285	200			
26KA34A	26KB34A	3 x 6	900#	150#	—	—	—	—	1225	670	285	200			
26KA35	26KB35	3 x 6	1500#	300#	—	—	—	—	2040	1115	600	200			
26KA10/S3	26KB10/S3	3 x 4	150#	150#	—	275	—	—	—	—	275	150	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-21°F to -75°F
26KA11/S3	26KB11/S3	3 x 4	300#	150#	—	275	—	—	—	—	275	150			
26KA12/S3	26KB12/S3	3 x 4	300#	150#	—	720	—	—	—	—	275	150			
26KA13/S3	26KB13/S3	3 x 4	600#	150#	—	1440	—	—	—	—	275	200			
26KA14/S3	26KB14/S3	3 x 6	900#	150#	—	2160	—	—	—	—	275	200			
26KA15/S3	26KB15/S3	3 x 6	1500#	300#	—	2220	—	—	—	—	600	200			
26KA10/S4	26KB10/S4	3 x 4	150#	150#	275	—	—	—	—	—	275	150	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26KA11/S4	26KB11/S4	3 x 4	300#	150#	275	—	—	—	—	—	275	150			
26KA12/S4	26KB12/S4	3 x 4	300#	150#	525	—	—	—	—	—	275	150			
26KA13/S4	26KB13/S4	3 x 4	600#	150#	600	—	—	—	—	—	275	200			
26KA14/S4	26KB14/S4	3 x 6	900#	150#	600	—	—	—	—	—	275	200			
26KA15/S4	26KB15/S4	3 x 6	1500#	300#	750	—	—	—	—	—	600	200			

Selection Chart



General Notes:

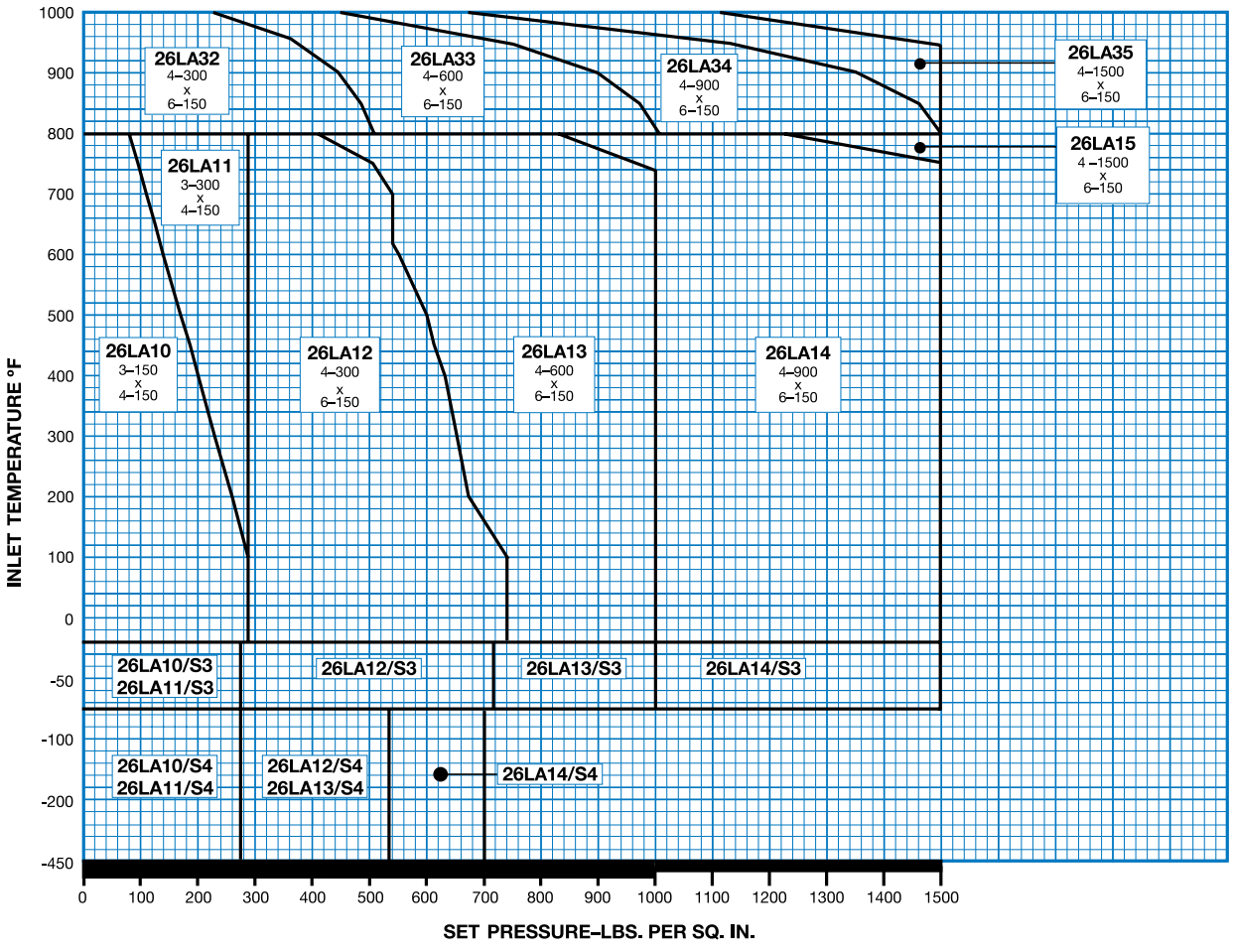
1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

L Orifice

API Area: 2.853 sq. in.
Actual Area: 3.170 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26LA10	26LB10	3 x 4	150#	150#	—	—	285	185	80	—	285	100			
26LA11	26LB11	3 x 4	300#	150#	—	—	285	285	285	—	285	100			
26LA12	26LB12	4 x 6	300#	150#	—	—	740	615	410	—	285	170	CARBON STEEL	CHROME ALLOY	-20°F to 800°F
26LA13	26LB13	4 x 6	600#	150#	—	—	1000	1000	825	—	285	170			
26LA14	26LB14	4 x 6	900#	150#	—	—	1500	1500	1235	—	285	170			
26LA15	26LB15	4 x 6	1500#	150#	—	—	1500	1500	1500	—	285	170			
26LA32	26LB32	4 x 6	300#	150#	—	—	—	—	510	225	285	170	CHROME MOLY STEEL	HIGH TEMP. ALLOY	801°F to 1000°F
26LA33	26LB33	4 x 6	600#	150#	—	—	—	—	1000	445	285	170			
26LA34	26LB34	4 x 6	900#	150#	—	—	—	—	1500	670	285	170			
26LA35	26LB35	4 x 6	1500#	150#	—	—	—	—	1500	1115	285	170			
26LA10/S3	26LB10/S3	3 x 4	150#	150#	—	275	—	—	—	—	275	100			
26LA11/S3	26LB11/S3	3 x 4	300#	150#	—	275	—	—	—	—	275	100	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-21°F to -75°F
26LA12/S3	26LB12/S3	4 x 6	300#	150#	—	720	—	—	—	—	275	170			
26LA13/S3	26LB13/S3	4 x 6	600#	150#	—	1000	—	—	—	—	275	170			
26LA14/S3	26LB14/S3	4 x 6	900#	150#	—	1500	—	—	—	—	275	170			
26LA10/S4	26LB10/S4	3 x 4	150#	150#	275	—	—	—	—	—	275	170			
26LA11/S4	26LB11/S4	3 x 4	300#	150#	275	—	—	—	—	—	275	170	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26LA12/S4	26LB12/S4	4 x 6	300#	150#	535	—	—	—	—	—	275	170			
26LA13/S4	26LB13/S4	4 x 6	600#	150#	535	—	—	—	—	—	275	170			
26LA14/S4	26LB14/S4	4 x 6	900#	150#	700	—	—	—	—	—	275	170			

Selection Chart



General Notes:

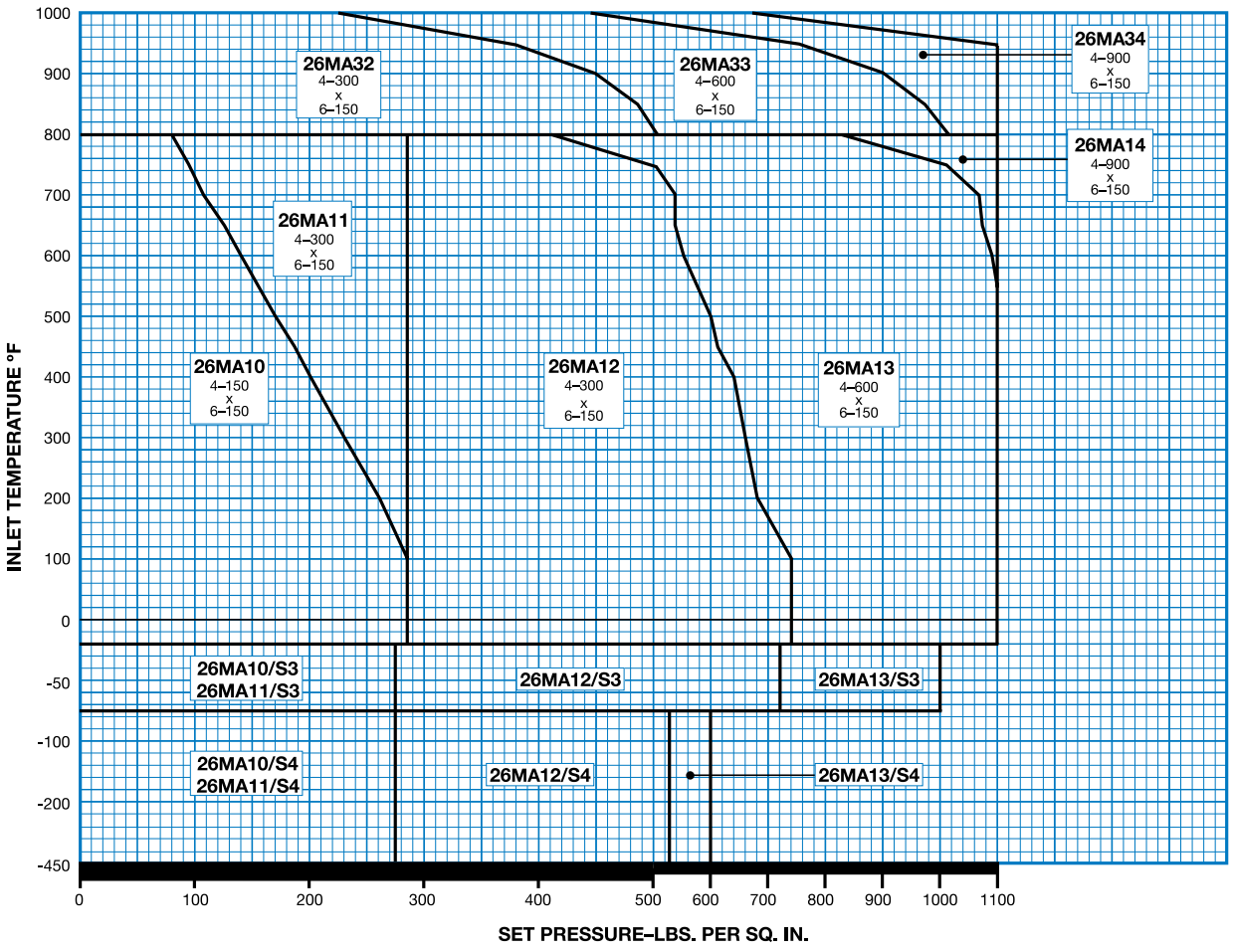
1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

M Orifice

API Area: 3.60 sq. in.
Actual Area: 4.000 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26MA10	26MB10	4 x 6	150#	150#	—	—	285	185	80	—	285	80	CARBON STEEL	CHROME ALLOY	-20°F to 800°F
26MA11	26MB11	4 x 6	300#	150#	—	—	285	285	285	—	285	80			
26MA12	26MB12	4 x 6	300#	150#	—	—	740	615	410	—	285	160			
26MA13	26MB13	4 x 6	600#	150#	—	—	1100	1100	825	—	285	160			
26MA14	26MB14	4 x 6	900#	150#	—	—	1100	1100	1100	—	285	160			
26MA32	26MB32	4 x 6	300#	150#	—	—	—	—	510	225	285	160	CHROME MOLY STEEL	HIGH TEMP. ALLOY	801°F to 1000°F
26MA33	26MB33	4 x 6	600#	150#	—	—	—	—	1015	445	285	160			
26MA34	26MB34	4 x 6	900#	150#	—	—	—	—	1100	670	285	160			
26MA10/S3	26MB10/S3	4 x 6	150#	150#	—	275	—	—	—	—	275	80	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-21°F to -75°F
26MA11/S3	26MB11/S3	4 x 6	300#	150#	—	275	—	—	—	—	275	80			
26MA12/S3	26MB12/S3	4 x 6	300#	150#	—	720	—	—	—	—	275	160			
26MA13/S3	26MB13/S3	4 x 6	600#	150#	—	1000	—	—	—	—	275	160			
26MA10/S4	26MB10/S4	4 x 6	150#	150#	275	—	—	—	—	—	275	80	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26MA11/S4	26MB11/S4	4 x 6	300#	150#	275	—	—	—	—	—	275	80			
26MA12/S4	26MB12/S4	4 x 6	300#	150#	525	—	—	—	—	—	275	160			
26MA13/S4	26MB13/S4	4 x 6	600#	150#	600	—	—	—	—	—	275	160			

Selection Chart



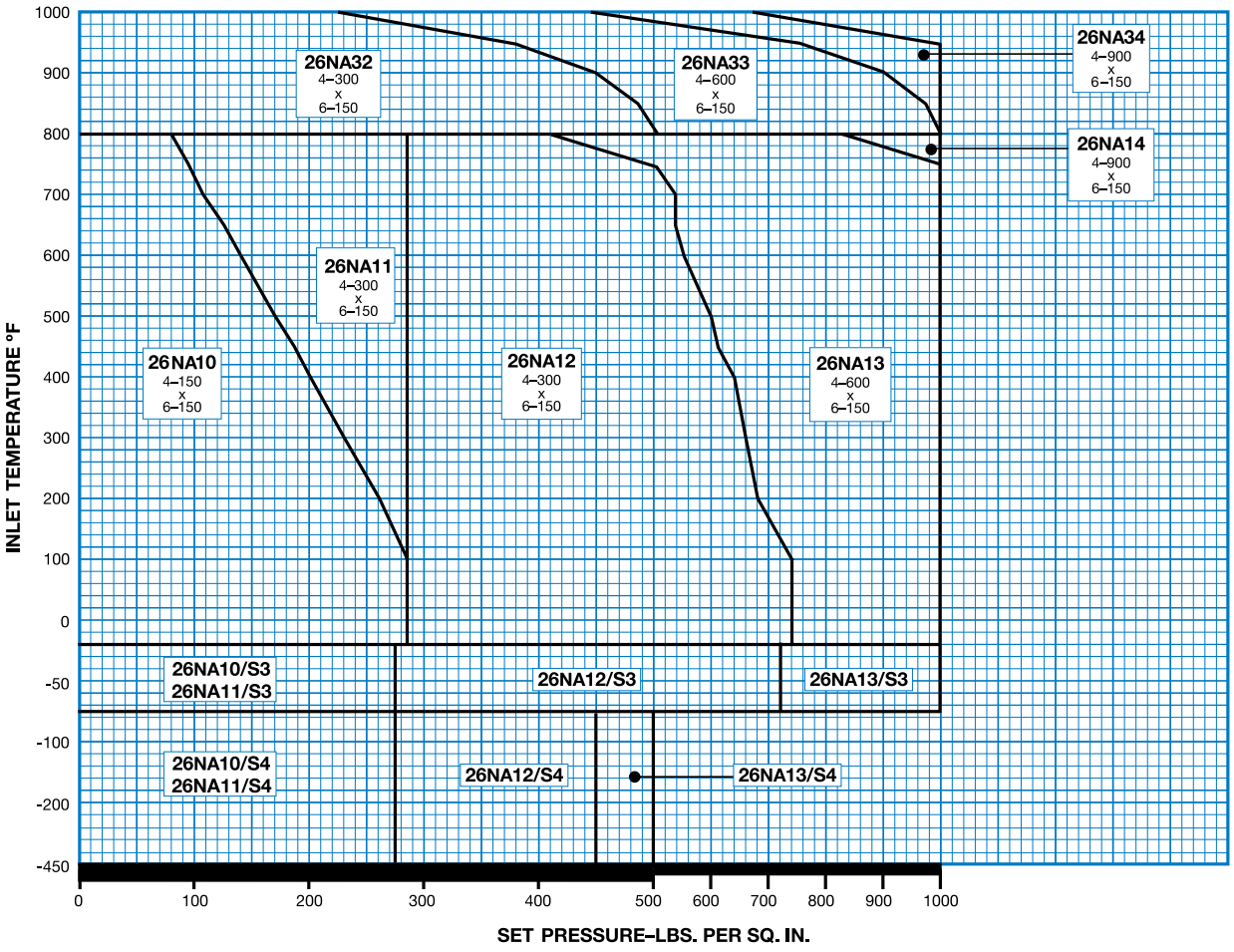
General Notes:

1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

N Orifice

API Area: 4.34 sq. in.
Actual Area: 4.822 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26NA10	26NB10	4 x 6	150#	150#	—	—	285	185	80	—	285	80	CARBON STEEL	CHROME ALLOY	-20°F to 800°F
26NA11	26NB11	4 x 6	300#	150#	—	—	285	285	285	—	285	80			
26NA12	26NB12	4 x 6	300#	150#	—	—	740	615	410	—	285	160			
26NA13	26NB13	4 x 6	600#	150#	—	—	1000	1000	825	—	285	160			
26NA14	26NB14	4 x 6	900#	150#	—	—	1000	1000	1000	—	285	160			
26NA32	26NB32	4 x 6	300#	150#	—	—	—	—	510	225	285	160	CHROME MOLY STEEL	HIGH TEMP. ALLOY	801°F to 1000°F
26NA33	26NB33	4 x 6	600#	150#	—	—	—	—	1000	445	285	160			
26NA34	26NB34	4 x 6	900#	150#	—	—	—	—	1000	670	285	160			
26NA10/S3	26NB10/S3	4 x 6	150#	150#	—	275	—	—	—	—	275	80	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-21°F to -75°F
26NA11/S3	26NB11/S3	4 x 6	300#	150#	—	275	—	—	—	—	275	80			
26NA12/S3	26NB12/S3	4 x 6	300#	150#	—	720	—	—	—	—	275	160			
26NA13/S3	26NB13/S3	4 x 6	600#	150#	—	1000	—	—	—	—	275	160			
26NA10/S4	26NB10/S4	4 x 6	150#	150#	275	—	—	—	—	—	275	80	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26NA11/S4	26NB11/S4	4 x 6	300#	150#	275	—	—	—	—	—	275	80			
26NA12/S4	26NB12/S4	4 x 6	300#	150#	450	—	—	—	—	—	275	160			
26NA13/S4	26NB13/S4	4 x 6	600#	150#	500	—	—	—	—	—	275	160			



Selection Chart

General Notes:

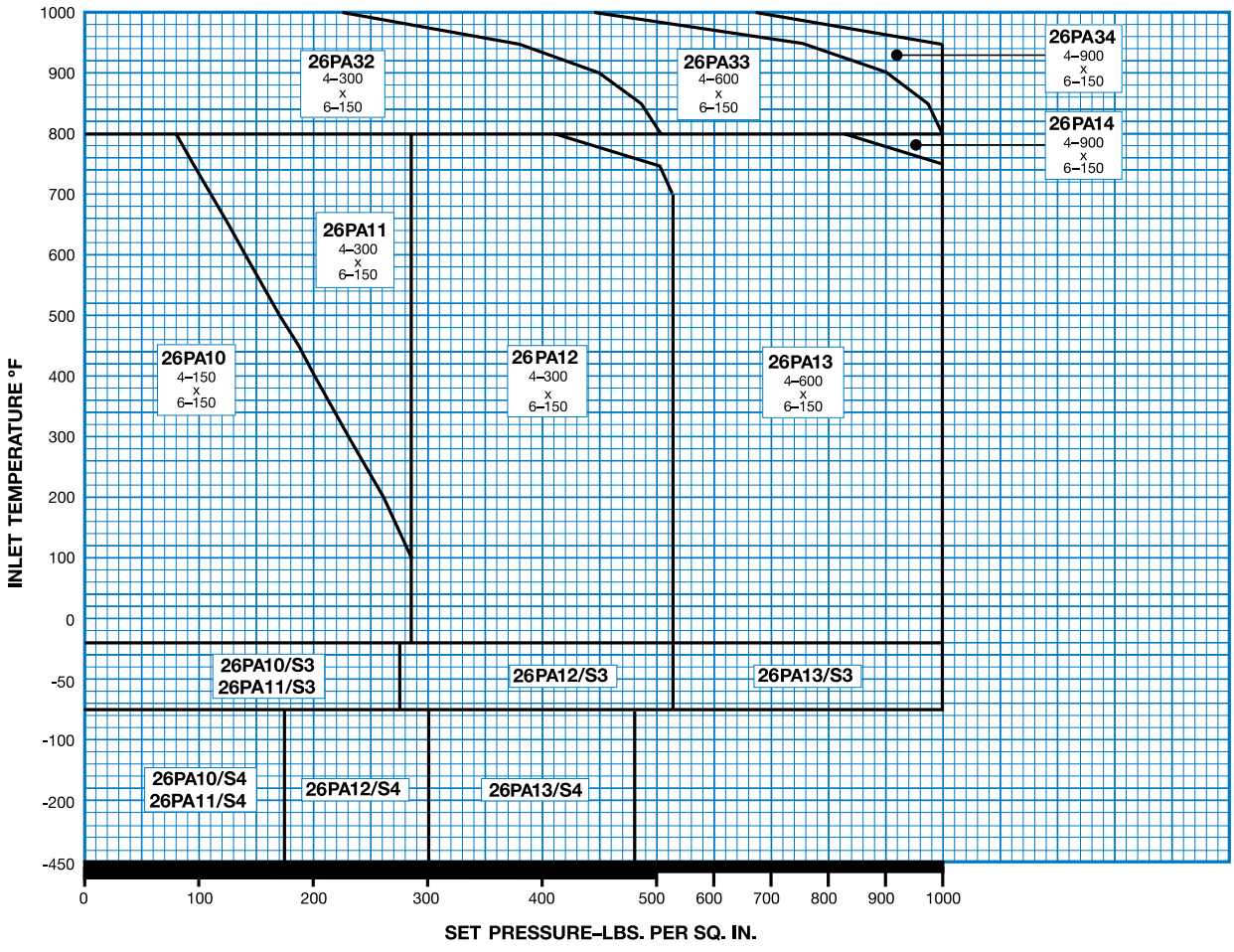
1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

P Orifice

API Area: 6.38 sq. in.
Actual Area: 7.087 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26PA10	26PB10	4 x 6	150#	150#	—	—	285	185	80	—	285	80	CARBON STEEL	CHROME ALLOY	-20°F to 800°F
26PA11	26PB11	4 x 6	300#	150#	—	—	285	285	285	—	285	80			
26PA12	26PB12	4 x 6	300#	150#	—	—	525	525	410	—	285	150			
26PA13	26PB13	4 x 6	600#	150#	—	—	1000	1000	825	—	285	150			
26PA14	26PB14	4 x 6	900#	150#	—	—	1000	1000	1000	—	285	150			
26PA32	26PB32	4 x 6	300#	150#	—	—	—	—	510	225	285	150	CHROME MOLY STEEL	HIGH TEMP. ALLOY	801°F to 1000°F
26PA33	26PB33	4 x 6	600#	150#	—	—	—	—	1000	445	285	150			
26PA34	26PB34	4 x 6	900#	150#	—	—	—	—	1000	670	285	150			
26PA10/S3	26PB10/S3	4 x 6	150#	150#	—	275	—	—	—	—	275	80	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-21°F to -75°F
26PA11/S3	26PB11/S3	4 x 6	300#	150#	—	275	—	—	—	—	275	80			
26PA12/S3	26PB12/S3	4 x 6	300#	150#	—	720	—	—	—	—	275	150			
26PA13/S3	26PB13/S3	4 x 6	600#	150#	—	1000	—	—	—	—	275	150			
26PA10/S4	26PB10/S4	4 x 6	150#	150#	175	—	—	—	—	—	175	80	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26PA11/S4	26PB11/S4	4 x 6	300#	150#	175	—	—	—	—	—	175	80			
26PA12/S4	26PB12/S4	4 x 6	300#	150#	300	—	—	—	—	—	275	150			
26PA13/S4	26PB13/S4	4 x 6	600#	150#	480	—	—	—	—	—	275	150			

Selection Chart



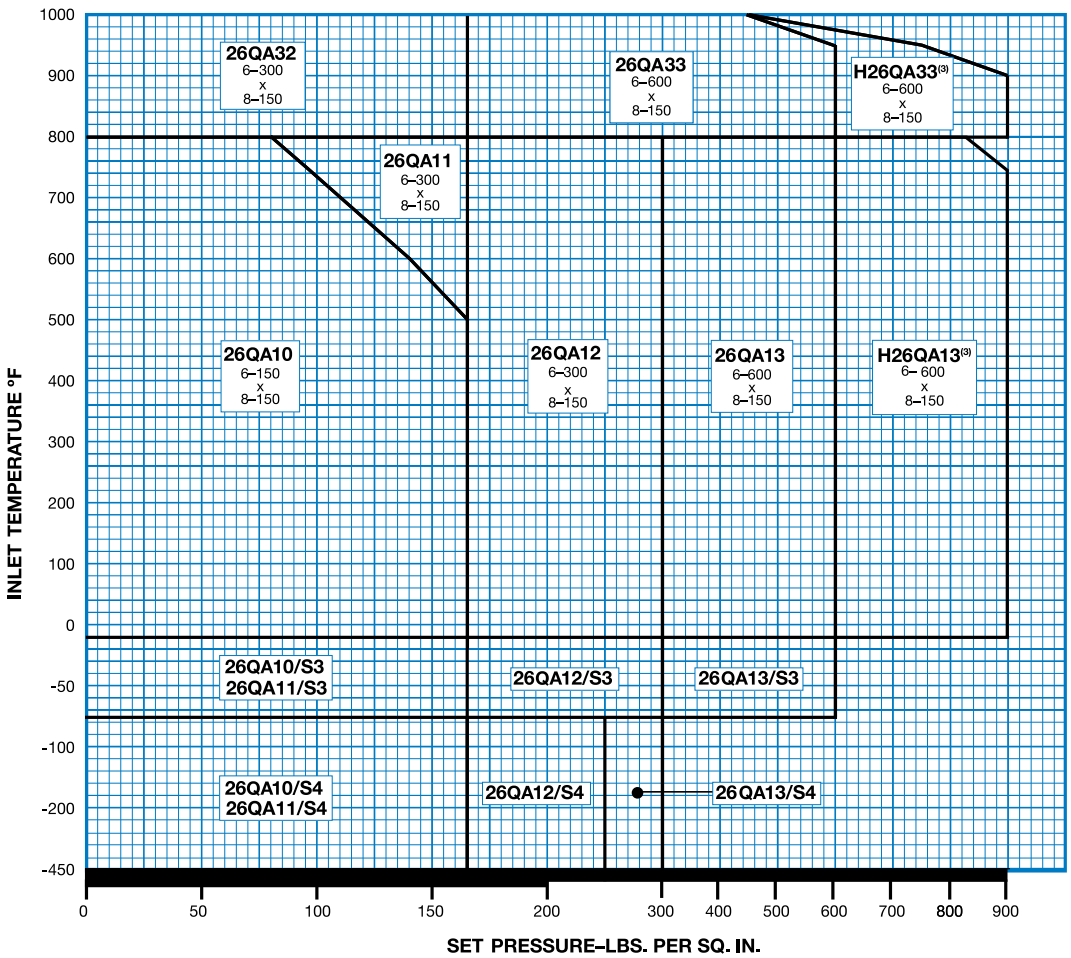
General Notes:

1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

Q Orifice

API Area: 11.05 sq. in.
Actual Area: 12.27 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26QA10	26QB10	6 x 8	150#	150#	—	—	165	165	80	—	115	70			
26QA11	26QB11	6 x 8	300#	150#	—	—	165	165	165	—	115	70	CARBON STEEL	CHROME ALLOY	-20°F to 800°F
26QA12	26QB12	6 x 8	300#	150#	—	—	300	300	300	—	115	115			
26QA13	26QB13	6 x 8	600#	150#	—	—	600	600	600	—	115	115			
H26QA13	H26QB13	6 x 8	600#	150#	—	—	900	900	825	—	285	200			
26QA32	26QB32	6 x 8	300#	150#	—	—	—	—	165	165	115	70	CHROME MOLY STEEL	HIGH TEMP. ALLOY	801°F to 1000°F
26QA33	26QB33	6 x 8	600#	150#	—	—	—	—	600	445	115	70			
H26QA33	H26QB33	6 x 8	600#	150#	—	—	—	—	900	445	285	200			
26QA10/S3	26QB10/S3	6 x 8	150#	150#	—	165	—	—	—	—	115	70			
26QA11/S3	26QB11/S3	6 x 8	300#	150#	—	165	—	—	—	—	115	70	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-21°F to -75°F
26QA12/S3	26QB12/S3	6 x 8	300#	150#	—	300	—	—	—	—	115	115			
26QA13/S3	26QB13/S3	6 x 8	600#	150#	—	600	—	—	—	—	115	115			
26QA10/S4	26QB10/S4	6 x 8	150#	150#	165	—	—	—	—	—	115	70			
26QA11/S4	26QB11/S4	6 x 8	300#	150#	165	—	—	—	—	—	115	70	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26QA12/S4	26QB12/S4	6 x 8	300#	150#	250	—	—	—	—	—	115	115			
26QA13/S4	26QB13/S4	6 x 8	600#	150#	300	—	—	—	—	—	115	115			



Selection Chart

General Notes:

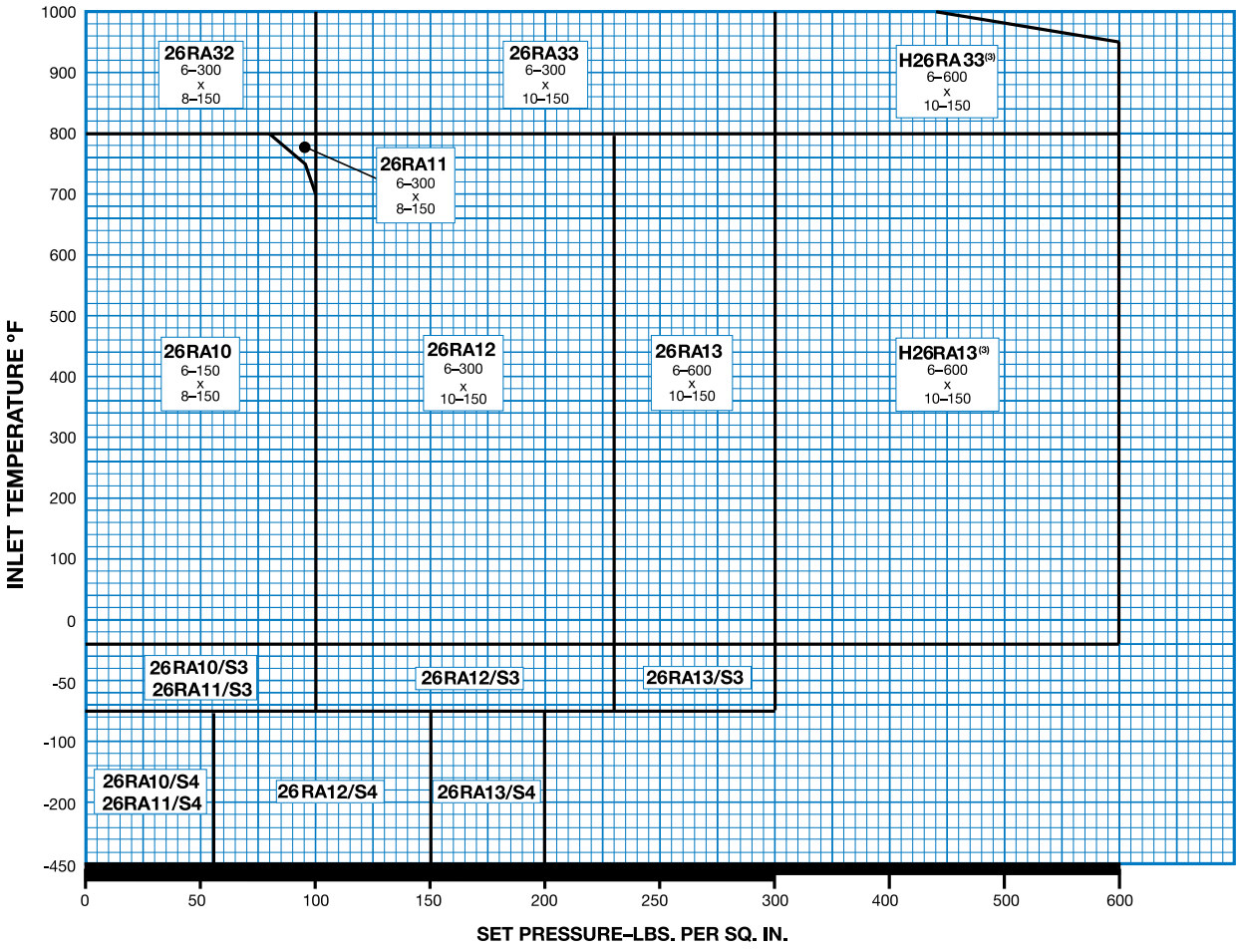
1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

R Orifice

API Area: 16.00 sq. in.
Actual Area: 17.78 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26RA10	26RB10	6 x 8	150#	150#	—	—	100	100	80	—	60	60	CARBON STEEL	CHROME ALLOY	-20°F to 800°F
26RA11	26RB11	6 x 8	300#	150#	—	—	100	100	100	—	60	60			
26RA12	26RB12	6 x 10	300#	150#	—	—	230	230	230	—	100	100			
26RA13	26RB13	6 x 10	600#	150#	—	—	300	300	300	—	100	100			
H26RA13	H26RB13	6 x 10	600#	150#	—	—	600	600	600	—	285	200			
26RA32	26RB32	6 x 8	300#	150#	—	—	—	—	100	100	60	60	CHROME MOLY STEEL	HIGH TEMP. ALLOY	801°F to 1000°F
26RA33	26RB33	6 x 10	600#	150#	—	—	—	—	300	300	100	100			
H26RA33	H26RB33	6 x 10	600#	150#	—	—	—	—	600	445	285	200			
26RA10/S3	26RB10/S3	6 x 8	150#	150#	—	100	—	—	—	—	60	60	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-21°F to -75°F
26RA11/S3	26RB11/S3	6 x 8	300#	150#	—	100	—	—	—	—	60	60			
26RA12/S3	26RB12/S3	6 x 10	300#	150#	—	230	—	—	—	—	100	100			
26RA13/S3	26RB13/S3	6 x 10	600#	150#	—	300	—	—	—	—	100	100			
26RA10/S4	26RB10/S4	6 x 8	150#	150#	55	—	—	—	—	—	55	55	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26RA11/S4	26RB11/S4	6 x 8	300#	150#	55	—	—	—	—	—	55	55			
26RA12/S4	26RB12/S4	6 x 10	300#	150#	150	—	—	—	—	—	100	100			
26RA13/S4	26RB13/S4	6 x 10	600#	150#	200	—	—	—	—	—	100	100			

Selection Chart



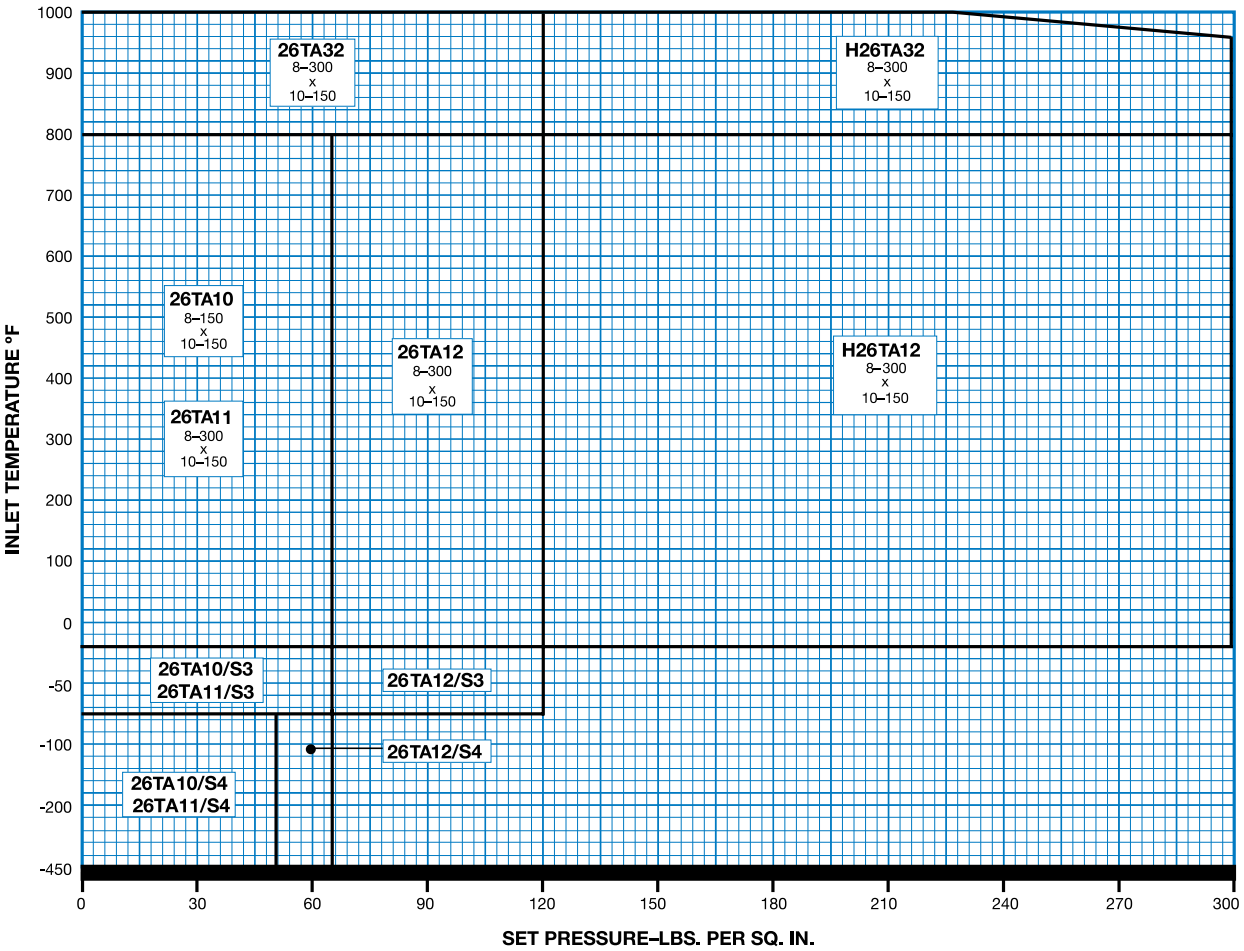
General Notes:

1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

T Orifice

API Area: 26.00 sq. in.
Actual Area: 28.94 sq. in.

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, PSIG						BACK PRESSURE LIMIT PSIG @ 100°F		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-450°F -76°F	-75°F -21°F	-20°F 100°F	450°F	800°F	1000°F	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26TA10	26TB10	8 x 10	150#	150#	—	—	65	65	65	—	30	30	CARBON STEEL	CHROME ALLOY	-20°F to 800°F
26TA11	26TB11	8 x 10	300#	150#	—	—	65	65	65	—	30	30			
26TA12	26TB12	8 x 10	300#	150#	—	—	120	120	120	—	60	60			
H26TA12	H26TB12	8 x 10	300#	150#	—	—	300	300	300	—	100	100			
26TA32	26TB32	8 x 10	300#	150#	—	—	—	—	120	120	60	60	CHROME MOLY ST.	HIGH TEMP. ALLOY	801°F to 1000°F
H26TA32	H26TB32	8 x 10	300#	150#	—	—	—	—	300	225	100	100			
26TA10/S3	26TB10/S3	8 x 10	150#	150#	—	65	—	—	—	—	30	30	316 ST. ST.	CHROME ALLOY NICKEL PLTD.	-21°F to -75°F
26TA11/S3	26TB11/S3	8 x 10	300#	150#	—	65	—	—	—	—	30	30			
26TA12/S3	26TB12/S3	8 x 10	300#	150#	—	120	—	—	—	—	60	60			
26TA10/S4	26TB10/S4	8 x 10	150#	150#	50	—	—	—	—	—	30	30	316 ST. ST.	316 ST. ST.	-76°F to -450°F
26TA11/S4	26TB11/S4	8 x 10	300#	150#	50	—	—	—	—	—	30	30			
26TA12/S4	26TB12/S4	8 x 10	300#	150#	65	—	—	—	—	—	60	60			



Selection Chart

General Notes:

1. The type numbers shown on the Selection Chart indicate conventional valves. For BalanSeal, O-ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperatures above 100° F should not exceed the rating in ANSI B16.5.
3. For applications above 1000° F, consult the Farris Factory.

Former API Standard Sizes

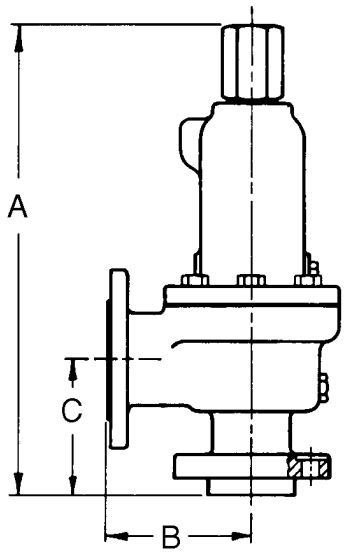
API Standard 526, Flanged Steel Pressure Relief Valves, was revised to eliminate the use of 2½" size connections and to use 3" connections instead. The following is a summary of the old type numbers previously offered. The original type numbers with 2½" connections are still available for replacement of existing valves.

Oriface	Type Number		Valve Size	ANSI Flange Class		Dimensions, Inches					Approx.
	Air, Steam, & Vapor	Liquid	Inlet x Outlet	Inlet	Outlet	A	B	C	E	F	Weight
D	26DA16	26DA16L	1 1/2 x 2 1/2	2500#	300#	22 3/4	6 1/2	5 1/2	11/16	2 7/16	80
E	26EA16	26EA16L	1 1/2 x 2 1/2	2500#	300#	22 3/4	6 1/2	5 1/2	11/16	2 7/16	80
F	26FA14	26FA14L	1 1/2 x 2 1/2	900#	300#	22 3/4	6	4 7/8	11/16	1 15/16	70
	26FA15	26FA15L	1 1/2 x 2 1/2	1500#	300#	22 3/4	6	4 7/8	11/16	1 15/16	70
	26FA16	26FA16L	1 1/2 x 2 1/2	2500#	300#	22 3/4	6 1/2	5 1/2	11/16	2 7/16	80
G	26GA10	26GA10L	1 1/2 x 2 1/2	150#	150#	18 5/8	4 3/4	4 7/8	11/16	1 1/4	50
	26GA11	26GA11L	1 1/2 x 2 1/2	300#	150#	18 5/8	4 3/4	4 7/8	11/16	1 9/16	50
	26GA12	26GA12L	1 1/2 x 2 1/2	300#	150#	22 1/4	6	4 7/8	11/16	1 9/16	60
	26GA13	26GA13L	1 1/2 x 2 1/2	600#	150#	22 1/4	6	4 7/8	11/16	1 9/16	60
	26GA14	26GA14L	1 1/2 x 2 1/2	900#	300#	23 3/4	6	4 7/8	11/16	1 15/16	70
J	26JA12	26JA12L	2 1/2 x 4	300#	150#	24 3/8	5 5/8	5 3/8	11/16	1 13/16	150
	26JA13	26JA13L	2 1/2 x 4	600#	150#	24 3/8	5 5/8	5 3/8	11/16	1 13/16	150
	26JA32	26JA32L	2 1/2 x 4	300#	150#	24 3/8	5 5/8	5 3/8	11/16	1 13/16	150
	26JA33	26JA33L	2 1/2 x 4	600#	150#	24 3/8	6 3/4	6 1/8	11/16	1 13/16	150
	26JA34	26JA34L	2 1/2 x 4	900#	150#	33 1/8	7 1/8	7 1/4	11/16	2 5/16	170
K	26KA34	26KA34L	3 x 4	900#	150#	32 3/8	7 1/8	7 1/4	11/16	2 3/16	175

Notes:
1. Pressure and temperature limitations are the same as the comparable orifice and flange classes shown in main Selection Tables.
2. The sizes and flange connections are also available in their respective high temperature type numbers. Example: 26DA36-120.
3. All standard constructions and accessories are available including balanced bellows, O-ring seats, test levers, etc.
4. Additional optional constructions may be specified by changing the seventh digit of the type number. See following table.

Optional Construction	7th Digit Designation	
	Air, Steam & Vapor	Liquids
Heat Transfer Fluid Service	F	G
Exposed Spring	C	N/A*

*Not applicable



ASME PRESSURE VESSEL CODE (UV)

CAPACITIES IN STANDARD CUBIC FEET PER MINUTE AT 60 °F

Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches													
AREAS	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**P**	**Q**	**R**	**T**
API	**0.110**	**0.196**	**0.307**	**0.503**	**0.785**	**1.287**	**1.838**	**2.853**	**3.60**	**4.34**	**6.38**	**11.05**	**16.0**	**26.0**
Actual	**0.150**	**0.225**	**0.371**	**0.559**	**0.873**	**1.43**	**2.042**	**3.170**	**4.000**	**4.822**	**7.087**	**12.27**	**17.78**	**28.94**
15	77	115	190	287	448	735	1050	1630	2057	2479	3644	6310	9144	14884
20	88	133	219	331	517	847	1210	1879	2371	2859	4202	7275	10542	17159
30	112	168	278	419	654	1072	1531	2378	3000	3617	5316	9205	13339	21711
40	138	207	342	516	805	1320	1885	2926	3692	4451	6542	11328	16415	26718
50	164	246	406	612	957	1567	2238	3475	4384	5286	7769	13450	19491	31725
60	190	285	470	709	1108	1815	2591	4023	5076	6120	8995	15573	22567	36732
70	216	324	535	806	1259	2062	2945	4571	5769	6954	10221	17696	25643	41738
80	242	363	599	902	1410	2309	3298	5120	6461	7788	11447	19819	28719	46745
90	268	402	663	999	1561	2557	3651	5668	7153	8623	12673	21942	31795	51752
100	294	441	727	1096	1712	2804	4004	6217	7845	9457	13899	24064	34871	56759
150	423	635	1048	1579	2467	4041	5771	8959	11305	13628	20030	34678	50251	81793
200	553	830	1369	2063	3222	5278	7537	11701	14765	17799	26160	45293	65632	106827
250	683	1025	1690	2547	3977	6515	9304	14443	18225	21970	32291	55907	81012	131862
300	813	1219	2011	3030	4732	7752	11070	17185	21685	26142	38421	66521	96393	156896
350	942	1414	2332	3514	5488	8989	12836	19928	25145	30313	44552	77135	111773	—
400	1072	1609	2653	3997	6243	10226	14603	22670	28606	34484	50682	87749	127154	—
450	1202	1803	2974	4481	6998	11463	16369	25412	32066	38655	56813	98363	142534	—
500	1332	1998	3295	4964	7753	12700	18136	28154	35526	42827	62943	108977	157914	—
550	1461	2192	3616	5448	8508	13937	19902	30896	38986	46998	69074	119591	173295	—
600	1591	2387	3936	5931	9263	15174	21669	33639	42446	51169	75204	130205	188675	—
650	1721	2582	4257	6415	10019	16411	23435	36381	45906	55340	81335	140819	—	—
700	1851	2776	4578	6899	10774	17648	25201	39123	49367	59511	87466	151433	—	—
750	1981	2971	4899	7382	11529	18885	26968	41865	52827	63683	93596	162047	—	—
800	2110	3166	5220	7866	12284	20122	28734	44607	56287	67854	99727	172661	—	—
850	2240	3360	5541	8349	13039	21359	30501	47349	59747	72025	105857	183275	—	—
900	2370	3555	5862	8833	13795	22596	32267	50092	63207	76196	111988	193889	—	—
950	2500	3750	6183	9316	14550	23833	34033	52834	66667	80368	118118	—	—	—
1000	2629	3944	6504	9800	15305	25070	35800	55576	70127	84539	124249	—	—	—
1050	2759	4139	6825	10283	16060	26307	37566	58318	73588	—	—	—	—	—
1100	2889	4333	7146	10767	16815	27544	39333	61060	77048	—	—	—	—	—
1150	3019	4528	7467	11251	17570	28781	41099	63802	—	—	—	—	—	—
1200	3148	4723	7788	11734	18326	30018	42865	66545	—	—	—	—	—	—
1250	3278	4917	8109	12218	19081	31255	44632	69287	—	—	—	—	—	—
1300	3408	5112	8429	12701	19836	32492	46398	72029	—	—	—	—	—	—
1350	3538	5307	8750	13185	20591	33729	48165	74771	—	—	—	—	—	—
1400	3667	5501	9071	13668	21346	34966	49931	77513	—	—	—	—	—	—
1450	3797	5696	9392	14152	22102	36203	51698	80256	—	—	—	—	—	—
1500	3927	5891	9713	14635	22857	37440	53464	82998	—	—	—	—	—	—
1550	4057	6085	10034	15119	23612	38677	55230	—	—	—	—	—	—	—
1600	4186	6280	10355	15603	24367	39914	56997	—	—	—	—	—	—	—
1650	4316	6474	10676	16086	25122	41151	58763	—	—	—	—	—	—	—
1700	4446	6669	10997	16570	25877	42388	60530	—	—	—	—	—	—	—
1750	4576	6864	11318	17053	26633	43625	62296	—	—	—	—	—	—	—
1800	4705	7058	11639	17537	27388	44862	64062	—	—	—	—	—	—	—
1850	4835	7253	11960	18020	28143	46099	65829	—	—	—	—	—	—	—
1900	4965	7448	12281	18504	28898	47336	67595	—	—	—	—	—	—	—
2000	5224	7837	12922	19471	30409	49810	71128	—	—	—	—	—	—	—
2100	5484	8226	13564	20438	31919	52284	74661	—	—	—	—	—	—	—
2200	5743	8615	14206	21405	33429	54758	78194	—	—	—	—	—	—	—
2300	6003	9005	14848	22372	34940	57232	—	—	—	—	—	—	—	—
2400	6262	9394	15490	23339	36450	59706	—	—	—	—	—	—	—	—
2500	6522	9783	16132	24307	37960	62180	—	—	—					
2600	6781	10172	16774	25274	39471	64654	—	—	—					
2700	7041	10562	17415	26241	40981	67128	—	—	—					
2800	7301	10951	18057	27208	—	—	—	—	—					
2900	7560	11340	18699	28175	—	—	—	—	—					
3000	7820	11730	19341	29142	—	—	—	—	—					
3500	9117	13676	22550	33978	—	—	—	—	—					
3700	9636	14454	23834	35912	—	—	—	—	—					
4000	10415	15622	25760	—	—	—	—	—	—					
4500	11712	17569	28969	—	—	—	—	—	—					
5000	13010	19515	32178	—	—	—	—	—	—					
5500	14307	21461	—	—	—	—	—	—	—					
6000	15605	23408	—	—	—	—	—	—	—	—	—	—	—	—

General Notes:

1. Above capacities should also be used for 2600L series when used in air service.
2. Capacities at 30 PSIG and below are based on 3 PSI overpressure.
3. For sizing purposes the effective coefficient of discharge K_d for air, gas, and steam is 0.953 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for air, gas, and steam service is 0.858.

Steam Capacities, 10% Overpressure

ASME PRESSURE VESSEL CODE (UV) CAPACITIES IN POUNDS PER HOUR AT SATURATION TEMPERATURE

Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches													
AREAS	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**P**	**Q**	**R**	**T**
API	**0.110**	**0.196**	**0.307**	**0.503**	**0.785**	**1.287**	**1.838**	**2.853**	**3.60**	**4.34**	**6.38**	**11.05**	**16.0**	**26.0**
Actual	**0.150**	**0.225**	**0.371**	**0.559**	**0.873**	**1.43**	**2.042**	**3.170**	**4.000**	**4.822**	**7.087**	**12.27**	**17.78**	**28.94**
15	216	325	536	807	1261	2066	2950	4580	5779	6967	10240	17729	25690	41815
20	249	374	618	931	1454	2382	3401	5280	6663	8032	11805	20439	29618	48209
30	316	474	781	1178	1840	3014	4303	6681	8430	10163	14937	25861	37475	60997
40	389	583	962	1449	2264	3709	5296	8222	10375	12507	18382	31825	46117	75063
50	461	692	1142	1721	2688	4404	6289	9763	12319	14850	21826	37789	54759	89130
60	534	802	1322	1993	3113	5099	7281	11303	14263	17194	25271	43753	63401	103196
70	607	911	1503	2265	3537	5794	8274	12844	16207	19538	28716	49717	72043	117263
80	680	1021	1683	2536	3961	6489	9266	14385	18152	21882	32160	55681	80685	131329
90	753	1130	1863	2808	4386	7184	10259	15926	20096	24226	35605	61645	89327	145396
100	826	1239	2044	3080	4810	7879	11251	17467	22040	26569	39050	67609	97969	159462
150	1191	1786	2945	4438	6931	11354	16214	25171	31761	38288	56273	97428	141180	229795
200	1555	2333	3847	5797	9053	14830	21176	32875	41482	50007	73497	127248	184390	300127
250	1920	2880	4749	7155	11175	18305	26139	40579	51203	61726	90720	157067	227601	370460
300	2284	3427	5650	8514	13296	21780	31102	48283	60925	73445	107943	186887	270811	440792
350	2649	3973	6552	9872	15418	25256	36064	55987	70646	85163	125167	216707	314022	—
400	3013	4520	7454	11231	17540	28731	41027	63691	80367	96882	142390	246526	357232	—
450	3378	5067	8355	12589	19661	32206	45990	71395	90088	108601	159614	276346	400443	—
500	3742	5614	9257	13948	21783	35681	50952	79099	99809	120320	176837	306165	443653	—
550	4107	6161	10158	15306	23905	39157	55915	86803	109530	132039	194061	335985	486864	—
600	4471	6707	11060	16665	26026	42632	60878	94507	119251	143758	211284	365805	530074	—
650	4836	7254	11962	18023	28148	46107	65840	102211	128973	155476	228507	395624	—	—
700	5201	7801	12863	19382	30269	49583	70803	109915	138694	167195	245731	425444	—	—
750	5565	8348	13765	20741	32391	53058	75766	117619	148415	178914	262954	455263	—	—
800	5930	8895	14667	22099	34513	56533	80728	125323	158136	190633	280178	485083	—	—
850	6294	9441	15568	23458	36634	60009	85691	133027	167857	202352	297401	514903	—	—
900	6659	9988	16470	24816	38756	63484	90653	140731	177578	214071	314625	544722	—	—
950	7023	10535	17372	26175	40878	66959	95616	148435	187299	225789	331848	—	—	—
1000	7388	11082	18273	27533	42999	70435	100579	156139	197020	237508	349071	—	—	—
1050	7752	11629	19175	28892	45121	73910	105541	163843	206742	—	—	—	—	—
1100	8117	12176	20076	30250	47243	77385	110504	171547	216463	—	—	—	—	—
1150	8481	12722	20978	31609	49364	80860	115467	179251	—	—	—	—	—	—
1200	8846	13269	21880	32967	51486	84336	120429	186955	—	—	—	—	—	—
1250	9211	13816	22781	34326	53608	87811	125392	194659	—	—	—	—	—	—
1300	9575	14363	23683	35684	55729	91286	130355	202363	—	—	—	—	—	—
1350	9940	14910	24585	37043	57851	94762	135317	210067	—	—	—	—	—	—
1400	10304	15456	25486	38401	59972	98237	140280	217771	—	—	—	—	—	—
1450	10669	16003	26388	39760	62094	101712	145242	225475	—	—	—	—	—	—
1500	11088	16633	27426	41324	64537	105714	150956	234345	—	—	—	—	—	—
1550	11489	17234	28417	42817	66868	109532	156409	—	—	—	—	—	—	—
1600	11891	17838	29413	44318	69212	113372	161891	—	—	—	—	—	—	—
1650	12309	18464	30444	45872	71640	117348	167569	—	—	—	—	—	—	—
1700	12728	19093	31483	47438	74083	121352	173287	—	—	—	—	—	—	—
1750	13152	19728	32529	49013	76545	125383	179043	—	—	—	—	—	—	—
1800	13564	20347	33549	50551	78947	129316	184661	—	—	—	—	—	—	—
1850	14006	21010	34643	52197	81518	133530	190677	—	—	—	—	—	—	—
1900	14438	21657	35711	53807	84031	137645	196553	—	—	—	—	—	—	—
2000	15325	22987	37903	57111	89191	146098	208625	—	—	—	—	—	—	—
2100	16240	24360	40167	60522	94517	154823	221084	—	—	—	—	—	—	—
2200	17202	25803	42546	64107	100118	163996	234181	—	—	—	—	—	—	—
2300	18182	27272	44970	67758	105819	173335	—	—	—	—	—	—	—	—
2400	19214	28821	47523	71605	111826	183175	—	—	—	—	—	—	—	—
2500	20285	30427	50171	75596	118059	193386	—	—	—	—	—	—	—	—
2600	21416	32124	52970	79811	124643	204168	—	—	—	—	—	—	—	—
2700	22631	33947	55975	84339	131714	215753	—	—	—	—	—	—	—	—
2800	23916	35874	59154	89129	—	—	—	—	—	—	—	—	—	—
2900	25318	37978	62622	94355	—	—	—	—	—	—	—	—	—	—

General Notes:

1. Above capacities should also be used for 2600L series when used in steam service.
2. Capacities at 30 PSIG and below are based on 3 PSI overpressure.
3. For sizing purposes the effective coefficient of discharge K_d for air, gas, and steam is 0.953 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for air, gas, and steam service is 0.858.

Water Capacities - 2600L: 10% Overpressure

ASME PRESSURE VESSEL CODE (UV)

CAPACITIES IN GALLONS PER MINUTE AT 70 °F

Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches													
AREAS	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**P**	**Q**	**R**	**T**
API	**0.110**	**0.196**	**0.307**	**0.503**	**0.785**	**1.287**	**1.838**	**2.853**	**3.600**	**4.34**	**6.38**	**11.05**	**16.0**	**26.0**
Actual	**0.150**	**0.225**	**0.371**	**0.559**	**0.873**	**1.43**	**2.042**	**3.170**	**4.000**	**4.822**	**7.087**	**12.27**	**17.78**	**28.94**
15	16	24	39	59	92	150	214	333	420	507	745	1289	1868	3041
20	18	27	44	66	104	170	242	376	475	573	842	1457	2112	3438
30	21	32	53	80	124	204	290	451	569	686	1008	1746	2530	4118
40	25	37	61	92	143	235	335	521	657	792	1164	2016	2921	4756
50	28	41	68	103	160	263	375	582	734	886	1302	2254	3266	5317
60	30	45	75	112	176	288	411	638	805	970	1426	2469	3578	5825
70	33	49	81	122	189	311	443	689	869	1048	1540	2667	3865	6292
80	35	52	86	130	203	332	474	736	929	1120	1647	2851	4132	6726
90	37	55	91	137	215	352	503	781	986	1188	1747	3024	4382	7134
100	39	58	96	145	227	372	530	823	1039	1252	1841	3188	4620	7520
150	48	72	118	177	278	455	649	1008	1272	1534	2255	3904	5658	9210
200	55	83	136	205	320	525	750	1164	1469	1771	2604	4508	6533	10635
250	62	92	152	229	358	587	838	1302	1643	1981	2911	5041	7304	11890
300	67	101	167	252	392	644	919	1426	1800	2170	3189	5522	8002	13025
350	73	109	180	271	424	695	992	1541	1944	2344	3445	5964	8643	—
400	78	117	193	290	453	743	1061	1647	2078	2505	3683	6376	9240	—
450	83	124	204	308	481	788	1125	1747	2204	2657	3906	6763	9800	—
500	87	131	215	325	507	831	1186	1841	2324	2801	4117	7129	10330	—
550	91	137	226	341	531	871	1244	1931	2437	2938	4318	7477	10834	—
600	95	143	236	356	555	910	1299	2017	2545	3069	4510	7809	11316	—
650	99	149	245	370	578	947	1352	2100	2649	3194	4694	8128	—	—
700	103	154	255	384	600	983	1403	2179	2749	3315	4872	8435	—	—
750	107	160	264	398	621	1018	1453	2255	2846	3431	5043	8731	—	—
800	110	165	272	411	641	1051	1500	2329	2939	3543	5208	9017	—	—
850	114	170	281	423	661	1083	1546	2401	3030	3653	5368	9295	—	—
900	117	175	289	436	680	1115	1591	2471	3118	3758	5524	9564	—	—
950	120	180	297	448	699	1145	1635	2538	3203	3861	5675	—	—	—
1000	123	185	304	459	717	1175	1677	2604	3286	3962	5823	—	—	—
1050	126	189	312	470	735	1204	1719	2669	3367	—	—	—	—	—
1100	129	194	319	482	752	1232	1759	2731	3447	—	—	—	—	—
1150	132	198	326	492	769	1260	1799	2793	—	—	—	—	—	—
1200	135	202	333	503	785	1287	1838	2853	—	—	—	—	—	—
1250	137	206	340	513	802	1313	1875	2912	—	—	—	—	—	—
1300	140	210	347	524	817	1340	1913	2969	—	—	—	—	—	—
1350	143	214	354	533	833	1365	1949	3026	—	—	—	—	—	—
1400	146	218	360	543	848	1390	1985	3082	—	—	—	—	—	—
1450	148	222	367	553	863	1414	2020	3136	—	—	—	—	—	—
1500	151	226	373	562	878	1439	2055	3190	—	—	—	—	—	—
1550	153	230	379	571	893	1462	2088	—	—	—	—	—	—	—
1600	155	233	385	581	907	1486	2122	—	—	—	—	—	—	—
1650	158	237	391	590	921	1509	2155	—	—	—	—	—	—	—
1700	160	241	397	598	935	1532	2187	—	—	—	—	—	—	—
1750	163	244	403	607	948	1554	2219	—	—	—	—	—	—	—
1800	165	248	409	616	962	1576	2251	—	—	—	—	—	—	—
1850	167	251	414	624	975	1598	2282	—	—	—	—	—	—	—
1900	169	254	420	633	988	1619	2312	—	—	—	—	—	—	—
2000	174	261	431	649	1014	1661	2372	—	—	—	—	—	—	—
2100	178	267	441	665	1039	1702	2431	—	—	—	—	—	—	—
2200	182	274	452	681	1063	1742	2488	—	—	—	—	—	—	—
2300	186	280	462	696	1087	1782	—	—	—	—	—	—	—	—
2400	190	286	472	711	1111	1820	—	—	—	—	—	—	—	—
2500	194	292	482	726	1134	1857	—	—	—	—	—	—	—	—
2600	198	298	491	740	1156	1894	—	—	—	—	—	—	—	—
2700	202	303	500	754	1178	1930	—	—	—	—	—	—	—	—
2800	206	309	510	768	—	—	—	—						
2900	209	314	519	782	—	—	—	—						
3000	213	320	528	795	—	—	—	—						
3500	230	345	570	859	—	—	—	—						
3700	237	355	586	883	—	—	—	—						
4000	246	369	609	—	—	—	—	—						
4500	261	392	646	—	—	—	—	—						
5000	275	413	681	—	—	—	—	—						
5500	289	433	—	—	—	—	—	—						
6000	301	452	—	—	—	—	—	—	—	—	—	—	—	—

General Notes:

1. Capacities at 30 PSIG and below are based on 3 PSI overpressure.
2. For sizing purposes the effective coefficient of discharge K_d for liquids is 0.724 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for water is 0.652.

Water Capacities - 2600: 25% Overpressure

NON-CODE

CAPACITIES IN GALLONS PER MINUTE AT 70 °F

Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches													
AREAS	**D**	**E**	**F**	**G**	**H**	**J**	**K**	**L**	**M**	**N**	**P**	**Q**	**R**	**T**
API	**0.110**	**0.196**	**0.307**	**0.503**	**0.785**	**1.287**	**1.838**	**2.853**	**3.600**	**4.34**	**6.38**	**11.05**	**16.0**	**26.0**
Actual	**0.150**	**0.225**	**0.371**	**0.559**	**0.873**	**1.43**	**2.042**	**3.170**	**4.000**	**4.822**	**7.087**	**12.27**	**17.78**	**28.94**
15	14	21	35	53	82	136	193	300	379	457	672	1163	1685	2743
20	16	24	40	61	95	156	223	347	438	528	776	1342	1946	3167
30	20	30	49	75	117	192	274	425	536	646	950	1644	2383	3879
40	23	35	57	86	135	221	316	491	619	746	1097	1899	2752	4479
50	26	39	64	97	151	247	353	548	692	834	1226	2123	3076	5007
60	28	42	70	106	165	271	387	601	758	914	1343	2325	3370	5485
70	30	46	76	114	179	293	418	649	819	987	1451	2512	3640	5925
80	33	49	81	122	191	313	447	694	875	1055	1551	2685	3892	6334
90	35	52	86	130	203	332	474	736	929	1119	1645	2848	4128	6718
100	37	55	91	137	214	350	499	776	979	1180	1734	3002	4351	7082
150	45	71	111	168	261	428	611	950	1198	1445	2124	3677	5328	8673
200	52	77	128	193	302	495	706	1097	1384	1669	2452	4246	6153	10015
250	58	92	143	216	337	553	790	1226	1547	1866	2742	4747	6879	11197
300	64	95	157	237	370	606	865	1344	1695	2044	3004	5200	7536	12266
350	69	103	169	256	399	655	934	1451	1831	2208	3244	5617	8139	—
400	73	110	181	274	427	700	999	1551	1958	2360	3468	6005	8702	—
450	78	116	192	290	453	742	1060	1645	2076	2503	3678	6369	9229	—
500	82	123	203	306	477	782	1117	1734	2189	2638	3878	6713	9729	—
550	86	129	213	321	501	821	1171	1819	2295	2767	4067	7041	10204	—
600	90	135	222	335	523	857	1223	1900	2398	2890	4248	7354	10657	—
650	94	140	231	349	544	892	1273	1978	2495	3008	4421	7655	—	—
700	97	146	240	362	565	926	1322	2052	2590	3122	4588	7944	—	—
750	100	151	248	375	585	958	1368	2124	2681	3232	4749	8222	—	—
800	104	156	257	387	604	990	1413	2194	2768	3337	4905	8492	—	—
850	107	160	264	399	623	1020	1456	2262	2854	3440	5056	8753	—	—
900	110	165	272	410	641	1050	1499	2327	2936	3540	5203	9007	—	—
950	113	170	280	422	658	1078	1540	2391	3016	3637	5345	—	—	—
1000	116	174	287	432	675	1106	1580	2453	3095	3731	5484	—	—	—
1050	118	178	294	443	692	1133	1619	2513	3171	—	—	—	—	—
1100	122	182	301	454	708	1160	1657	2573	3246	—	—	—	—	—
1150	124	186	307	463	724	1186	1694	2630	—	—	—	—	—	—
1200	127	191	314	474	740	1212	1730	2687	—	—	—	—	—	—
1250	129	194	320	483	755	1237	1766	2742	—	—	—	—	—	—
1300	132	198	327	493	770	1262	1801	2797	—	—	—	—	—	—
1350	134	202	333	502	784	1285	1835	2850	—	—	—	—	—	—
1400	137	206	339	512	799	1309	1869	2902	—	—	—	—	—	—
1450	139	209	345	520	813	1332	1902	2953	—	—	—	—	—	—
1500	142	213	351	530	827	1355	1935	3004	—	—	—	—	—	—
1550	144	216	357	538	841	1377	1967	—	—	—	—	—	—	—
1600	147	220	363	547	854	1400	1998	—	—	—	—	—	—	—
1650	149	223	368	555	867	1421	2029	—	—	—	—	—	—	—
1700	151	227	374	564	880	1443	2060	—	—	—	—	—	—	—
1750	153	230	379	572	893	1463	2090	—	—	—	—	—	—	—
1800	156	233	385	580	906	1484	2120	—	—	—	—	—	—	—
1850	157	236	390	588	918	1505	2149	—	—	—	—	—	—	—
1900	160	239	395	596	931	1525	2178	—	—	—	—	—	—	—
2000	164	246	406	612	955	1564	2234	—	—	—	—	—	—	—
2100	168	252	416	627	978	1603	2289	—	—	—	—	—	—	—
2200	172	258	425	642	1002	1641	2343	—	—	—	—	—	—	—
2300	176	264	435	656	1024	1678	—	—	—	—	—	—	—	—
2400	180	270	444	670	1046	1714	—	—	—	—	—	—	—	—
2500	184	275	454	684	1068	1749	—	—	—	—	—	—	—	—
2600	187	281	463	698	1089	1784	—	—	—	—	—	—	—	—
2700	191	286	471	711	1110	1818	—	—	—	—	—	—	—	—
2800	194	291	480	724	—	—	—	—	—					
2900	198	296	488	737	—	—	—	—	—					
3000	201	301	497	749	—	—	—	—	—					
3500	217	325	537	809	—	—	—	—	—					
3700	223	334	552	832	—	—	—	—	—					
4000	232	348	574	—	—	—	—	—	—					
4500	246	369	609	—	—	—	—	—	—					
5000	260	389	641	—	—	—	—	—	—					
5500	272	408	—	—	—	—	—	—	—					
6000	284	426	—	—	—	—	—	—	—	—	—	—	—	—

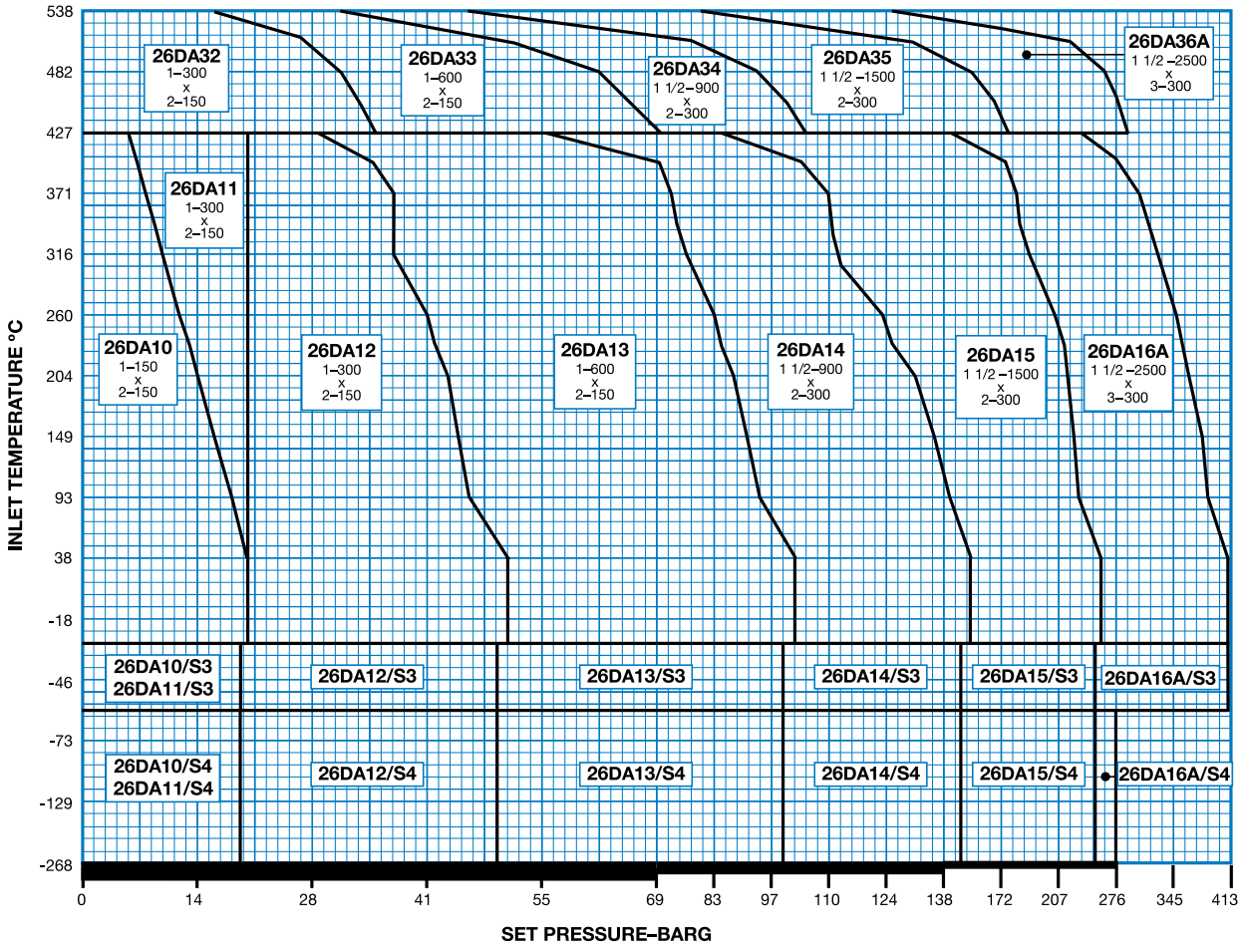
General Notes:

1. Capacities at 30 PSIG and below are based on 3 PSI overpressure.
2. For sizing purposes the effective coefficient of discharge K_d for liquids is 0.64 when sizing using the API effective areas. When sizing using the actual areas, the coefficient of discharge K for water is 0.576.

D Orifice

API Area: 71 sq. mm
Actual Area: 97 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26DA10	26DB10	1 x 2	150#	150#	—	—	19.6	12.7	5.5	—	19.6	15.8	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26DA11	26DB11	1 x 2	300#	150#	—	—	19.6	19.6	19.6	—	19.6	15.8			
26DA12	26DB12	1 x 2	300#	150#	—	—	51.0	42.4	28.2	—	19.6	15.8			
26DA13	26DB13	1 x 2	600#	150#	—	—	102	85.1	56.8	—	19.6	15.8			
26DA14	—	1 1/2 x 2	900#	300#	—	—	153	127	85.1	—	41.3	34.5			
26DA15	—	1 1/2 x 2	1500#	300#	—	—	255	212	142	—	41.3	34.5			
26DA16A	—	1 1/2 x 3	2500#	300#	—	—	413	354	236	—	51	34.5			
26DA32	26DB32	1 x 2	300#	150#	—	—	—	—	35.1	15.5	19.6	15.8	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26DA33	26DB33	1 x 2	600#	150#	—	—	—	—	69.9	30.6	19.6	15.8			
26DA34	—	1 1/2 x 2	900#	300#	—	—	—	—	105	46.2	41.3	34.5			
26DA35	—	1 1/2 x 2	1500#	300#	—	—	—	—	175	76.8	41.3	34.5			
26DA36A	—	1 1/2 x 3	2500#	300#	—	—	—	—	291	128	51	34.5			
26DA10/S3	26DB10/S3	1 x 2	150#	150#	—	18.9	—	—	—	—	18.9	15.8	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-30°C to -59°C
26DA11/S3	26DB11/S3	1 x 2	300#	150#	—	18.9	—	—	—	—	18.9	15.8			
26DA12/S3	26DB12/S3	1 x 2	300#	150#	—	49.6	—	—	—	—	18.9	15.8			
26DA13/S3	26DB13/S3	1 x 2	600#	150#	—	99.2	—	—	—	—	18.9	15.8			
26DA14/S3	—	1 1/2 x 2	900#	300#	—	149	—	—	—	—	41.3	34.5			
26DA15/S3	—	1 1/2 x 2	1500#	300#	—	248	—	—	—	—	41.3	34.5			
26DA16A/S3	—	1 1/2 x 3	2500#	300#	—	413	—	—	—	—	49.6	34.5			
26DA10/S4	26DB10/S4	1 x 2	150#	150#	18.9	—	—	—	—	—	18.9	15.8	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26DA11/S4	26DB11/S4	1 x 2	300#	150#	18.9	—	—	—	—	—	18.9	15.8			
26DA12/S4	26DB12/S4	1 x 2	300#	150#	49.6	—	—	—	—	—	18.9	15.8			
26DA13/S4	26DB13/S4	1 x 2	600#	150#	99.2	—	—	—	—	—	18.9	15.8			
26DA14/S4	—	1 1/2 x 2	900#	300#	149	—	—	—	—	—	41.3	34.5			
26DA15/S4	—	1 1/2 x 2	1500#	300#	248	—	—	—	—	—	41.3	34.5			
26DA16A/S4	—	1 1/2 x 3	2500#	300#	276	—	—	—	—	—	49.6	34.5			



Selection Chart

Notes:

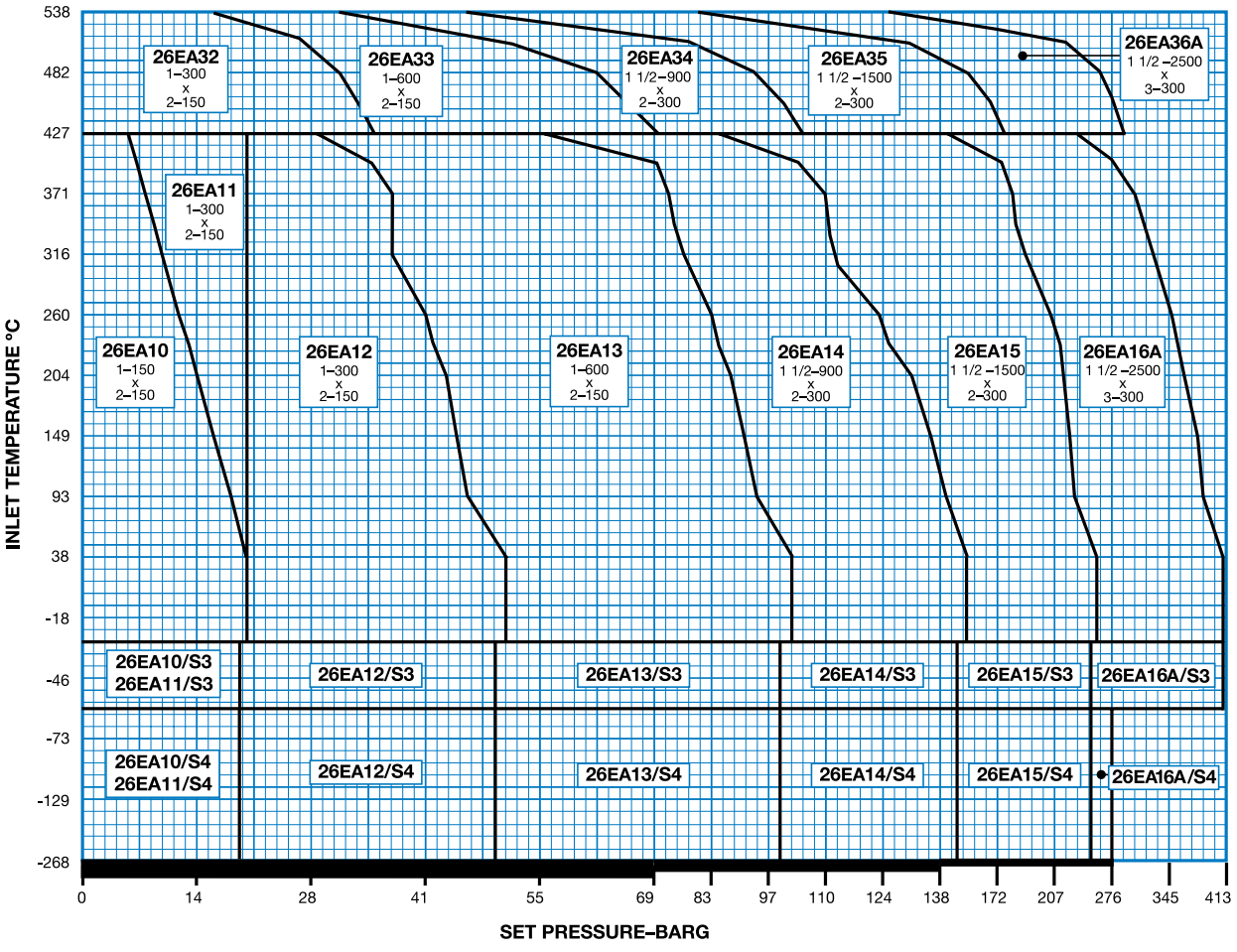
1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

E Orifice

API Area: 126 sq. mm
Actual Area: 145 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26EA10	26EB10	1 x 2	150#	150#	—	—	19.6	12.7	5.5	—	19.6	15.8	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26EA11	26EB11	1 x 2	300#	150#	—	—	19.6	19.6	19.6	—	19.6	15.8			
26EA12	26EB12	1 x 2	300#	150#	—	—	51.0	42.4	28.2	—	19.6	15.8			
26EA13	26EB13	1 x 2	600#	150#	—	—	102	85.1	56.8	—	19.6	15.8			
26EA14	—	1 1/2 x 2	900#	300#	—	—	153	127	85.1	—	41.3	34.5			
26EA15	—	1 1/2 x 2	1500#	300#	—	—	255	212	142	—	41.3	34.5			
26EA16A	—	1 1/2 x 3	2500#	300#	—	—	413	354	236	—	51	34.5			
26EA32	26EB32	1 x 2	300#	150#	—	—	—	—	35.1	15.5	19.6	15.8	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26EA33	26EB33	1 x 2	600#	150#	—	—	—	—	69.9	30.6	19.6	15.8			
26EA34	26EB34*	1 1/2 x 2	900#	300#	—	—	—	—	105	46.2	41.3	34.5			
26EA35	26EB35*	1 1/2 x 2	1500#	300#	—	—	—	—	175	76.8	41.3	34.5			
26EA36A	26EB36A*	1 1/2 x 3	2500#	300#	—	—	—	—	291	128	51	34.5			
26EA10/S3	26EB10/S3	1 x 2	150#	150#	—	18.9	—	—	—	—	18.9	15.8	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-30°C to -59°C
26EA11/S3	26EB11/S3	1 x 2	300#	150#	—	18.9	—	—	—	—	18.9	15.8			
26EA12/S3	26EB12/S3	1 x 2	300#	150#	—	49.6	—	—	—	—	18.9	15.8			
26EA13/S3	26EB13/S3	1 x 2	600#	150#	—	99.2	—	—	—	—	18.9	15.8			
26EA14/S3	—	1 1/2 x 2	900#	300#	—	149	—	—	—	—	41.3	34.5			
26EA15/S3	—	1 1/2 x 2	1500#	300#	—	248	—	—	—	—	41.3	34.5			
26EA16A/S3	—	1 1/2 x 3	2500#	300#	—	413	—	—	—	—	49.6	34.5			
26EA10/S4	26EB10/S4	1 x 2	150#	150#	18.9	—	—	—	—	—	18.9	15.8	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26EA11/S4	26EB11/S4	1 x 2	300#	150#	18.9	—	—	—	—	—	18.9	15.8			
26EA12/S4	26EB12/S4	1 x 2	300#	150#	49.6	—	—	—	—	—	18.9	15.8			
26EA13/S4	26EB13/S4	1 x 2	600#	150#	99.2	—	—	—	—	—	18.9	15.8			
26EA14/S4	—	1 1/2 x 2	900#	300#	149	—	—	—	—	—	41.3	34.5			
26EA15/S4	—	1 1/2 x 2	1500#	300#	248	—	—	—	—	—	41.3	34.5			
26EA16A/S4	—	1 1/2 x 3	2500#	300#	276	—	—	—	—	—	49.6	34.5			

Selection Chart



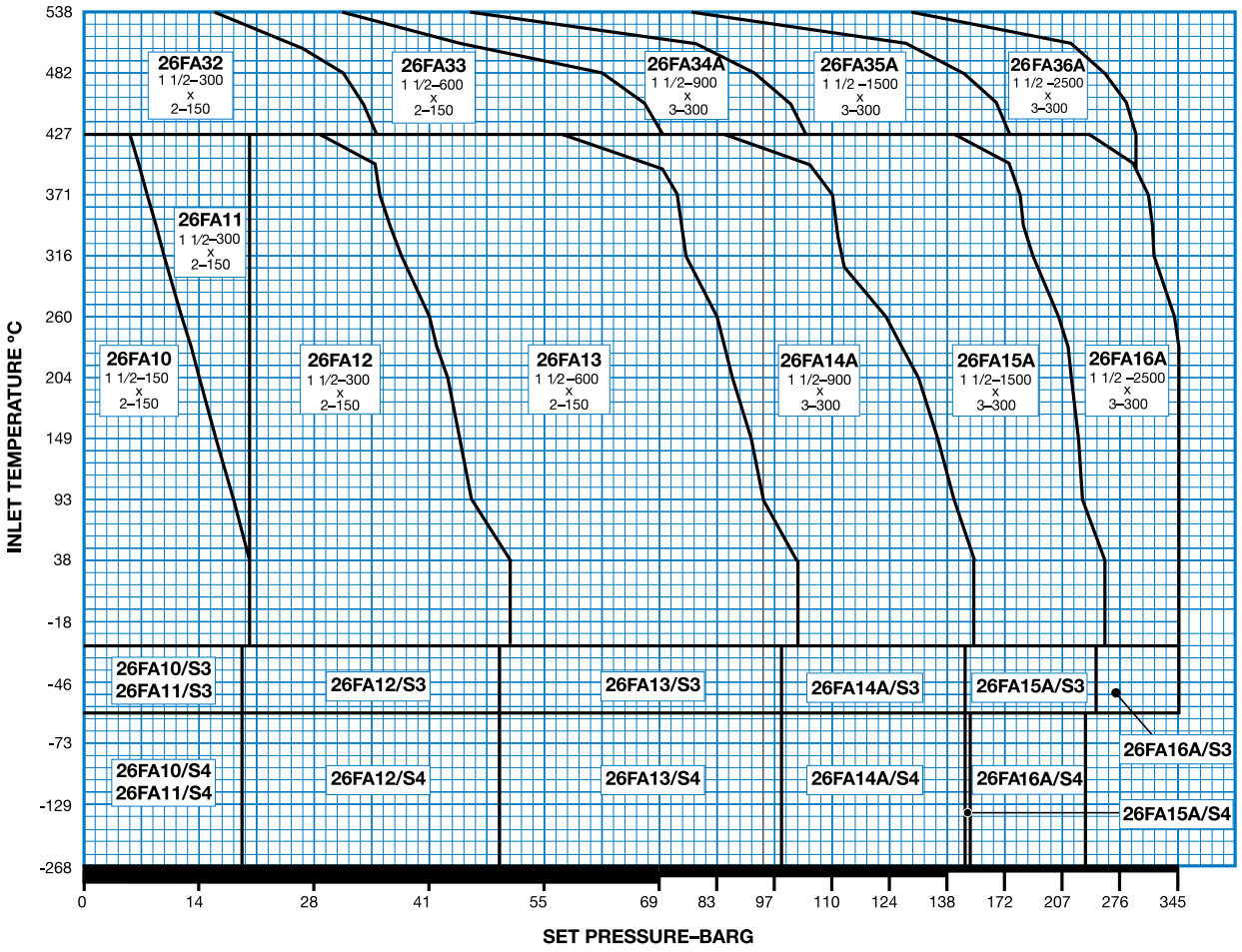
Notes:

1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

F Orifice

API Area: 198 sq. mm
Actual Area: 239 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26FA10	26FB10	1 1/2 x 2	150#	150#	—	—	19.6	12.7	5.5	—	19.6	15.8	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26FA11	26FB11	1 1/2 x 2	300#	150#	—	—	19.6	19.6	19.6	—	19.6	15.8			
26FA12	26FB12	1 1/2 x 2	300#	150#	—	—	51.0	42.4	28.2	—	19.6	15.8			
26FA13	26FB13	1 1/2 x 2	600#	150#	—	—	102	85.1	56.8	—	19.6	15.8			
26FA14A	26FB14A	1 1/2 x 3	900#	300#	—	—	153	127	85.1	—	51.0	34.5			
26FA15A	26FB15A	1 1/2 x 3	1500#	300#	—	—	255	212	142	—	51.0	34.5			
26FA16A	26FB16A	1 1/2 x 3	2500#	300#	—	—	345	345	236	—	51.0	34.5			
26FA32	26FB32	1 1/2 x 2	300#	150#	—	—	—	—	35.1	15.5	19.6	15.8	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26FA33	26FB33	1 1/2 x 2	600#	150#	—	—	—	—	69.9	30.6	19.6	15.8			
26FA34A	26FB34A	1 1/2 x 3	900#	300#	—	—	—	—	105	46.2	51.0	34.5			
26FA35A	26FB35A	1 1/2 x 3	1500#	300#	—	—	—	—	175	76.8	51.0	34.5			
26FA36A	26FB36A	1 1/2 x 3	2500#	300#	—	—	—	—	291	128	51.0	34.5			
26FA10/S3	26FB10/S3	1 1/2 x 2	150#	150#	—	18.9	—	—	—	—	18.9	15.8	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-30°C to -59°C
26FA11/S3	26FB11/S3	1 1/2 x 2	300#	150#	—	18.9	—	—	—	—	18.9	15.8			
26FA12/S3	26FB12/S3	1 1/2 x 2	300#	150#	—	49.6	—	—	—	—	18.9	15.8			
26FA13/S3	26FB13/S3	1 1/2 x 2	600#	150#	—	99.2	—	—	—	—	18.9	15.8			
26FA14A/S3	26FB14A/S3	1 1/2 x 3	900#	300#	—	149	—	—	—	—	49.6	34.5			
26FA15A/S3	26FB15A/S3	1 1/2 x 3	1500#	300#	—	248	—	—	—	—	49.6	34.5			
26FA16A/S3	26FB16A/S3	1 1/2 x 3	2500#	300#	—	345	—	—	—	—	49.6	34.5			
26FA10/S4	26FB10/S4	1 1/2 x 2	150#	150#	18.9	—	—	—	—	—	18.9	15.8	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26FA11/S4	26FB11/S4	1 1/2 x 2	300#	150#	18.9	—	—	—	—	—	18.9	15.8			
26FA12/S4	26FB12/S4	1 1/2 x 2	300#	150#	49.6	—	—	—	—	—	18.9	15.8			
26FA13/S4	26FB13/S4	1 1/2 x 2	600#	150#	99.2	—	—	—	—	—	18.9	15.8			
26FA14A/S4	26FB14A/S4	1 1/2 x 3	900#	300#	149	—	—	—	—	—	49.6	34.5			
26FA15A/S4	26FB15A/S4	1 1/2 x 3	1500#	300#	152	—	—	—	—	—	49.6	34.5			
26FA16A/S4	26FB16A/S4	1 1/2 x 3	2500#	300#	234	—	—	—	—	—	49.6	34.5			



Selection Chart

Notes:

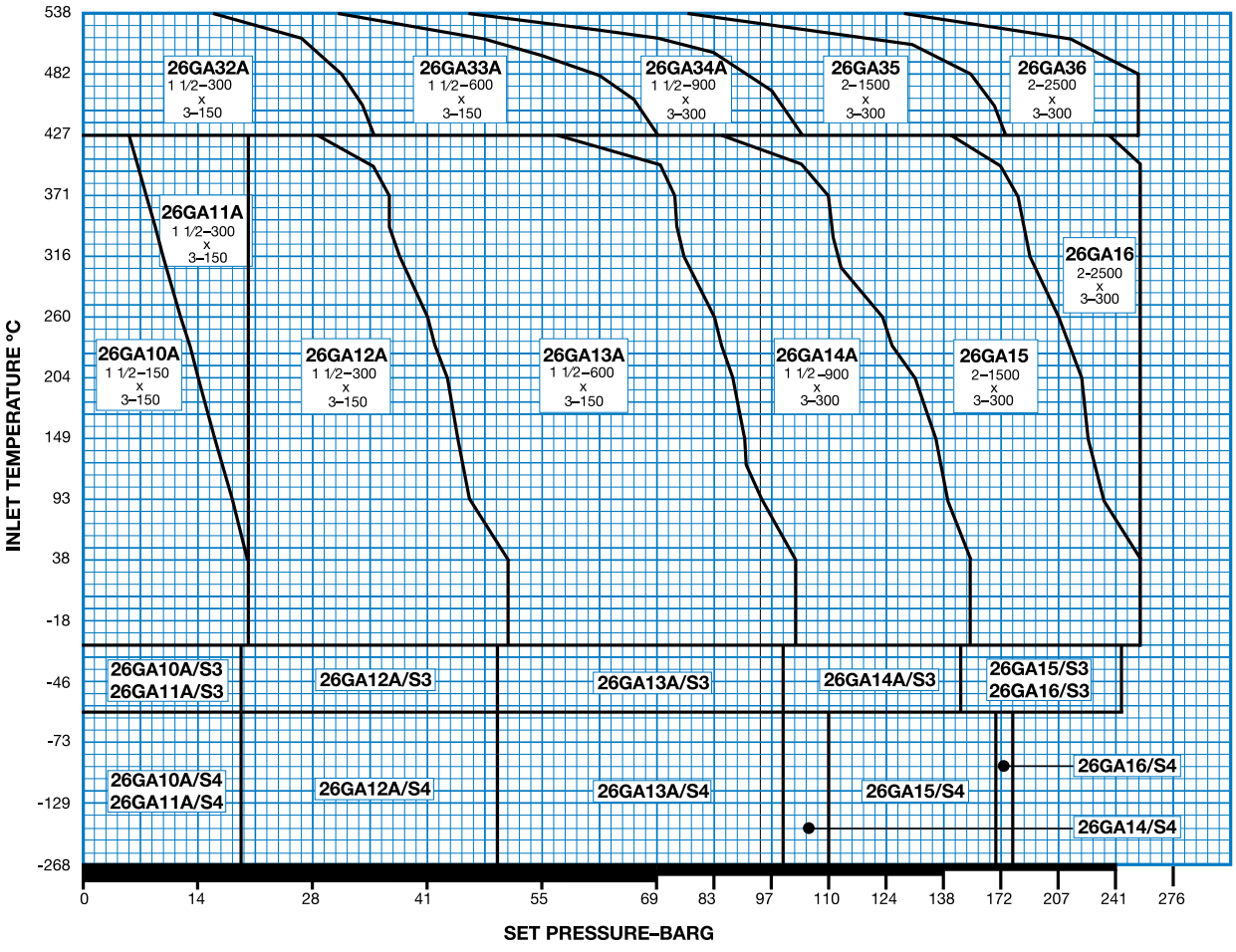
1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

G Orifice

API Area: 325 sq. mm
Actual Area: 361 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26GA10A	26GB10A	1 1/2 x 3	150#	150#	—	—	19.6	12.7	5.5	—	19.6	15.8			
26GA11A	26GB11A	1 1/2 x 3	300#	150#	—	—	19.6	19.6	19.6	—	19.6	15.8			
26GA12A	26GB12A	1 1/2 x 3	300#	150#	—	—	51.0	42.4	28.2	—	19.6	15.8	CARBON	CHROME	-29°C
26GA13A	26GB13A	1 1/2 x 3	600#	150#	—	—	102	85.1	56.8	—	19.6	15.8	STEEL	ALLOY	to
26GA14A	26GB14A	1 1/2 x 3	900#	300#	—	—	153	127	85.1	—	51.0	32.4			427°C
26GA15	26GB15	2 x 3	1500#	300#	—	—	255	212	142	—	51.0	32.4			
26GA16	26GB16	2 x 3	2500#	300#	—	—	255	255	236	—	51.0	32.4			
26GA32A	26GB32A	1 1/2 x 3	300#	150#	—	—	—	—	35.1	15.5	19.6	15.8			
26GA33A	26GB33A	1 1/2 x 3	600#	150#	—	—	—	—	69.9	30.6	19.6	15.8	CHROME	HIGH	428°C
26GA34A	26GB34A	1 1/2 x 3	900#	300#	—	—	—	—	105	46.2	51.0	32.4	MOLY	TEMP.	to
26GA35	26GB35	2 x 3	1500#	300#	—	—	—	—	175	76.8	51.0	32.4	STEEL	ALLOY	538°C
26GA36	26GB36	2 x 3	2500#	300#	—	—	—	—	255	128	51.0	32.4			
26GA10A/S3	26GB10A/S3	1 1/2 x 3	150#	150#	—	18.9	—	—	—	—	18.9	15.8			
26GA11A/S3	26GB11A/S3	1 1/2 x 3	300#	150#	—	18.9	—	—	—	—	18.9	15.8			
26GA12A/S3	26GB12A/S3	1 1/2 x 3	300#	150#	—	49.6	—	—	—	—	18.9	15.8	316	CHROME ALLOY NICKEL PLATED	-30°C
26GA13A/S3	26GB13A/S3	1 1/2 x 3	600#	150#	—	99.2	—	—	—	—	18.9	15.8	ST. ST.		to
26GA14A/S3	26GB14A/S3	1 1/2 x 3	900#	300#	—	149	—	—	—	—	49.6	32.4			-59°C
26GA15/S3	26GB15/S3	2 x 3	1500#	300#	—	248	—	—	—	—	49.6	32.4			
26GA16/S3	26GB16/S3	2 x 3	2500#	300#	—	248	—	—	—	—	49.6	32.4			
26GA10A/S4	26GB10A/S4	1 1/2 x 3	150#	150#	18.9	—	—	—	—	—	18.9	15.8			
26GA11A/S4	26GB11A/S4	1 1/2 x 3	300#	150#	18.9	—	—	—	—	—	18.9	15.8			
26GA12A/S4	26GB12A/S4	1 1/2 x 3	300#	150#	49.6	—	—	—	—	—	18.9	15.8	316	316	-60°C
26GA13A/S4	26GB13A/S4	1 1/2 x 3	600#	150#	99.2	—	—	—	—	—	18.9	15.8	ST. ST.	ST. ST.	to
26GA14A/S4	26GB14A/S4	1 1/2 x 3	900#	300#	110	—	—	—	—	—	49.6	32.4			-268°C
26GA15/S4	26GB15/S4	2 x 3	1500#	300#	169	—	—	—	—	—	49.6	32.4			
26GA16/S4	26GB16/S4	2 x 3	2500#	300#	179	—	—	—	—	—	49.6	32.4			

Selection Chart



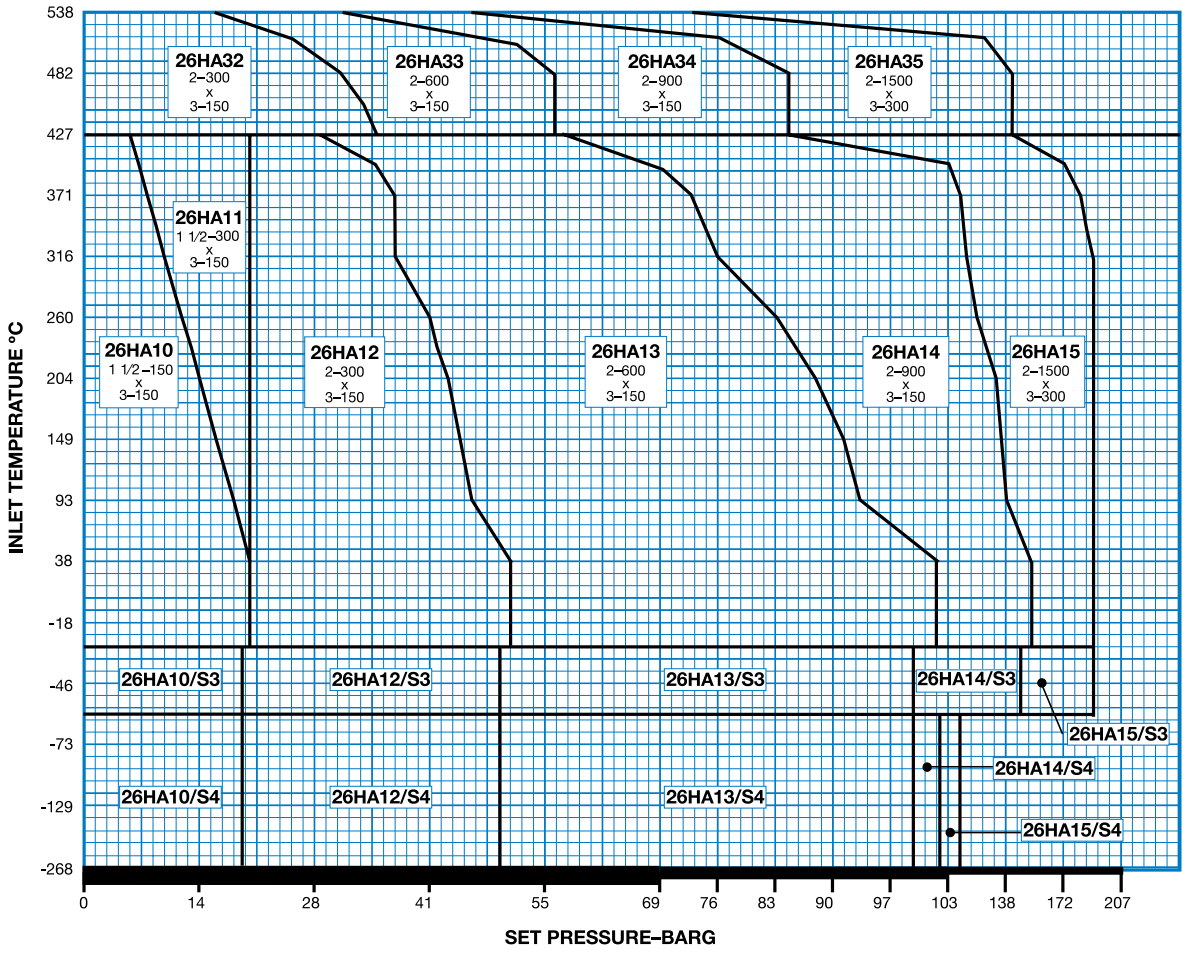
Notes:

1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

H Orifice

API Area: 506 sq. mm
Actual Area: 563 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26HA10	26HB10	1 1/2 x 3	150#	150#	—	—	19.6	12.7	5.5	—	19.6	15.8			
26HA11	26HB11	1 1/2 x 3	300#	150#	—	—	19.6	19.6	19.6	—	19.6	15.8			
26HA12	26HB12	2 x 3	300#	150#	—	—	51.0	42.4	28.2	—	19.6	15.8	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26HA13	26HB13	2 x 3	600#	150#	—	—	102	85.1	56.8	—	19.6	15.8			
26HA14	26HB14	2 x 3	900#	150#	—	—	153	127	85.1	—	19.6	15.8			
26HA15	26HB15	2 x 3	1500#	300#	—	—	189	189	142	—	51.0	28.6			
26HA32	26HB32	2 x 3	300#	150#	—	—	—	—	35.1	15.5	19.6	15.8			
26HA33	26HB33	2 x 3	600#	150#	—	—	—	—	56.2	30.6	19.6	15.8	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26HA34	26HB34	2 x 3	900#	150#	—	—	—	—	84.4	46.2	19.6	15.8			
26HA35	26HB35	2 x 3	1500#	300#	—	—	—	—	141	76.8	51.0	28.6			
26HA10/S3	26HB10/S3	1 1/2 x 3	150#	150#	—	18.9	—	—	—	—	18.9	15.8			
26HA11/S3	26HB11/S3	1 1/2 x 3	300#	150#	—	18.9	—	—	—	—	18.9	15.8			
26HA12/S3	26HB12/S3	2 x 3	300#	150#	—	49.6	—	—	—	—	18.9	15.8	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-30°C to -59°C
26HA13/S3	26HB13/S3	2 x 3	600#	150#	—	99.2	—	—	—	—	18.9	15.8			
26HA14/S3	26HB14/S3	2 x 3	900#	150#	—	149	—	—	—	—	18.9	15.8			
26HA15/S3	26HB15/S3	2 x 3	1500#	300#	—	189	—	—	—	—	49.6	28.6			
26HA10/S4	26HB10/S4	1 1/2 x 3	150#	150#	18.9	—	—	—	—	—	18.9	15.8			
26HA11/S4	26HB11/S4	1 1/2 x 3	300#	150#	18.9	—	—	—	—	—	18.9	15.8			
26HA12/S4	26HB12/S4	2 x 3	300#	150#	49.6	—	—	—	—	—	18.9	15.8	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26HA13/S4	26HB13/S4	2 x 3	600#	150#	99.2	—	—	—	—	—	18.9	15.8			
26HA14/S4	26HB14/S4	2 x 3	900#	150#	102	—	—	—	—	—	18.9	15.8			
26HA15/S4	26HB15/S4	2 x 3	1500#	300#	110	—	—	—	—	—	49.6	28.6			



Selection Chart

Notes:

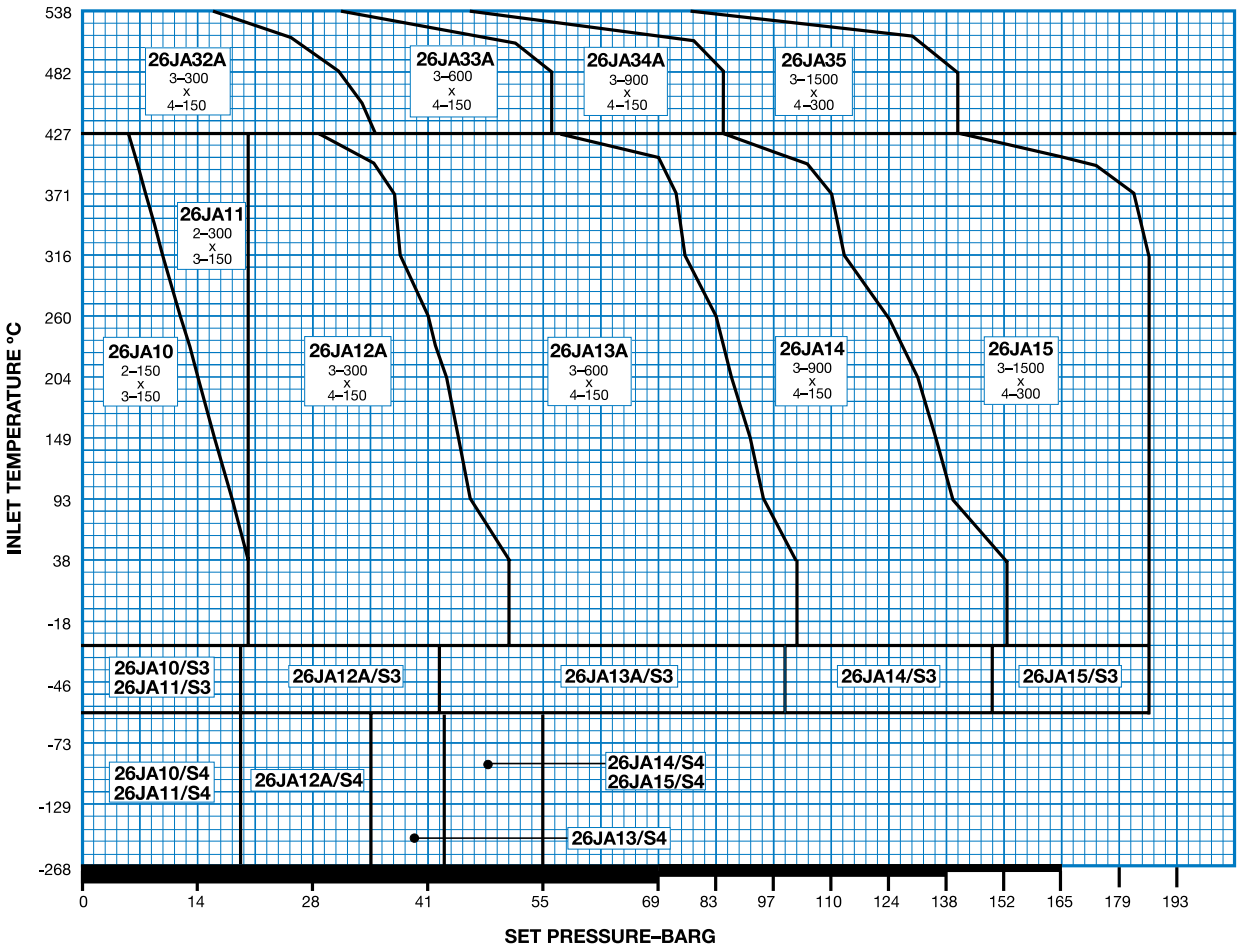
1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

J Orifice

API Area: 830 sq. mm
Actual Area: 923 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26JA10	26JB10	2 x 3	150#	150#	—	—	19.6	12.7	5.5	—	19.6	15.8			
26JA11	26JB11	2 x 3	300#	150#	—	—	19.6	19.6	19.6	—	19.6	15.8			
26JA12A	26JB12A	3 x 4	300#	150#	—	—	51.0	42.4	28.2	—	19.6	15.8	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26JA13A	26JB13A	3 x 4	600#	150#	—	—	102	85.1	56.8	—	19.6	15.8			
26JA14	26JB14	3 x 4	900#	150#	—	—	153	127	85.1	—	19.6	15.8			
26JA15	26JB15	3 x 4	1500#	300#	—	—	186	186	142	—	41.3	15.8			
26JA32A	26JB32A	3 x 4	300#	150#	—	—	—	—	35.1	15.5	19.6	15.8			
26JA33A	26JB33A	3 x 4	600#	150#	—	—	—	—	56.2	30.6	19.6	15.8	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26JA34A	26JB34A	3 x 4	900#	150#	—	—	—	—	84.4	46.2	19.6	15.8			
26JA35	26JB35	3 x 4	1500#	300#	—	—	—	—	141	76.8	41.3	15.8			
26JA10/S3	26JB10/S3	2 x 3	150#	150#	—	18.9	—	—	—	—	18.9	15.8			
26JA11/S3	26JB11/S3	2 x 3	300#	150#	—	18.9	—	—	—	—	18.9	15.8			
26JA12A/S3	26JB12A/S3	3 x 4	300#	150#	—	49.6	—	—	—	—	18.9	15.8	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-30°C to -59°C
26JA13A/S3	26JB13A/S3	3 x 4	600#	150#	—	99.2	—	—	—	—	18.9	15.8			
26JA14/S3	26JB14/S3	3 x 4	900#	150#	—	149	—	—	—	—	18.9	15.8			
26JA15/S3	26JB15/S3	3 x 4	1500#	300#	—	186	—	—	—	—	41.3	15.8			
26JA10/S4	26JB10/S4	2 x 3	150#	150#	18.9	—	—	—	—	—	18.9	15.8			
26JA11/S4	26JB11/S4	2 x 3	300#	150#	18.9	—	—	—	—	—	18.9	15.8			
26JA12A/S4	26JB12A/S4	3 x 4	300#	150#	34.5	—	—	—	—	—	18.9	15.8	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26JA13A/S4	26JB13A/S4	3 x 4	600#	150#	43.1	—	—	—	—	—	18.9	15.8			
26JA14/S4	26JB14/S4	3 x 4	900#	150#	55	—	—	—	—	—	18.9	15.8			
26JA15/S4	26JB15/S4	3 x 4	1500#	300#	55	—	—	—	—	—	41.3	15.8			

Selection Chart



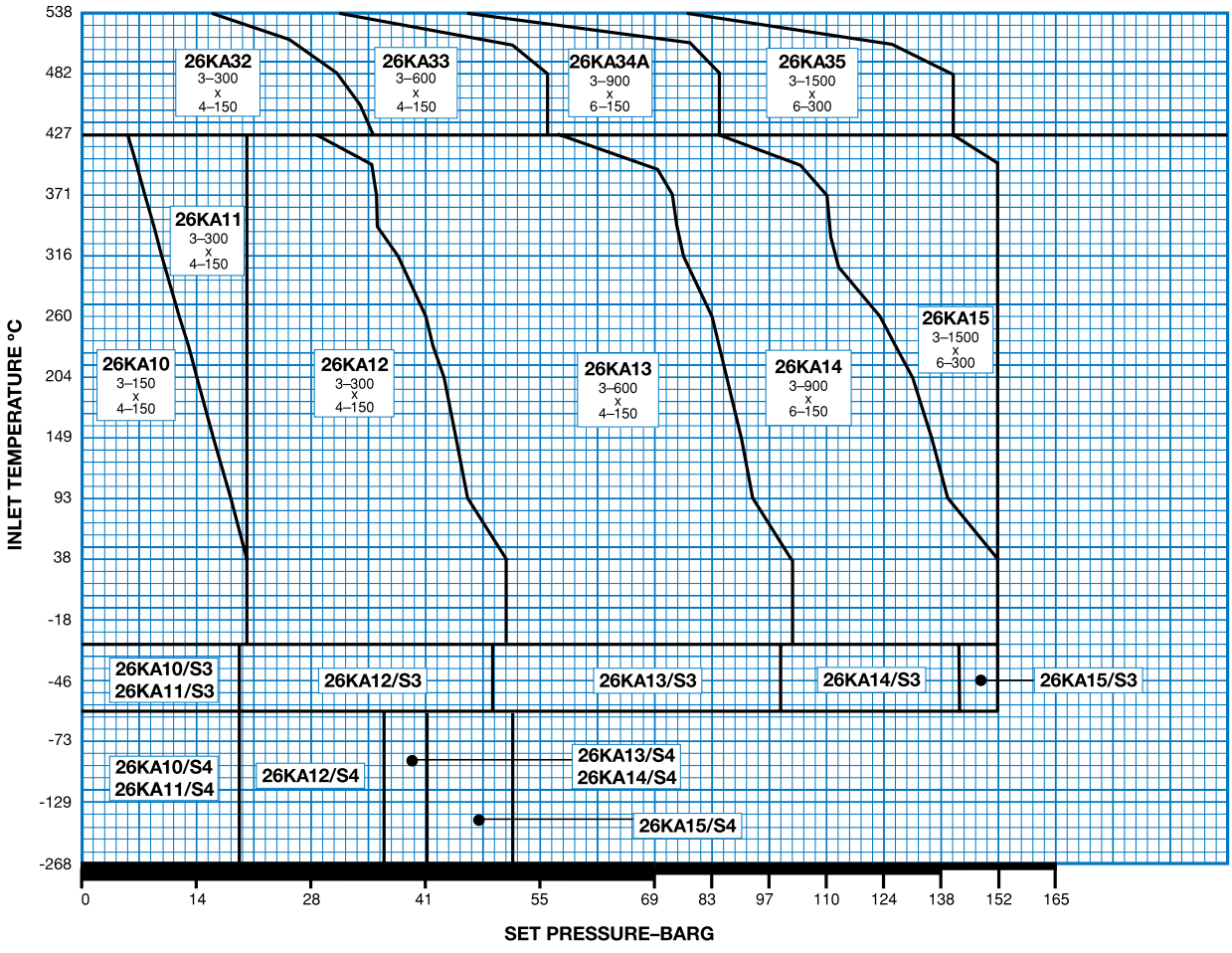
Notes:

1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

K Orifice

API Area: 1186 sq. mm
Actual Area: 1317 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26KA10	26KB10	3 x 4	150#	150#	—	—	19.6	12.7	5.5	—	19.6	10.3			
26KA11	26KB11	3 x 4	300#	150#	—	—	19.6	19.6	19.6	—	19.6	10.3			
26KA12	26KB12	3 x 4	300#	150#	—	—	51.0	42.4	28.2	—	19.6	10.3	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26KA13	26KB13	3 x 4	600#	150#	—	—	102	85.1	56.8	—	19.6	13.8			
26KA14	26KB14	3 x 6	900#	150#	—	—	153	127	85.1	—	19.6	13.8			
26KA15	26KB15	3 x 6	1500#	300#	—	—	153	153	142	—	41.3	13.8			
26KA32	26KB32	3 x 4	300#	150#	—	—	—	—	35.1	15.5	19.6	10.3			
26KA33	26KB33	3 x 4	600#	150#	—	—	—	—	56.2	30.6	19.6	13.8	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26KA34A	26KB34A	3 x 6	900#	150#	—	—	—	—	84.4	46.2	19.6	13.8			
26KA35	26KB35	3 x 6	1500#	300#	—	—	—	—	141	76.8	41.3	13.8			
26KA10/S3	26KB10/S3	3 x 4	150#	150#	—	18.9	—	—	—	—	18.9	10.3			
26KA11/S3	26KB11/S3	3 x 4	300#	150#	—	18.9	—	—	—	—	18.9	10.3		CHROME ALLOY NICKEL PLATED	
26KA12/S3	26KB12/S3	3 x 4	300#	150#	—	49.6	—	—	—	—	18.9	10.3	316 ST. ST.		-30°C to -59°C
26KA13/S3	26KB13/S3	3 x 4	600#	150#	—	99.2	—	—	—	—	18.9	13.8			
26KA14/S3	26KB14/S3	3 x 6	900#	150#	—	149	—	—	—	—	18.9	13.8			
26KA15/S3	26KB15/S3	3 x 6	1500#	300#	—	153	—	—	—	—	41.3	13.8			
26KA10/S4	26KB10/S4	3 x 4	150#	150#	18.9	—	—	—	—	—	18.9	10.3			
26KA11/S4	26KB11/S4	3 x 4	300#	150#	18.9	—	—	—	—	—	18.9	10.3			
26KA12/S4	26KB12/S4	3 x 4	300#	150#	36.2	—	—	—	—	—	18.9	10.3	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26KA13/S4	26KB13/S4	3 x 4	600#	150#	41.3	—	—	—	—	—	18.9	13.8			
26KA14/S4	26KB14/S4	3 x 6	900#	150#	41.3	—	—	—	—	—	18.9	13.8			
26KA15/S4	26KB15/S4	3 x 6	1500#	300#	51.7	—	—	—	—	—	41.3	13.8			



Selection Chart

Notes:

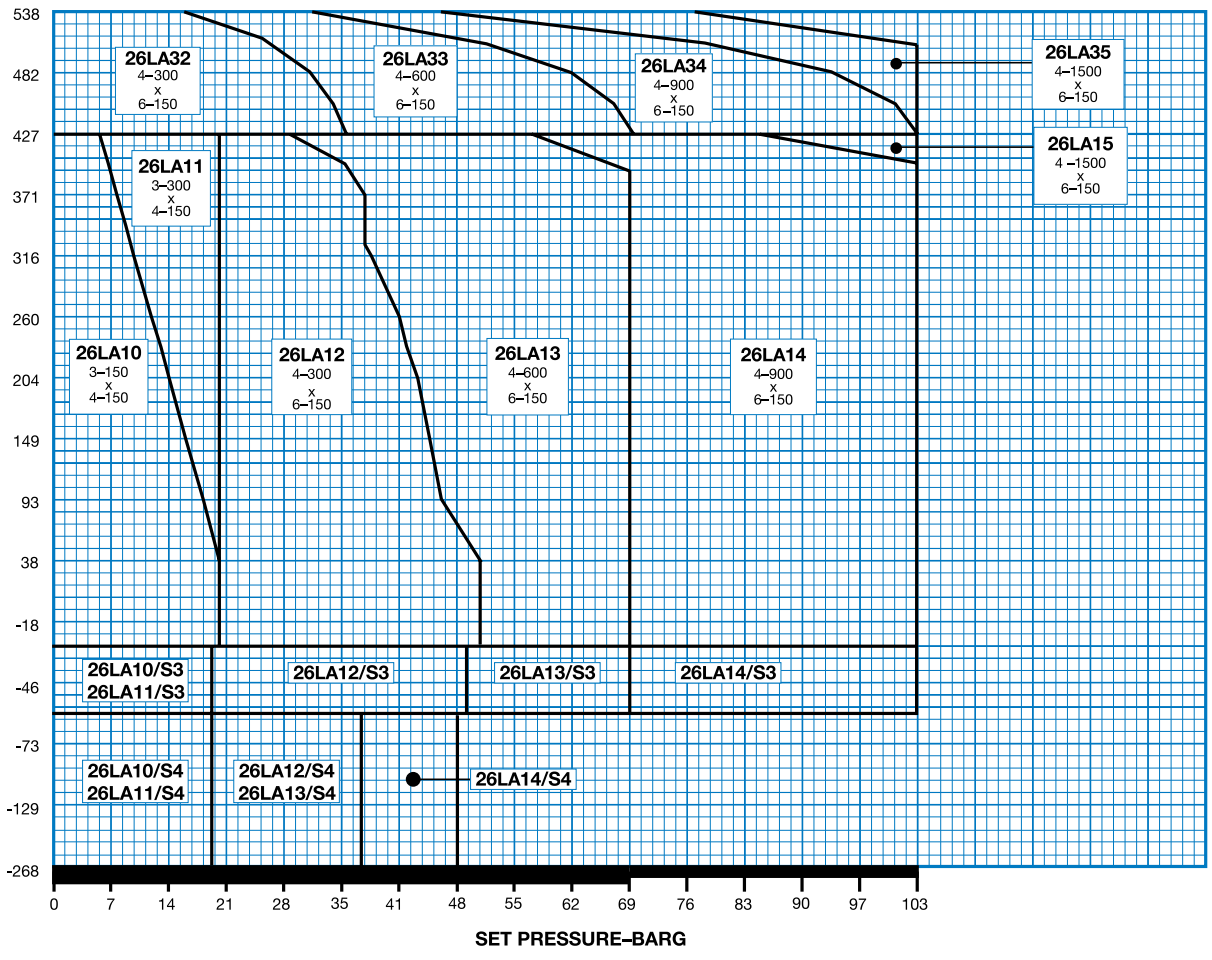
1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

L Orifice

API Area: 1841 sq. mm
Actual Area: 2045 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26LA10	26LB10	3 x 4	150#	150#	—	—	19.6	12.7	5.5	—	19.6	6.9	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26LA11	26LB11	3 x 4	300#	150#	—	—	19.6	19.6	19.6	—	19.6	6.9			
26LA12	26LB12	4 x 6	300#	150#	—	—	51.0	42.4	28.2	—	19.6	11.7			
26LA13	26LB13	4 x 6	600#	150#	—	—	68.9	68.9	56.8	—	19.6	11.7			
26LA14	26LB14	4 x 6	900#	150#	—	—	103	103	85.1	—	19.6	11.7			
26LA15	26LB15	4 x 6	1500#	150#	—	—	103	103	103	—	19.6	11.7			
26LA32	26LB32	4 x 6	300#	150#	—	—	—	—	35.1	15.5	19.6	11.7	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26LA33	26LB33	4 x 6	600#	150#	—	—	—	—	68.9	30.6	19.6	11.7			
26LA34	26LB34	4 x 6	900#	150#	—	—	—	—	103	46.2	19.6	11.7			
26LA35	26LB35	4 x 6	1500#	150#	—	—	—	—	103	76.8	19.6	11.7			
26LA10/S3	26LB10/S3	3 x 4	150#	150#	—	18.9	—	—	—	—	18.9	6.9	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-30°C to -59°C
26LA11/S3	26LB11/S3	3 x 4	300#	150#	—	18.9	—	—	—	—	18.9	6.9			
26LA12/S3	26LB12/S3	4 x 6	300#	150#	—	49.6	—	—	—	—	18.9	11.7			
26LA13/S3	26LB13/S3	4 x 6	600#	150#	—	68.9	—	—	—	—	18.9	11.7			
26LA14/S3	26LB14/S3	4 x 6	900#	150#	—	103	—	—	—	—	18.9	11.7			
26LA10/S4	26LB10/S4	3 x 4	150#	150#	18.9	—	—	—	—	—	18.9	6.9	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26LA11/S4	26LB11/S4	3 x 4	300#	150#	18.9	—	—	—	—	—	18.9	6.9			
26LA12/S4	26LB12/S4	4 x 6	300#	150#	36.9	—	—	—	—	—	18.9	11.7			
26LA13/S4	26LB13/S4	4 x 6	600#	150#	36.9	—	—	—	—	—	18.9	11.7			
26LA14/S4	26LB14/S4	4 x 6	900#	150#	48.2	—	—	—	—	—	18.9	11.7			

Selection Chart



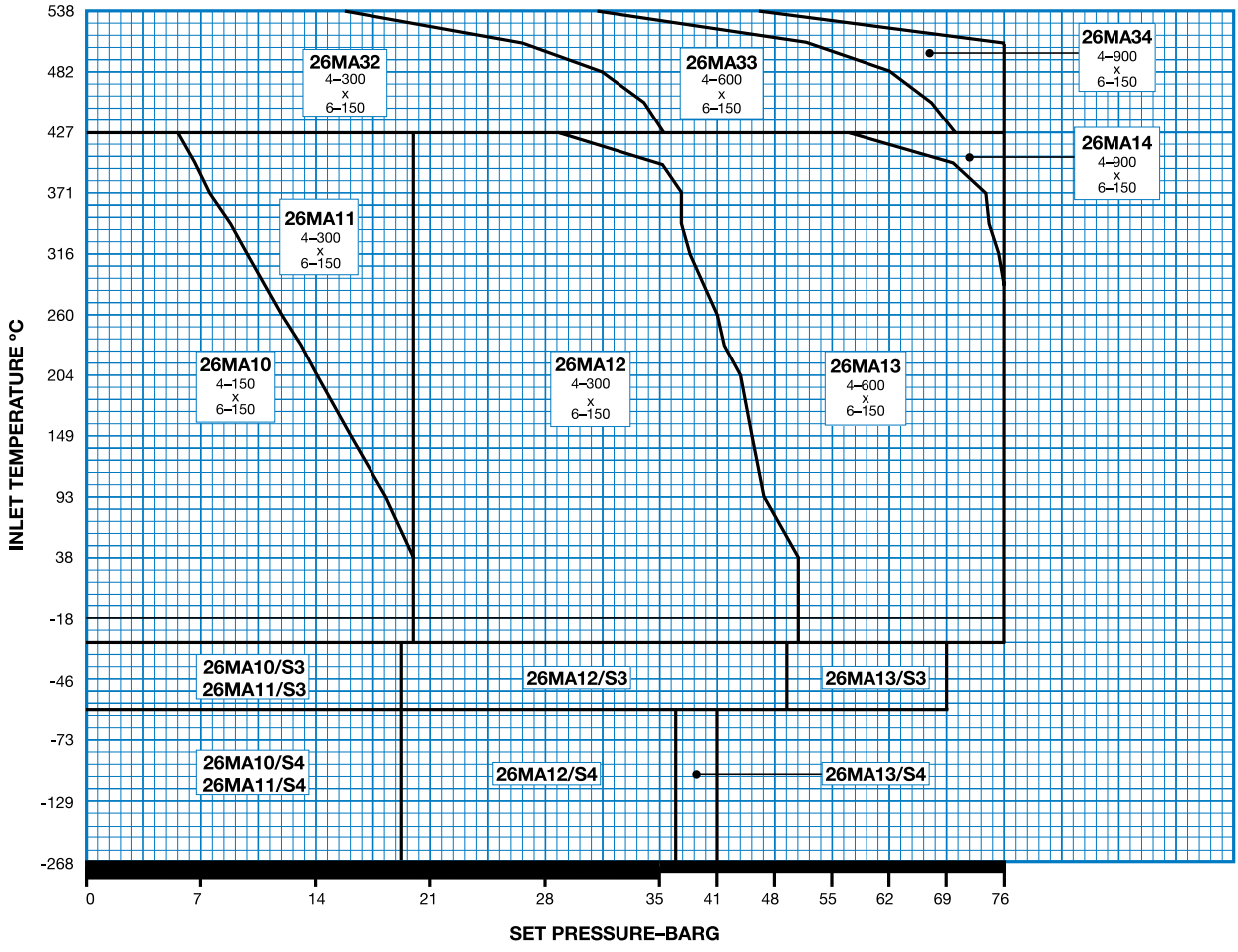
Notes:

1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

M Orifice

API Area: 2323 sq. mm
Actual Area: 2581 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26MA10	26MB10	4 x 6	150#	150#	—	—	19.6	12.7	5.5	—	19.6	5.5	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26MA11	26MB11	4 x 6	300#	150#	—	—	19.6	19.6	19.6	—	19.6	5.5			
26MA12	26MB12	4 x 6	300#	150#	—	—	51.0	42.4	28.2	—	19.6	11.0			
26MA13	26MB13	4 x 6	600#	150#	—	—	75.8	75.8	56.8	—	19.6	11.0			
26MA14	26MB14	4 x 6	900#	150#	—	—	75.8	75.8	75.8	—	19.6	11.0			
26MA32	26MB32	4 x 6	300#	150#	—	—	—	—	35.1	15.5	19.6	11.0	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26MA33	26MB33	4 x 6	600#	150#	—	—	—	—	69.9	30.6	19.6	11.0			
26MA34	26MB34	4 x 6	900#	150#	—	—	—	—	75.8	46.2	19.6	11.0			
26MA10/S3	26MB10/S3	4 x 6	150#	150#	—	18.9	—	—	—	—	18.9	5.5	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-30°C to -59°C
26MA11/S3	26MB11/S3	4 x 6	300#	150#	—	18.9	—	—	—	—	18.9	5.5			
26MA12/S3	26MB12/S3	4 x 6	300#	150#	—	49.6	—	—	—	—	18.9	11.0			
26MA13/S3	26MB13/S3	4 x 6	600#	150#	—	68.9	—	—	—	—	18.9	11.0			
26MA10/S4	26MB10/S4	4 x 6	150#	150#	18.9	—	—	—	—	—	18.9	5.5	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26MA11/S4	26MB11/S4	4 x 6	300#	150#	18.9	—	—	—	—	—	18.9	5.5			
26MA12/S4	26MB12/S4	4 x 6	300#	150#	36.2	—	—	—	—	—	18.9	11.0			
26MA13/S4	26MB13/S4	4 x 6	600#	150#	41.3	—	—	—	—	—	18.9	11.0			



Selection Chart

Notes:

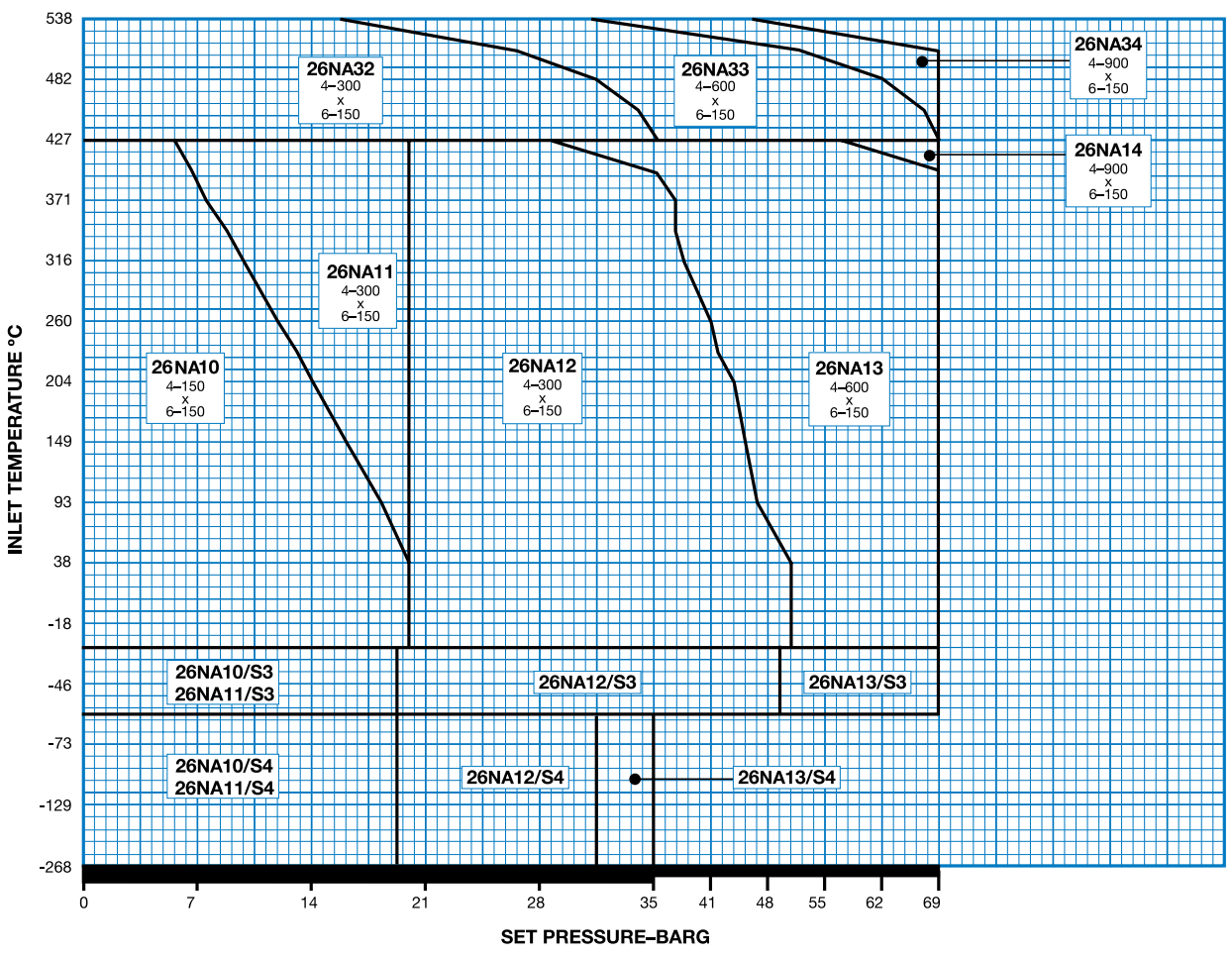
1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

N Orifice

API Area: 2800 sq. mm
Actual Area: 3111 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26NA10	26NB10	4 x 6	150#	150#	—	—	19.6	12.7	5.5	—	19.6	5.5	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26NA11	26NB11	4 x 6	300#	150#	—	—	19.6	19.6	19.6	—	19.6	5.5			
26NA12	26NB12	4 x 6	300#	150#	—	—	51.0	42.4	28.2	—	19.6	11.0			
26NA13	26NB13	4 x 6	600#	150#	—	—	68.9	68.9	56.8	—	19.6	11.0			
26NA14	26NB14	4 x 6	900#	150#	—	—	68.9	68.9	68.9	—	19.6	11.0			
26NA32	26NB32	4 x 6	300#	150#	—	—	—	—	35.1	15.5	19.6	11.0	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26NA33	26NB33	4 x 6	600#	150#	—	—	—	—	68.9	30.6	19.6	11.0			
26NA34	26NB34	4 x 6	900#	150#	—	—	—	—	68.9	46.2	19.6	11.0			
26NA10/S3	26NB10/S3	4 x 6	150#	150#	—	18.9	—	—	—	—	18.9	5.5	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-30°C to -59°C
26NA11/S3	26NB11/S3	4 x 6	300#	150#	—	18.9	—	—	—	—	18.9	5.5			
26NA12/S3	26NB12/S3	4 x 6	300#	150#	—	49.6	—	—	—	—	18.9	11.0			
26NA13/S3	26NB13/S3	4 x 6	600#	150#	—	68.9	—	—	—	—	18.9	11.0			
26NA10/S4	26NB10/S4	4 x 6	150#	150#	18.9	—	—	—	—	—	18.9	5.5	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26NA11/S4	26NB11/S4	4 x 6	300#	150#	18.9	—	—	—	—	—	18.9	5.5			
26NA12/S4	26NB12/S4	4 x 6	300#	150#	31.0	—	—	—	—	—	18.9	11.0			
26NA13/S4	26NB13/S4	4 x 6	600#	150#	34.5	—	—	—	—	—	18.9	11.0			

Selection Chart



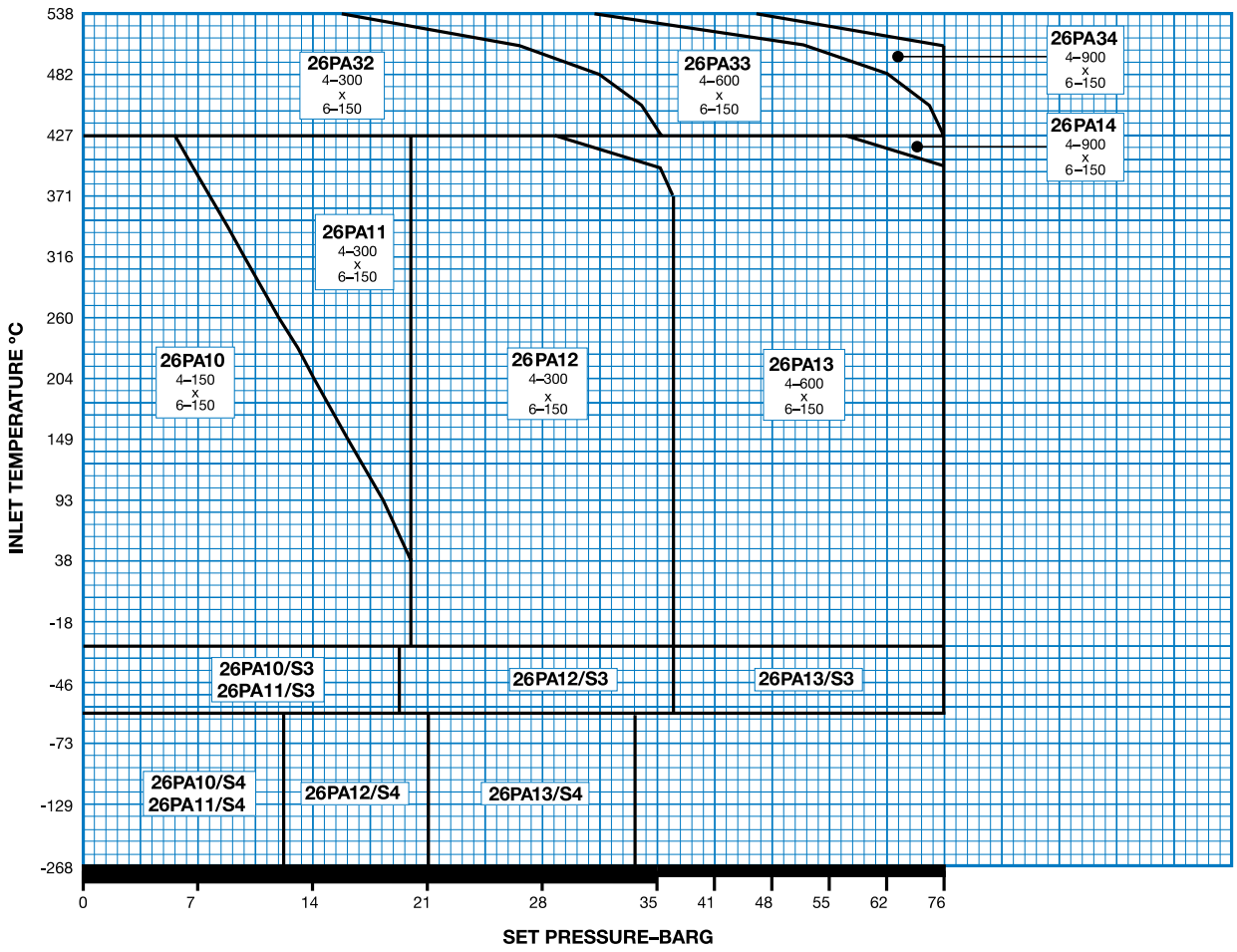
Notes:

1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

P Orifice

API Area: 4116 sq. mm
Actual Area: 4572 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26PA10	26PB10	4 x 6	150#	150#	—	—	19.6	12.7	5.5	—	19.6	5.5	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26PA11	26PB11	4 x 6	300#	150#	—	—	19.6	19.6	19.6	—	19.6	5.5			
26PA12	26PB12	4 x 6	300#	150#	—	—	36.2	36.2	28.2	—	19.6	10.3			
26PA13	26PB13	4 x 6	600#	150#	—	—	68.9	68.9	56.8	—	19.6	10.3			
26PA14	26PB14	4 x 6	900#	150#	—	—	68.9	68.9	68.9	—	19.6	10.3			
26PA32	26PB32	4 x 6	300#	150#	—	—	—	—	35.1	15.5	19.6	10.3	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26PA33	26PB33	4 x 6	600#	150#	—	—	—	—	68.9	30.6	19.6	10.3			
26PA34	26PB34	4 x 6	900#	150#	—	—	—	—	68.9	46.2	19.6	10.3			
26PA10/S3	26PB10/S3	4 x 6	150#	150#	—	18.9	—	—	—	—	18.9	5.5	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-30°C to -59°C
26PA11/S3	26PB11/S3	4 x 6	300#	150#	—	18.9	—	—	—	—	18.9	5.5			
26PA12/S3	26PB12/S3	4 x 6	300#	150#	—	49.6	—	—	—	—	18.9	10.3			
26PA13/S3	26PB13/S3	4 x 6	600#	150#	—	68.9	—	—	—	—	18.9	10.3			
26PA10/S4	26PB10/S4	4 x 6	150#	150#	12.1	—	—	—	—	—	12.0	5.5	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26PA11/S4	26PB11/S4	4 x 6	300#	150#	12.1	—	—	—	—	—	12.0	5.5			
26PA12/S4	26PB12/S4	4 x 6	300#	150#	20.7	—	—	—	—	—	18.9	10.3			
26PA13/S4	26PB13/S4	4 x 6	600#	150#	33.1	—	—	—	—	—	18.9	10.3			



Selection Chart

Notes:

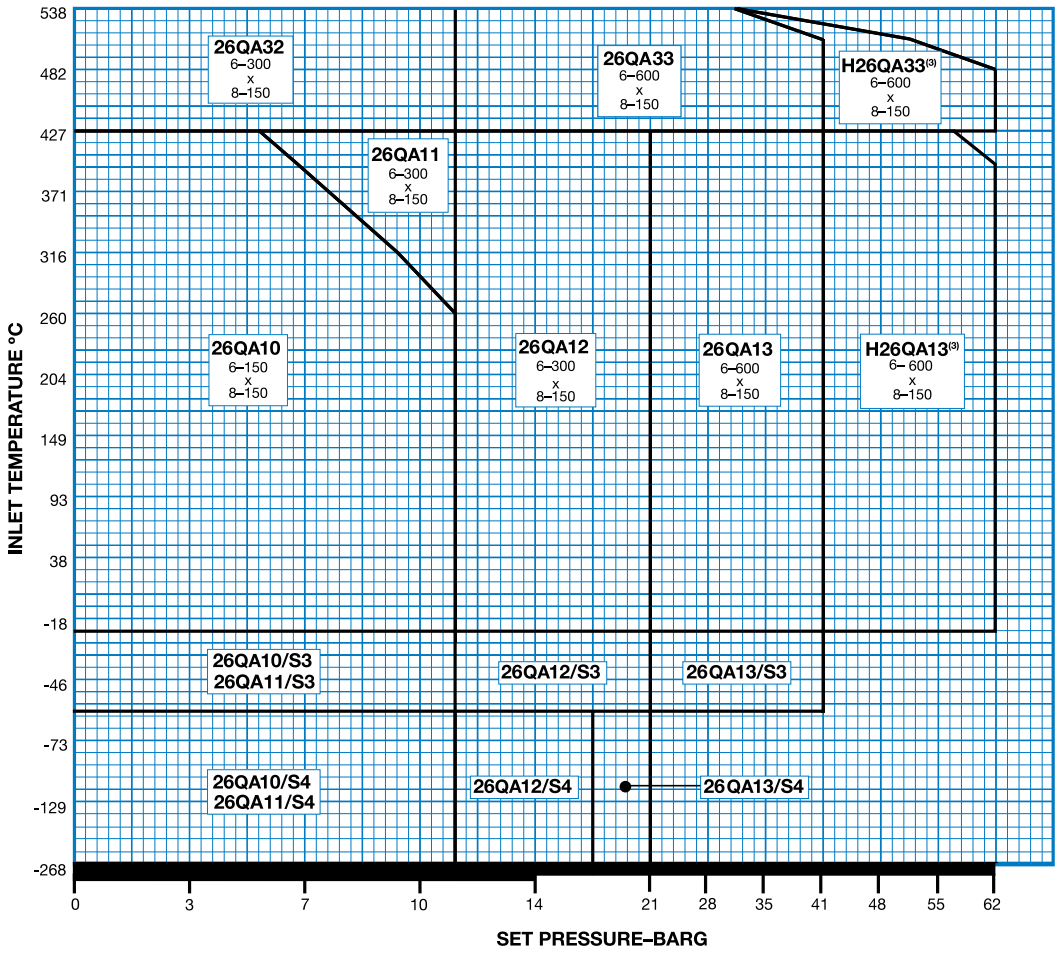
1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

Q Orifice

API Area: 7129 sq. mm
Actual Area: 7916 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26QA10	26QB10	6 x 8	150#	150#	—	—	11.4	11.4	5.5	—	7.9	4.8	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26QA11	26QB11	6 x 8	300#	150#	—	—	11.4	11.4	11.4	—	7.9	4.8			
26QA12	26QB12	6 x 8	300#	150#	—	—	20.7	20.7	20.7	—	7.9	7.9			
26QA13	26QB13	6 x 8	600#	150#	—	—	41.3	41.3	41.3	—	7.9	7.9			
H26QA13	H26QB13	6 x 8	600#	150#	—	—	62.0	62.0	56.8	—	19.6	13.8			
26QA32	26QB32	6 x 8	300#	150#	—	—	—	—	11.4	11.4	7.9	4.8	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26QA33	26QB33	6 x 8	600#	150#	—	—	—	—	41.3	30.6	7.9	4.8			
H26QA33	H26QB33	6 x 8	600#	150#	—	—	—	—	62.0	30.7	19.6	13.8			
26QA10/S3	26QB10/S3	6 x 8	150#	150#	—	11.4	—	—	—	—	7.9	4.8	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-30°C to -59°C
26QA11/S3	26QB11/S3	6 x 8	300#	150#	—	11.4	—	—	—	—	7.9	4.8			
26QA12/S3	26QB12/S3	6 x 8	300#	150#	—	20.7	—	—	—	—	7.9	7.9			
26QA13/S3	26QB13/S3	6 x 8	600#	150#	—	41.3	—	—	—	—	7.9	7.9			
26QA10/S4	26QB10/S4	6 x 8	150#	150#	11.4	—	—	—	—	—	7.9	4.8	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26QA11/S4	26QB11/S4	6 x 8	300#	150#	11.4	—	—	—	—	—	7.9	4.8			
26QA12/S4	26QB12/S4	6 x 8	300#	150#	17.2	—	—	—	—	—	7.9	7.9			
26QA13/S4	26QB13/S4	6 x 8	600#	150#	20.7	—	—	—	—	—	7.9	7.9			

Selection Chart



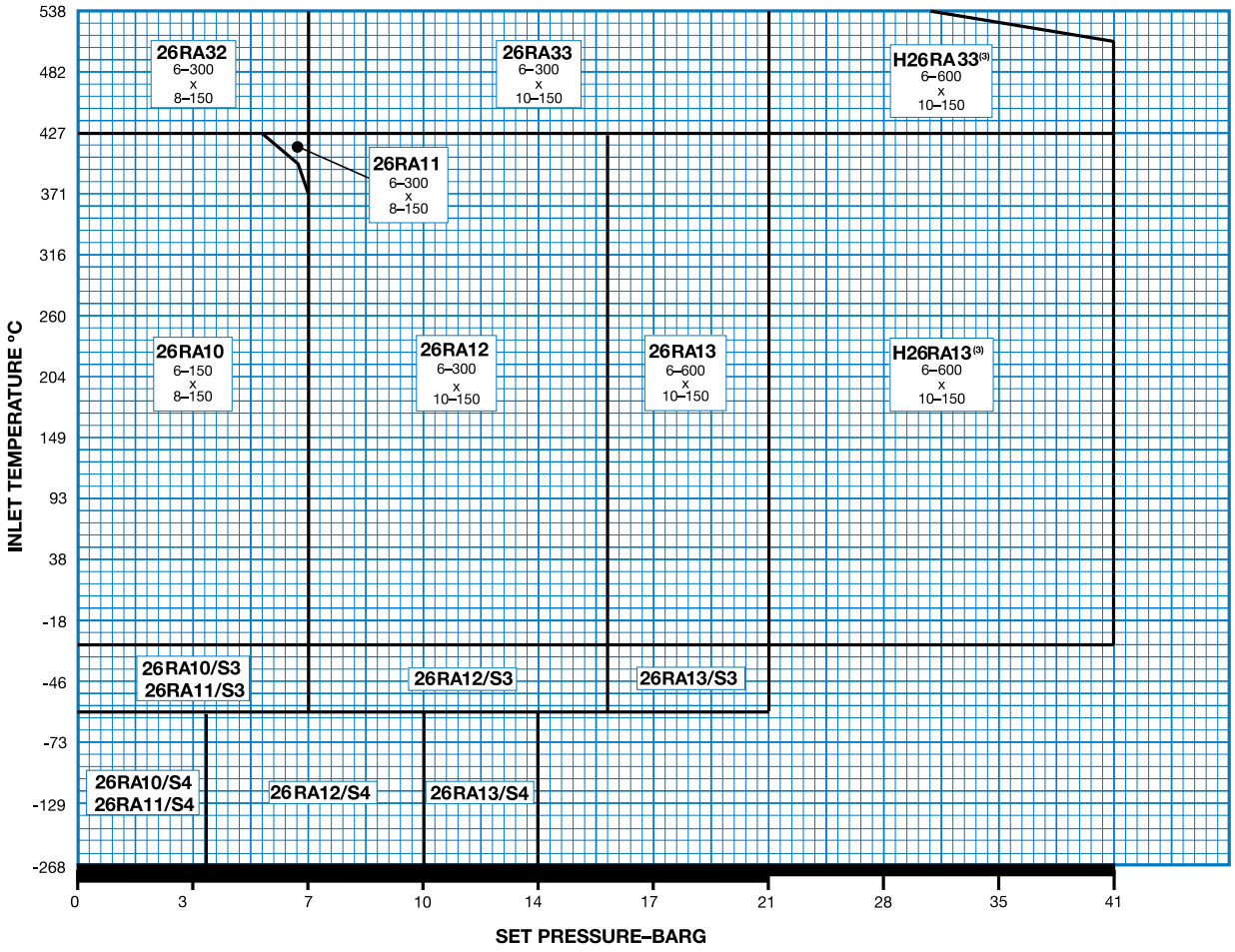
Notes:

1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

R Orifice

API Area: 10323 sq. mm
Actual Area: 11471 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26RA10	26RB10	6 x 8	150#	150#	—	—	6.9	6.9	5.5	—	4.1	4.1	CARBON STEEL	CHROME ALLOY	-29°C to 427°C
26RA11	26RB11	6 x 8	300#	150#	—	—	6.9	6.9	6.9	—	4.1	4.1			
26RA12	26RB12	6 x 10	300#	150#	—	—	15.8	15.8	15.8	—	6.9	6.9			
26RA13	26RB13	6 x 10	600#	150#	—	—	20.7	20.7	20.7	—	6.9	6.9			
H26RA13	H26RB13	6 x 10	600#	150#	—	—	41.3	41.3	41.3	—	19.6	13.8			
26RA32	26RB32	6 x 8	300#	150#	—	—	—	—	6.9	6.8	4.1	4.1	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
26RA33	26RB33	6 x 10	600#	150#	—	—	—	—	20.7	20.7	6.9	6.9			
H26RA33	H26RB33	6 x 10	600#	150#	—	—	—	—	41.3	30.7	19.6	13.8			
26RA10/S3	26RB10/S3	6 x 8	150#	150#	—	6.9	—	—	—	—	4.1	3.8	316 ST. ST.	CHROME ALLOY NICKEL PLATED	-30°C to -59°C
26RA11/S3	26RB11/S3	6 x 8	300#	150#	—	6.9	—	—	—	—	4.1	3.8			
26RA12/S3	26RB12/S3	6 x 10	300#	150#	—	15.8	—	—	—	—	6.9	6.9			
26RA13/S3	26RB13/S3	6 x 10	600#	150#	—	20.7	—	—	—	—	6.9	6.9			
26RA10/S4	26RB10/S4	6 x 8	150#	150#	3.8	—	—	—	—	—	4.1	3.8	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26RA11/S4	26RB11/S4	6 x 8	300#	150#	3.8	—	—	—	—	—	4.1	3.8			
26RA12/S4	26RB12/S4	6 x 10	300#	150#	10.3	—	—	—	—	—	6.9	6.9			
26RA13/S4	26RB13/S4	6 x 10	600#	150#	13.8	—	—	—	—	—	6.9	6.9			



Selection Chart

Notes:

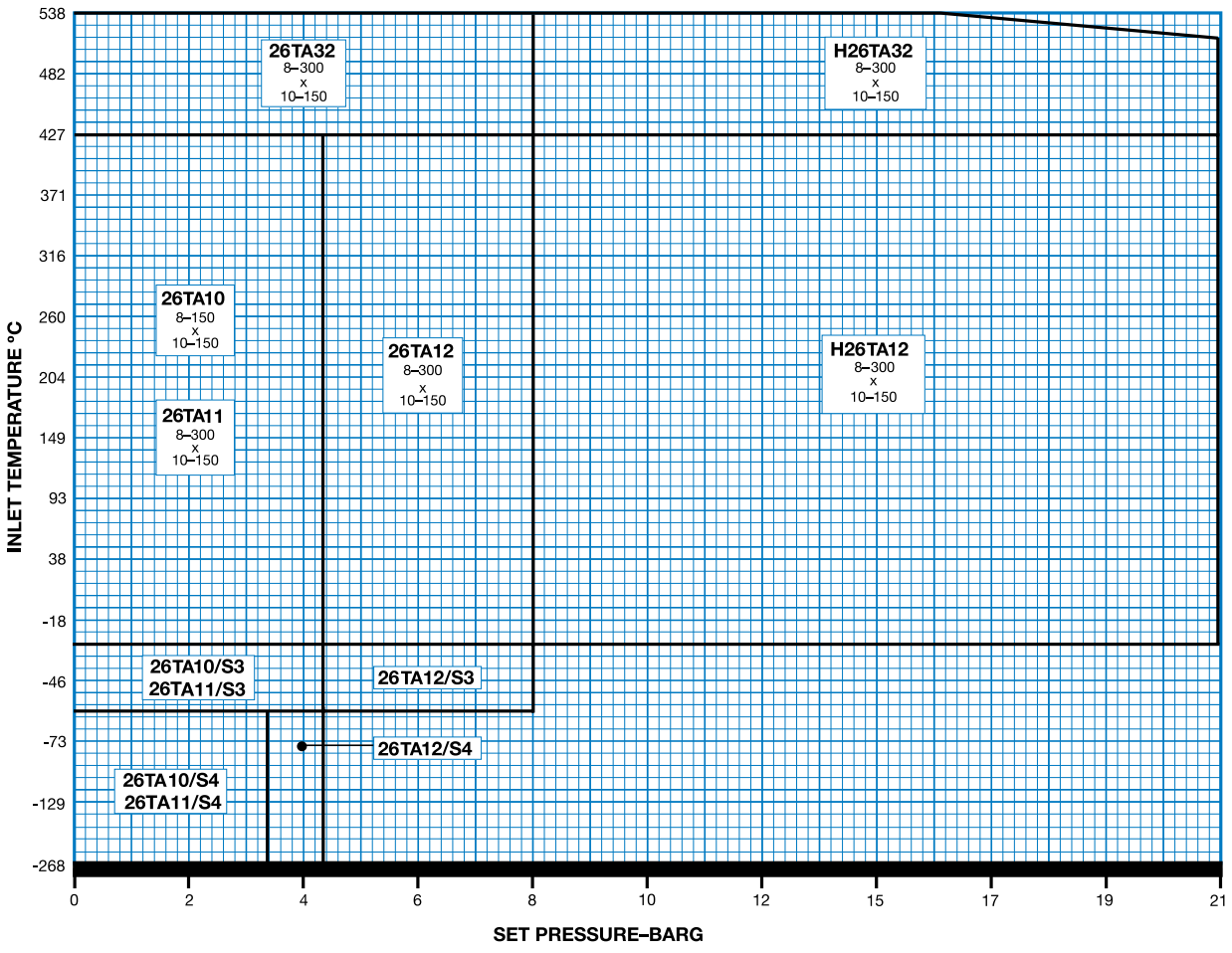
1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

T Orifice

API Area: 16774 sq. mm
Actual Area: 18671 sq. mm

TYPE NUMBER		VALVE SIZE	ANSI FLANGE CLASS		MAXIMUM SET PRESSURE, BARG						BACK PRESSURE LIMIT BARG @ 38°C		MATERIAL		INLET TEMP. RANGE
CONVENTIONAL	BALANSEAL	INLET OUTLET	INLET RF OR RJ	OUTLET RF	-268°C -60°C	-59°C -30°C	-29°C +38°C	+232°C	+427°C	+538°C	CONVENTIONAL TYPE	BALANSEAL TYPE	BODY & BONNET	SPRING	
26TA10	26TB10	8 x 10	150#	150#	—	—	4.5	4.5	4.5	—	2.1	2.1	CARBON STEEL	CHROME ALLOY	-29°C to 232°C
26TA11	26TB11	8 x 10	300#	150#	—	—	4.5	4.5	4.5	—	2.1	2.1			
26TA12	26TB12	8 x 10	300#	150#	—	—	8.3	8.3	8.3	—	4.1	4.1			
H26TA12	H26TB12	8 x 10	300#	150#	—	—	20.7	20.7	20.7	—	6.9	6.9			
26TA32	26TB32	8 x 10	300#	150#	—	—	—	—	8.3	8.2	4.1	4.1	CHROME MOLY STEEL	HIGH TEMP. ALLOY	428°C to 538°C
H26TA32	H26TB32	8 x 10	300#	150#	—	—	—	—	20.7	15.5	6.9	6.9			
26TA10/S3	26TB10/S3	8 x 10	150#	150#	—	4.5	—	—	—	—	2.1	2.1	316 ST. ST.	CHROME ALLOY NICKEL PLTD.	-30°C to -59°C
26TA11/S3	26TB11/S3	8 x 10	300#	150#	—	4.5	—	—	—	—	2.1	2.1			
26TA12/S3	26TB12/S3	8 x 10	300#	150#	—	8.3	—	—	—	—	4.1	4.1			
26TA10/S4	26TB10/S4	8 x 10	150#	150#	3.4	—	—	—	—	—	2.1	2.1	316 ST. ST.	316 ST. ST.	-60°C to -268°C
26TA11/S4	26TB11/S4	8 x 10	300#	150#	3.4	—	—	—	—	—	2.1	2.1			
26TA12/S4	26TB12/S4	8 x 10	300#	150#	4.5	—	—	—	—	—	4.1	4.1			

Selection Chart



Notes:

1. The type numbers shown on the selection chart indicate conventional valves. For BalanSeal, "O" ring construction, balanced piston design and other valve options, see the type numbering system on pages 10 and 11.
2. Outlet pressure for temperature above 38°C should not exceed the rating in ANSI B16.5.
3. For applications above 538°C, consult the Farris Factory.

ASME PRESSURE VESSEL CODE (UV)

CAPACITIES IN STANDARD CUBIC METERS PER MINUTE AT 15.6 °C

Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. mm													
AREAS	D	E	F	G	H	J	K	L	M	N	P	Q	R	T
API	71	126	198	325	506	830	1186	1841	2323	2800	4116	7129	10323	16774
Actual	97	145	239	361	563	923	1317	2045	2581	3111	4572	7916	11471	18671
1	2.1	3.2	5.3	8.0	12.5	20.5	29.2	45.4	57.3	69.1	101	176	255	415
2	3.1	4.6	7.7	11.6	18.1	29.7	42.5	65.9	83.2	100	147	255	370	602
3	4.1	6.2	10.3	15.5	24.3	39.8	56.9	88.3	111	134	197	342	495	806
4	5.2	7.8	12.9	19.5	30.5	50.0	71.4	110	139	168	247	429	622	1012
5	6.3	9.4	15.6	23.5	36.7	60.2	85.9	133	168	203	298	516	748	1218
6	7.3	11.0	18.2	27.5	42.9	70.3	100	156	196	237	348	603	875	1424
7	8.4	12.6	20.8	31.4	49.1	80.5	115	178	225	271	399	691	1001	1630
8	9.0	14.2	23.5	35.4	55.3	90.7	129	201	253	305	449	778	1127	1835
9	10.5	15.8	26.1	39.4	61.5	100	144	223	282	340	499	865	1254	2041
10	11.6	17.4	28.8	43.4	67.7	111	158	246	310	374	550	952	1380	2247
12	13.7	20.6	34.0	51.3	80.2	131	187	291	367	443	651	1127	1633	2659
14	15.9	23.8	39.3	59.3	92.6	151	216	336	424	511	751	1301	1886	3070
16	18.0	27.0	44.6	67.2	105	172	245	381	481	580	852	1476	2139	3482
18	20.1	30.2	49.9	75.2	117	192	274	426	538	648	953	1650	2392	3893
20	22.3	33.4	55.1	83.1	129	212	303	471	595	717	1054	1825	2645	4305
22	24.4	36.6	60.4	91.1	142	233	332	516	651	785	1155	1999	2898	—
24	26.5	39.8	65.7	99.0	154	253	361	561	708	854	1255	2174	3150	—
26	28.7	43.0	71.0	107	167	273	390	606	765	923	1356	2348	3403	—
28	30.8	46.2	76.2	114	179	294	419	651	822	991	1457	2523	3656	—
30	32.9	49.4	81.5	122	191	314	448	697	879	1060	1558	2697	3909	—
32	35.1	52.6	86.8	130	204	334	478	742	936	1128	1659	2872	4162	—
34	37.2	55.8	92.1	138	216	355	507	787	993	1197	1759	3046	4415	—
36	39.3	59.0	97.4	146	229	375	536	832	1050	1266	1860	3221	4668	—
38	41.5	62.2	102	154	241	395	565	877	1107	1334	1961	3395	4920	—
40	43.6	65.4	107	162	254	416	594	922	1163	1403	2062	3570	5173	—
42	45.7	68.6	113	170	266	436	623	967	1220	1471	2163	3745	—	—
44	47.9	71.8	118	178	278	456	652	1012	1277	1540	2263	3919	—	—
46	50.0	75.0	123	186	291	477	681	1057	1334	1608	2364	4094	—	—
48	52.1	78.2	129	194	303	497	710	1102	1391	1677	2465	4268	—	—
50	54.3	81.4	134	202	316	517	739	1147	1448	1746	2566	4443	—	—
60	64.9	97.4	160	242	378	619	884	1373	1732	2088	3070	5315	—	—
70	75.6	113	187	281	440	721	1029	1598	2017	—	—	—	—	—
80	86.3	129	213	321	502	822	1175	1824	—	—	—	—	—	—
90	96.9	145	239	361	564	924	1320	2049	—	—	—	—	—	—
100	107	161	266	401	626	1026	1465	2274	—	—	—	—	—	—
110	118	177	292	440	688	1127	1610	—	—	—	—	—	—	—
120	128	193	319	480	750	1229	1755	—	—	—	—	—	—	—
130	139	209	345	520	812	1331	1901	—	—	—	—	—	—	—
140	150	225	371	560	874	1433	2046	—	—	—	—	—	—	—
150	160	241	398	599	936	1534	2191	—	—	—	—	—	—	—
160	171	257	424	639	999	1636	—	—	—	—	—	—	—	—
170	182	273	450	679	1061	1738	—	—	—	—	—	—	—	—
180	192	289	477	719	1123	1839	—	—	—	—	—	—	—	—
190	203	305	503	758	—	—	—	—	—	—	—	—	—	—
200	214	321	530	798	—	—	—	—	—	—	—	—	—	—
210	224	337	556	838	—	—	—	—	—	—	—	—	—	—
220	235	353	582	878	—	—	—	—	—	—	—	—	—	—
230	246	369	609	917	—	—	—	—	—	—	—	—	—	—
240	256	385	635	957	—	—	—	—	—	—	—	—	—	—
250	267	401	661	997	—	—	—	—	—	—	—	—	—	—
260	278	417	688	—	—	—	—	—	—	—	—	—	—	—
270	288	433	714	—	—	—	—	—	—	—	—	—	—	—
280	299	449	741	—	—	—	—	—	—					
290	310	465	767	—	—	—	—	—	—					
300	320	481	793	—	—	—	—	—	—					
310	331	497	820	—	—	—	—	—	—					
320	342	513	846	—	—	—	—	—	—					
330	352	529	873	—	—	—	—	—	—					
340	363	545	899	—	—	—	—	—	—					
350	374	561	—	—	—	—	—	—	—					
360	384	577	—	—	—	—	—	—	—					
370	395	593	—	—	—	—	—	—	—					
380	406	609	—	—	—	—	—	—	—					
390	416	625	—	—	—	—	—	—	—					
400	427	641	—	—	—	—	—	—	—					
410	438	657	—	—	—	—	—	—	—	—	—	—	—	—

General Notes:

1. Above capacities should also be used for 2600L series when used in air service.
2. Capacities at 2.0 Barg set pressure and below are based on 0.2 Bar overpressure.
3. For sizing purposes the effective coefficient of discharge K_d for air, gas, and steam is 0.953 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for air, gas, and steam service is 0.858.

Steam Capacities, 10% Overpressure

ASME PRESSURE VESSEL CODE (UV)

CAPACITIES IN KILOGRAMS PER HOUR AT SATURATION TEMPERATURE

Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. mm													
AREAS	D	E	F	G	H	J	K	L	M	N	P	Q	R	T
API	71	126	198	325	506	830	1186	1841	2323	2800	4116	7129	10323	16774
Actual	97	145	239	361	563	923	1317	2045	2581	3111	4572	7916	11471	18761
1	96	145	239	360	563	923	1318	2046	2582	3113	4575	7922	11479	18685
2	140	210	347	523	817	1339	1912	2968	3746	4516	6637	11491	16652	27104
3	188	282	465	701	1095	1794	2561	3977	5018	6049	8891	15394	22307	36308
4	236	354	584	880	1374	2251	3215	4991	6298	7592	11159	19320	27996	45569
5	284	426	702	1059	1653	2709	3868	6005	7578	9135	13427	23246	33686	54829
6	332	498	821	1237	1933	3166	4522	7020	8858	10678	15694	27173	39375	64090
7	380	570	940	1416	2212	3624	5175	8034	10138	12221	17962	31099	45064	73351
8	428	642	1059	1595	2492	4082	5829	9049	11418	13764	20230	35025	50754	82611
9	476	714	1177	1774	2771	4539	6482	10063	12698	15307	22498	38952	56443	91872
10	524	786	1296	1953	3050	4997	7135	11077	13978	16850	24766	42878	62133	101132
11	572	858	1415	2132	3330	5454	7789	12092	15258	18393	27033	46804	67822	110393
12	620	930	1533	2311	3609	5912	8442	13106	16538	19936	29301	50731	73512	119654
13	668	1002	1652	2490	3888	6370	9096	14120	17818	21479	31569	54657	79201	128914
14	716	1074	1771	2668	4168	6827	9749	15135	19098	23022	33837	58583	84891	138175
15	764	1146	1890	2847	4447	7285	10403	16149	20378	24565	36104	62509	90580	147435
16	812	1218	2008	3026	4726	7742	11056	17164	21658	26108	38372	66436	96270	156696
17	860	1290	2127	3205	5006	8200	11709	18178	22938	27651	40640	70362	101959	165957
18	908	1362	2246	3384	5285	8657	12363	19192	24218	29194	42908	74288	107649	175217
19	956	1434	2364	3563	5564	9115	13016	20207	25498	30737	45176	78215	113338	184478
20	1004	1506	2483	3742	5844	9573	13670	21221	26778	32280	47443	82141	119028	193738
22	1100	1650	2721	4099	6403	10488	14977	23250	29337	35366	51979	89994	130407	—
24	1196	1794	2958	4457	6961	11403	16283	25279	31897	38452	56515	97846	141786	—
26	1292	1938	3195	4815	7520	12318	17590	27307	34457	41538	61050	105699	153165	—
28	1388	2082	3433	5173	8079	13233	18897	29336	37017	44624	65586	113552	164544	—
30	1484	2226	3670	5530	8637	14149	20204	31365	39577	47710	70121	121404	175923	—
32	1580	2370	3908	5888	9196	15064	21511	33394	42137	50796	74657	129257	187302	—
34	1676	2514	4145	6246	9755	15979	22818	35422	44697	53883	79193	137110	198681	—
36	1772	2658	4383	6604	10313	16894	24125	37451	47257	56969	83728	144962	210059	—
38	1868	2802	4620	6962	10872	17809	25431	39480	49817	60055	88264	152815	221438	—
40	1964	2946	4858	7319	11431	18724	26738	41509	52377	63141	92799	160667	232817	—
42	2060	3090	5095	7677	11990	19640	28045	43537	54937	66227	97335	168520	—	—
44	2156	3234	5332	8035	12548	20555	29352	45566	57497	69313	101870	176373	—	—
46	2252	3378	5570	8393	13107	21470	30659	47595	60057	72399	106406	184225	—	—
48	2348	3522	5807	8750	13666	22385	31966	49624	62617	75485	110942	192078	—	—
50	2444	3666	6045	9108	14224	23300	33272	51652	65177	78571	115477	199931	—	—
52	2540	3810	6282	9466	14783	24216	34579	53681	67737	81657	120013	207783	—	—
54	2636	3954	6520	9824	15342	25131	35886	55710	70297	84743	124548	215636	—	—
56	2732	4098	6757	10181	15901	26046	37193	57739	72857	87829	129084	223489	—	—
58	2828	4242	6994	10539	16459	26961	38500	59767	75417	90915	133620	231341	—	—
60	2924	4386	7232	10897	17018	27876	39807	61796	77976	94001	138155	239194	—	—
62	3020	4530	7469	11255	17577	28791	41114	63825	80536	97087	142691	247046	—	—
64	3116	4674	7707	11612	18135	29707	42420	65854	83096	100173	147226	—	—	—
66	3212	4818	7944	11970	18694	30622	43727	67883	85656	103259	151762	—	—	—
68	3308	4962	8182	12328	19253	31537	45034	69911	88216	106345	156298	—	—	—
70	3404	5106	8419	12686	19812	32452	46341	71940	90776	—	—	—	—	—
72	3500	5250	8656	13043	20370	33367	47648	73969	93336	—	—	—	—	—
74	3596	5394	8894	13401	20929	34283	48955	75998	95896	—	—	—	—	—
76	3692	5538	9131	13759	21488	35198	50262	78026	—	—	—	—	—	—
78	3788	5682	9369	14117	22046	36113	51568	80055	—	—	—	—	—	—
80	3884	5826	9606	14474	22605	37028	52875	82084	—	—	—	—	—	—
82	3980	5970	9844	14832	23164	37943	54182	84113	—	—	—	—	—	—
84	4076	6114	10081	15190	23722	38858	55489	86141	—	—	—	—	—	—
86	4172	6258	10319	15548	24281	39774	56796	88170	—	—	—	—	—	—
88	4268	6402	10556	15905	24840	40689	58103	90199	—	—	—	—	—	—
90	4364	6546	10793	16263	25399	41604	59410	92228	—	—	—	—	—	—
92	4460	6690	11031	16621	25957	42519	60716	94256	—	—	—	—	—	—
94	4556	6834	11268	16979	26516	43434	62023	96285	—	—	—	—	—	—
96	4652	6978	11506	17336	27075	44350	63330	98314	—	—	—	—	—	—
98	4748	7122	11743	17694	27633	45265	64637	100343	—	—	—	—	—	—
100	4844	7266	11981	18052	28192	46180	65944	102371	—	—	—	—	—	—
110	5324	7986	13168	19841	30986	50756	72478	—	—	—	—	—	—	—
120	5804	8706	14355	21629	33779	55332	79012	—	—	—	—	—	—	—
130	6284	9426	15542	23418	36573	59908	85547	—	—	—	—	—	—	—
140	6764	10146	16729	25207	39366	64484	92081	—	—	—	—	—	—	—
150	7244	10866	17916	26996	42160	69059	98615	—	—	—	—	—	—	—
160	7724	11586	19104	28784	44953	73635	—	—	—	—	—	—	—	—
170	8204	12306	20291	30573	47747	78211	—	—	—	—	—	—	—	—
180	8684	13026	21478	32362	50540	82787	—	—	—	—	—	—	—	—
190	9164	13746	22665	34151	—	—	—	—	—	—	—	—	—	—
200	9643	14465	23852	35939	—	—	—	—	—	—	—	—	—	—

General Notes:

1. Above capacities should also be used for 2600L series when used in steam service.
2. Capacities at 2.0 Barg set pressure and below are based on 0.2 Bar overpressure.
3. For sizing purposes the effective coefficient of discharge K_d for air, gas, and steam is 0.953 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for air, gas, and steam service is 0.858.

Water Capacities - 2600L, 10% Overpressure

ASME PRESSURE VESSEL CODE (UV)

CAPACITIES IN LITERS PER MINUTE AT 21 °C

Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. mm													
AREAS	D	E	F	G	H	J	K	L	M	N	P	Q	R	T
API	71	126	198	325	506	830	1186	1841	2323	2800	4116	7129	10323	16774
Actual	97	145	239	361	563	923	1317	2045	2581	3111	4572	7916	11471	18761
1	58.8	88.2	145	219	342	561	801	1244	1569	1892	2781	4815	6977	11357
2	79.6	119	196	296	463	758	1083	1682	2122	2559	3761	6511	9435	15358
3	97.3	146	240	362	566	928	1325	2057	2595	3129	4599	7962	11538	18781
4	112	168	278	418	654	1071	1530	2375	2997	3613	5310	9194	13323	21686
5	125	188	310	468	731	1198	1710	2655	3351	4040	5937	10280	14896	24246
6	137	206	340	513	801	1312	1874	2909	3671	4425	6504	11261	16318	26561
7	148	223	367	554	865	1417	2024	3142	3965	4780	7025	12163	17625	28689
8	158	238	393	592	925	1515	2164	3359	4239	5110	7510	13003	18842	30670
9	168	252	417	628	981	1607	2295	3563	4496	5420	7966	13792	19985	32530
10	177	266	439	662	1034	1694	2419	3756	4739	5713	8397	14538	21066	34290
12	194	292	481	725	1133	1856	2650	4114	5191	6258	9198	15925	23077	37562
14	210	315	520	783	1223	2004	2862	4444	5607	6760	9935	17202	24926	40572
16	224	337	556	837	1308	2143	3060	4751	5995	7226	10621	18389	26647	43373
18	238	357	589	888	1387	2273	3246	5039	6358	7665	11265	19505	28264	46005
20	251	377	621	936	1462	2396	3421	5311	6702	8080	11875	20560	29793	—
22	263	395	652	982	1534	2513	3588	5571	7029	8474	12455	21563	31247	—
24	275	413	681	1026	1602	2624	3748	5818	7342	8851	13008	22522	32636	—
26	286	429	708	1067	1667	2732	3901	6056	7642	9212	13540	23442	33969	—
28	297	446	735	1108	1730	2835	4048	6285	7930	9560	14051	24327	35251	—
30	307	461	761	1147	1791	2934	4190	6505	8209	9895	14544	25181	36489	—
32	317	476	786	1184	1850	3030	4328	6719	8478	10220	15021	26006	—	—
34	327	491	810	1221	1907	3124	4461	6925	8739	10535	15483	26807	—	—
36	337	505	834	1256	1962	3214	4590	7126	8992	10840	15932	27584	—	—
38	346	519	856	1291	2016	3302	4716	7321	9238	11137	16369	28340	—	—
40	355	533	879	1324	2068	3388	4839	7512	9478	11426	16794	29076	—	—
42	364	546	900	1357	2119	3472	4958	7697	9713	11709	17209	29794	—	—
44	372	559	922	1389	2169	3554	5075	7878	9941	11984	17614	—	—	—
46	381	571	942	1420	2218	3634	5189	8055	10165	12253	18009	—	—	—
48	389	584	963	1451	2266	3712	5300	8229	10383	—	—	—	—	—
50	397	596	982	1481	2312	3788	5410	8398	10597	—	—	—	—	—
60	435	653	1076	1622	2533	4150	5926	9200	—	—	—	—	—	—
70	470	705	1163	1752	2736	4482	6401	9937	—	—	—	—	—	—
80	502	754	1243	1873	2925	4792	6843	10623	—	—	—	—	—	—
90	533	799	1318	1987	3103	5083	7258	11268	—	—	—	—	—	—
100	562	843	1390	2094	3271	5358	7651	11877	—	—	—	—	—	—
110	589	884	1457	2196	3430	5619	8024	12457	—	—	—	—	—	—
120	615	923	1522	2294	3583	5869	8381	13011	—	—	—	—	—	—
130	640	961	1584	2388	3729	6109	8723	13542	—	—	—	—	—	—
140	665	997	1644	2478	3870	6339	9052	—	—	—	—	—	—	—
150	688	1032	1702	2565	4006	6562	9370	—	—	—	—	—	—	—
160	710	1066	1758	2649	4137	6777	9678	—	—	—	—	—	—	—
170	732	1099	1812	2730	4264	6986	9975	—	—	—	—	—	—	—
180	754	1131	1865	2810	4388	7188	10265	—	—	—	—	—	—	—
190	774	1162	1916	2887	4508	7385	10546	—	—	—	—	—	—	—
200	794	1192	1965	2962	4625	7577	10820	—	—	—	—	—	—	—
210	814	1221	2014	3035	4740	7764	11087	—	—	—	—	—	—	—
220	833	1250	2061	3106	4851	7947	11348	—	—	—	—	—	—	—
230	852	1278	2108	3176	4960	8125	11603	—	—	—	—	—	—	—
240	870	1306	2153	3244	5067	8300	11853	—	—	—	—	—	—	—
250	888	1332	2197	3311	5171	8471	—	—	—	—	—	—	—	—
260	906	1359	2241	3377	5274	8639	—	—	—	—	—	—	—	—
270	923	1385	2284	3441	5374	8804	—	—	—	—	—	—	—	—
280	940	1410	2326	3504	5473	8965	—	—	—	—	—	—	—	—
290	957	1435	2367	3566	5570	9124	—	—	—	—	—	—	—	—
300	973	1460	2407	3627	—	—	—	—	—	—	—	—	—	—
310	989	1484	2447	3687	—	—	—	—	—	—	—	—	—	—
320	1005	1508	2486	3746	—	—	—	—	—	—	—	—	—	—
330	1020	1531	2525	3804	—	—	—	—	—	—	—	—	—	—
340	1036	1554	2563	3862	—	—	—	—	—	—	—	—	—	—
350	1051	1577	2600	—	—	—	—	—	—	—	—	—	—	—
360	1066	1599	2637	—	—	—	—	—	—	—	—	—	—	—
370	1081	1621	2673	—	—	—	—	—	—	—	—	—	—	—
380	1095	1643	—	—	—	—	—	—	—	—	—	—	—	—
390	1109	1664	—	—	—	—	—	—	—	—	—	—	—	—
400	1124	1686	—	—	—	—	—	—	—	—	—	—	—	—
410	1138	1707	—	—	—	—	—	—	—	—	—	—	—	—

General Notes:

1. Capacities at 2.0 Barg set pressure and below are based on 0.2 Bar overpressure.
2. For sizing purposes the effective coefficient of discharge K_d for liquids is 0.724 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for water is 0.652.

Water Capacities - 2600: 25% Overpressure

NON-CODE

CAPACITIES IN LITERS PER MINUTE AT 21 °C

Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. mm													
AREAS	D	E	F	G	H	J	K	L	M	N	P	Q	R	T
API	71	126	198	325	506	830	1186	1841	2323	2800	4116	7129	10323	16774
Actual	97	145	239	361	563	923	1317	2045	2581	3111	4572	7916	11471	18761
1	52.9	79.3	130	197	308	504	720	1118	1411	1701	2500	4329	6273	10211
2	74.8	112	185	278	435	713	1019	1581	1996	2406	3536	6122	8872	14441
3	91.6	137	226	341	533	873	1248	1937	2444	2947	4331	7499	10866	17687
4	105	158	261	394	616	1009	1441	2237	2822	3402	5001	8659	12547	20423
5	118	177	292	441	688	1128	1611	2501	3156	3804	5591	9681	14028	22834
6	129	194	320	483	754	1235	1764	2739	3457	4167	6125	10605	15367	25013
7	140	210	346	521	815	1335	1906	2959	3734	4501	6616	11455	16599	27017
8	149	224	370	557	871	1427	2038	3163	3992	4812	7073	12245	17745	28883
9	158	238	392	591	924	1513	2161	3355	4234	5104	7502	12988	18821	30635
10	167	251	413	623	974	1595	2278	3537	4463	5380	7907	13691	19839	32292
12	183	275	453	683	1067	1747	2496	3874	4889	5894	8662	14998	21733	35374
14	198	297	489	738	1152	1888	2696	4185	5281	6366	9356	16199	23474	38209
16	211	317	523	788	1232	2018	2882	4474	5645	6805	10002	17318	25095	40847
18	224	336	555	836	1306	2140	3057	4745	5988	7218	10609	18368	26617	43325
20	236	355	585	882	1377	2256	3222	5002	6312	7609	11183	19362	28057	—
22	248	372	614	925	1444	2366	3379	5246	6620	7980	11729	20307	29427	—
24	259	388	641	966	1509	2471	3529	5479	6914	8335	12251	21210	30735	—
26	269	404	667	1005	1570	2572	3674	5703	7196	8675	12751	22076	31990	—
28	280	420	692	1043	1630	2670	3812	5918	7468	9003	13232	22910	33198	—
30	289	434	717	1080	1687	2763	3946	6126	7730	9319	13697	23714	34363	—
32	299	449	740	1115	1742	2854	4076	6327	7984	9625	14146	24491	—	—
34	308	462	763	1150	1796	2942	4201	6522	8230	9921	14581	25245	—	—
36	317	476	785	1183	1848	3027	4323	6711	8468	10208	15004	25977	—	—
38	326	489	806	1215	1898	3110	4441	6895	8700	10488	15415	26689	—	—
40	334	502	827	1247	1948	3191	4557	7074	8926	10761	15815	27382	—	—
42	343	514	848	1278	1996	3270	4669	7249	9147	11026	16206	28059	—	—
44	351	526	868	1308	2043	3347	4779	7419	9362	11286	16587	—	—	—
46	358	538	887	1337	2089	3422	4886	7586	9572	11540	16960	—	—	—
48	366	550	906	1366	2134	3495	4992	7749	9778	—	—	—	—	—
50	374	561	925	1394	2178	3568	5095	7909	9980	—	—	—	—	—
60	409	614	1014	1527	2386	3908	5581	8664	—	—	—	—	—	—
70	442	664	1095	1650	2577	4221	6028	9358	—	—	—	—	—	—
80	473	710	1170	1764	2755	4513	6444	10004	—	—	—	—	—	—
90	502	753	1241	1871	2922	4786	6835	10611	—	—	—	—	—	—
100	529	793	1309	1972	3080	5045	7205	11185	—	—	—	—	—	—
110	555	832	1373	2068	3230	5292	7557	11731	—	—	—	—	—	—
120	579	869	1434	2160	3374	5527	7893	12253	—	—	—	—	—	—
130	603	905	1492	2248	3512	5753	8215	12753	—	—	—	—	—	—
140	626	939	1548	2333	3644	5970	8525	—	—	—	—	—	—	—
150	648	972	1603	2415	3772	6179	8824	—	—	—	—	—	—	—
160	669	1004	1655	2495	3896	6382	9114	—	—	—	—	—	—	—
170	690	1035	1706	2571	4016	6579	9394	—	—	—	—	—	—	—
180	710	1065	1756	2646	4132	6769	9667	—	—	—	—	—	—	—
190	729	1094	1804	2718	4246	6955	9931	—	—	—	—	—	—	—
200	748	1122	1851	2789	4356	7136	10190	—	—	—	—	—	—	—
210	767	1150	1897	2858	4464	7312	10441	—	—	—	—	—	—	—
220	785	1177	1941	2925	4569	7484	10687	—	—	—	—	—	—	—
230	802	1204	1985	2991	4671	7652	10927	—	—	—	—	—	—	—
240	819	1229	2028	3055	4772	7817	11162	—	—	—	—	—	—	—
250	836	1255	2069	3118	4870	7978	—	—	—	—	—	—	—	—
260	853	1280	2110	3180	4967	8136	—	—	—	—	—	—	—	—
270	869	1304	2151	3241	5061	8291	—	—	—	—	—	—	—	—
280	885	1328	2190	3300	5154	8443	—	—	—	—	—	—	—	—
290	901	1352	2229	3359	5245	8592	—	—	—	—	—	—	—	—
300	916	1375	2267	3416	—	—	—	—	—	—	—	—	—	—
310	931	1397	2304	3472	—	—	—	—	—	—	—	—	—	—
320	946	1420	2341	3528	—	—	—	—	—	—	—	—	—	—
330	961	1442	2378	3583	—	—	—	—	—	—	—	—	—	—
340	975	1463	2413	3637	—	—	—	—	—	—	—	—	—	—
350	990	1485	2449	—	—	—	—	—	—	—	—	—	—	—
360	1004	1506	2483	—	—	—	—	—	—	—	—	—	—	—
370	1018	1527	2518	—	—	—	—	—	—	—	—	—	—	—
380	1031	1547	—	—	—	—	—	—	—	—	—	—	—	—
390	1045	1567	—	—	—	—	—	—	—	—	—	—	—	—
400	1058	1587	—	—	—	—	—	—	—	—	—	—	—	—
410	1071	1607	—	—	—	—	—	—	—	—	—	—	—	—

General Notes:

1. Capacities at 2.0 Barg set pressure and below are based on 0.2 Bar overpressure.
2. For sizing purposes the effective coefficient of discharge K_d for liquids is 0.64 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for water is 0.576.

2600 Series Super Capacity Pressure Relief Valves

Farris Engineering offers a complete line of large orifice, spring-loaded safety relief valves for applications requiring flows larger than the standard API "T" orifice. These large orifice valves offer the same superior design, construction, metallurgy, and options as the standard 2600 Series. Features include full nozzle, balanced bellows, isolation of bonnet spring chamber, integral one-piece sleeve guide, temperature equalizing disc, and positive connection of internal parts. Six sizes with inlets ranging from 8" to 20" and effective orifice areas from 31.5 to 176.7 square inches are available.

The 2600 Series large orifice valves are offered in both conventional and BalanSeal construction with ANSI Class 300 RF flanged inlet by ANSI Class 150 RF flanged outlet, and temperature range from -20° to 800° F. They are designed and built in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII. Capacity ratings are certified by the National Board of Boiler and Pressure Vessel Inspectors.

Orifice	Actual Orifice Area		Type Number		Valve Size Inlet X Outlet (inches)	Maximum Set Pressure, PSIG		Maximum Set Pressure, BARG		Maximum Back Pressure All Designs	
	Square Inches	Square Centimeters	Conventional	BalanSeal		-20°F to +450°F	+451°F to +800°F	-29°C to +232°C	+233°C to +427°C	PSIG @ 100°F	BARG @ 38°C
U	31.5	203.2	26UA10	26UB10	8 x 10	65	65	4.5	4.5	30	2.1
			26UA11	26UB11		65	65	4.5	4.5	30	2.1
			26UA12	26UB12		120	120	8.3	8.3	60	4.1
			H26UA12	H26UB12		300	300	20.7	20.7	100	6.9
W	63.6	410.2	26WA12	26WB12	12 x 16	300	300	20.7	20.7	100	6.9
W2	104.0	670.8	26W2A12	26W2B12	16 x 18	300	300	20.7	20.7	100	6.9
X	113.1	729.5	26XA12	26XB12	16 x 20	300	300	20.7	20.7	100	6.9
Y	143.1	923.0	26YA12	26YB12	18 x 24	300	300	20.7	20.7	100	6.9
Z	176.7	1139.7	26ZA12	26ZB12	20 x 24	300	200	20.7	13.8	100	6.9

Materials of Construction: Carbon steel body and bonnet, stainless steel trim and chrome alloy spring. Other materials available on application. Consult the factory.

Connections: ANSI Class 300#RF inlet x 150#RF. Other connection types available on application. Consult the factory.

General Notes:

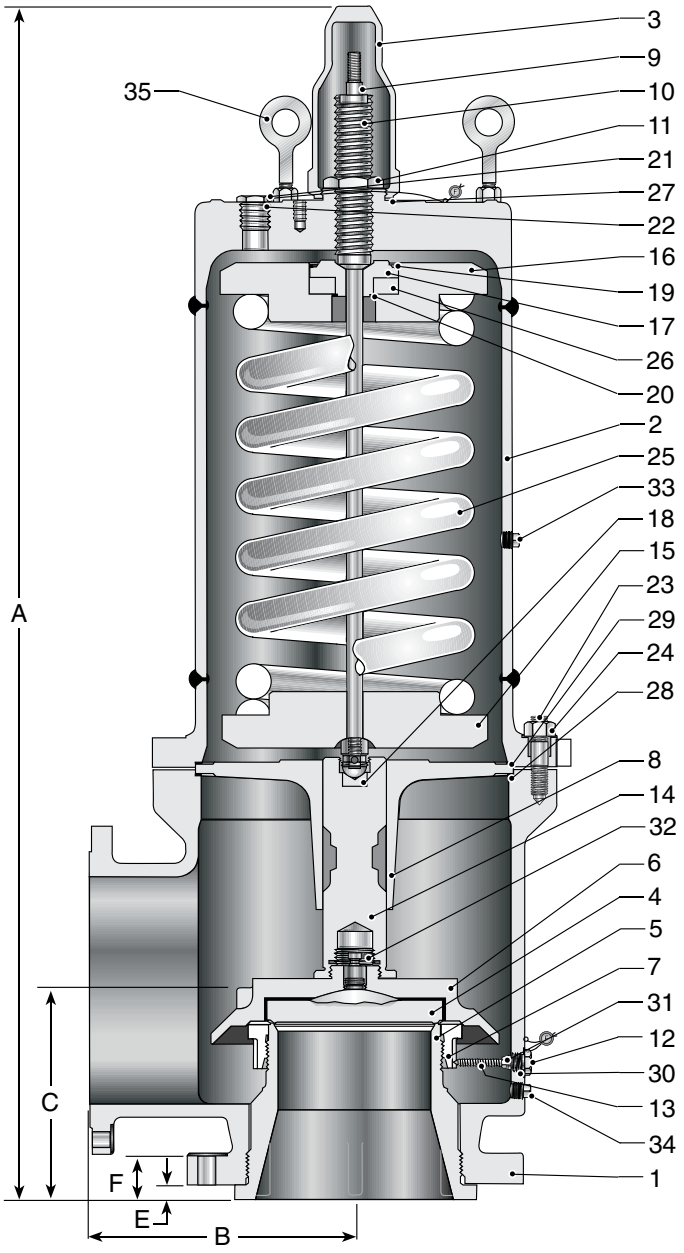
1. All valves supplied with plain caps unless otherwise specified. Standard suffix for type number is "-120". For other cap construction, refer to page 69.
2. For set pressures under 20 psig (1.4 barg) consult the factory.
3. ASME Boiler and Pressure Vessel Code Section VIII requires all valves have a lifting lever when used for air, steam and hot water (over 140°F).
4. For corrosive, low and high temperature materials, ANSI Class 150 inlet flange and open yoke designs, consult the Factory.
5. Standard flange finish is serrated unless otherwise specified.
6. Optional equipment includes: air set device for set pressure testing, extra large lapping glass for valve seat maintenance, spring compression device for set pressure adjustment, and special disassembly and reassembly equipment.
7. The "U" orifice with 300# inlet flange is available up to 1000°F. Set pressures are the same as the comparable "T" orifice.

2600 Series Large Orifice Conventional

Bill of Materials–Conventional

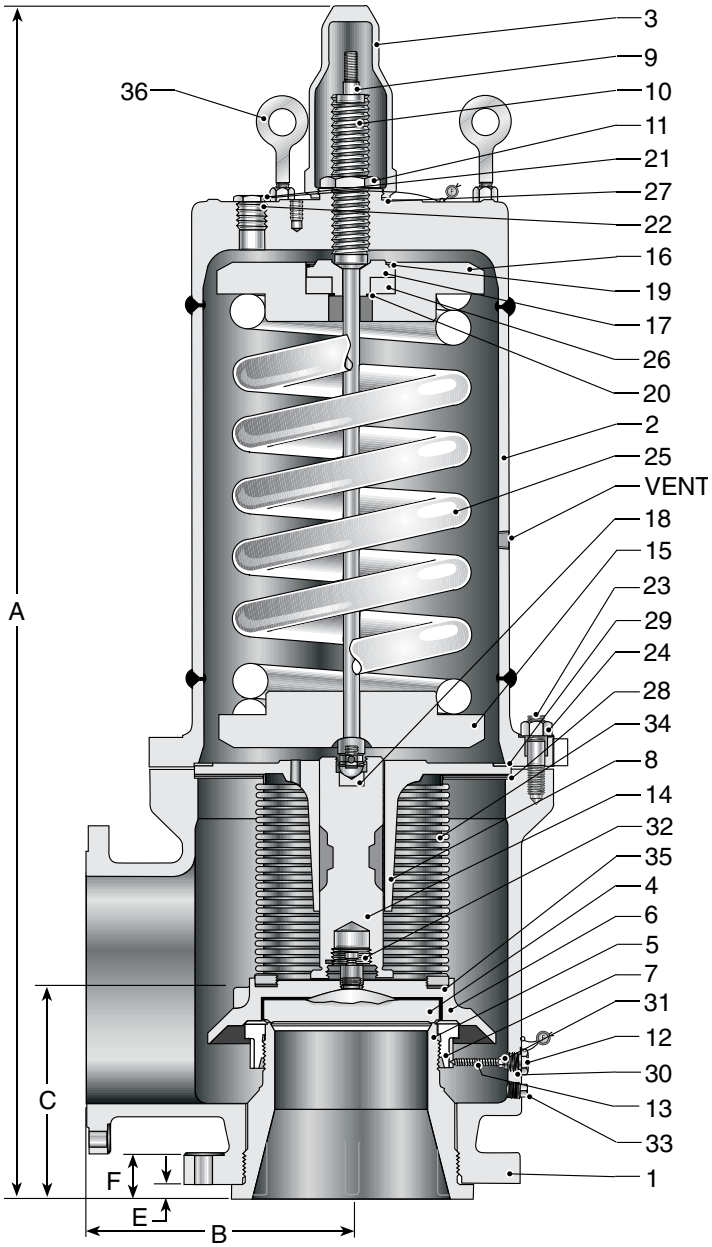
ITEM	PART NAME	MATERIAL
1	Body 26( )A12	ASTM A216 Gr. WCB. Carb. St.
2	Bonnet 26( )A12	ASTM A216 Gr. WCB. Carb. St.
3	Cap, Plain Screwed	ASTM A216 Gr. WCB. Carb. St.
4	Disc	Stainless Steel
5	Nozzle	316 St. St.
6	Disc Holder	Stainless Steel
7	Blowdown Ring	Stainless Steel
8	Sleeve Guide 26( )A12	Stainless Steel
9	Stem	Stainless Steel
10	Spring Adjusting Screw	Stainless Steel
11	Jam Nut (Spr. Adj. Screw)	Stainless Steel
12	Lock Screw (B.D.R.)	Stainless Steel
13	Lock Screw Stud	Stainless Steel
14	Stem Retainer	Stainless Steel
15	Spring Button, Lower	Carbon St. Rust Proofed
16	Spring Button, Upper	Carbon St. Rust Proofed
17*	Insert, Spring Button Upper	Stainless Steel
18	Stem Insert	Stainless Steel
19*	Retaining Ring	Stainless Steel
20*	Back-Up Ring	Teflon
21*	Cylinder Plug	Stainless Steel
22*	O-Ring, Cylinder Plug	Ethylene Propylene
23	Body Stud	ASTM A193 Gr. B7, Alloy St.
24	Hex Nut (Body)	ASTM A194 Gr. 2H, Alloy St.
25	Spring 26( )A12	Chrome Alloy, Rust Proofed
26*	Roller Thrust Bearing	Hardened Alloy Steel
27	Cap Gasket	Soft Iron or Steel
28	Body Gasket	Soft Iron or Steel
29	Bonnet Gasket	Soft Iron or Steel
30	Lock Screw Gasket	Soft Iron or Steel
31	Hex Nut (B.D.R.L.S.)	Stainless Steel
32	Lock Screw (D.H.)	Stainless Steel
33	Pipe Plug (Bonnet)	Steel
34	Pipe Plug (Body)	Steel
35*	Forged Eye Bolt	Steel, Galvanized

*Not supplied on U & W orifice



VALVE SIZE INLET X OUTLET	ANSI FLANGE CLASS		TYPE NUMBER CONV.	DIMENSIONS, IN./*MM.*					APPROX. WEIGHT Lbs./Kg
	INLET RF	OUTLET RF		A (max.)	B	C	E	F	
8 U 10	300	150	26UA12	54½ *1385*	11 *279*	10⅞ *276*	13/16 *21*	2 7/16 *62*	650 *295*
12 W 16	300	150	26WA12	70½ *1791*	16 *406*	14⅛ *359*	13/16 *21*	2 13/16 *71*	2800 *1270*
16 W2 18	300	150	26W2A12	90¾ *2305*	20 *508*	16 *406*	1¼ *32*	3½ *89*	4200 *1905*
16 X 20	300	150	26XA12	93½ *2375*	21 *533*	17 *432*	1¼ *32*	3½ *89*	5500 *2495*
18 Y 24	300	150	26YA12	97½ *2477*	25 *635*	20 *508*	1¼ *32*	3⅝ *92*	7000 *3175*
20 Z 24	300	150	26ZA12	109 *2769*	25 *635*	20 *508*	1¼ *32*	3¾ *95*	7500 *3402*

Note: The “U” orifice weights and dimensions are identical to the “T” orifice on page 75.



Bill of Materials–BalanSeal

ITEM	PART NAME	MATERIAL
1	Body 26( )B12	ASTM A216 Gr. WCB. Carb. St.
2	Bonnet 26( )B12	ASTM A216 Gr. WCB. Carb. St.
3	Cap, Plain Screwed	ASTM A216 Gr. WCB. Carb. St.
4	Disc	Stainless Steel
5	Nozzle	316 St. St.
6	Disc Holder	Stainless Steel
7	Blowdown Ring	Stainless Steel
8	Sleeve Guide 26( )B12	Stainless Steel
9	Stem	Stainless Steel
10	Spring Adjusting Screw	Stainless Steel
11	Jam Nut (Spr. Adj. Screw)	Stainless Steel
12	Lock Screw (B.D.R.)	Stainless Steel
13	Lock Screw Stud	Stainless Steel
14	Stem Retainer	Stainless Steel
15	Spring Button, Lower	Carbon St. Rust Proofed
16	Spring Button, Upper	Carbon St. Rust Proofed
17*	Insert, Spring Button Upper	Stainless Steel
18	Stem Insert	Stainless Steel
19*	Retaining Ring	Stainless Steel
20*	Back-Up Ring	Teflon
21*	Cylinder Plug	Stainless Steel
22*	O-Ring, Cylinder Plug	Ethylene Propylene
23	Body Stud	ASTM A193 Gr. B7, Alloy St.
24	Hex Nut (Body)	ASTM A194 Gr. 2H, Alloy St.
25	Spring 26( )B12	Chrome Alloy, Rust Proofed
26*	Roller Thrust Bearing	Hardened Alloy Steel
27	Cap Gasket	Soft Iron or Steel
28	Body Gasket	Soft Iron or Steel
29	Bonnet Gasket	Soft Iron or Steel
30	Lock Screw Gasket	Soft Iron or Steel
31	Hex Nut (B.D.R.L.S.)	Stainless Steel
32	Lock Screw (D.H.)	Stainless Steel
33	Pipe Plug (Body)	Steel
34	Bellows	Inconel Composite
35*	Bellows Gasket	Flexible Graphite
36*	Forged Eye Bolt	Steel, Galvanized

*Not supplied on U & W orifice

VALVE SIZE INLET X OUTLET	ANSI FLANGE CLASS		TYPE NUMBER CONV.	DIMENSIONS, IN./MM.					APPROX. WEIGHT Lbs./Kg
	INLET RF	OUTLET RF		A (max.)	B	C	E	F	
8 U 10	300	150	26UB12	54½ *1385*	11 *279*	10⅞ *276*	13/16 *21*	2 7/16 *62*	700 *317*
12 W 16	300	150	26WB12	70½ *1791*	16 *406*	14⅛ *359*	13/16 *21*	2 13/16 *71*	2850 *1293*
16 W2 18	300	150	26W2B12	90¾ *2305*	20 *508*	16 *406*	1¼ *32*	3½ *89*	4250 *1927*
16 X 20	300	150	26XB12	93½ *2375*	21 *533*	17 *432*	1¼ *32*	3½ *89*	5550 *2517*
18 Y 24	300	150	26YB12	97½ *2477*	25 *635*	20 *508*	1¼ *32*	3⅝ *92*	7050 *3197*
20 Z 24	300	150	26ZB12	109 *2769*	25 *635*	20 *508*	1¼ *32*	3¾ *95*	7550 *3424*

Note: The "U" orifice weights and dimensions are identical to the "T" orifice on page 75.

AIR CAPACITIES

10% OVERPRESSURE.
ASME PRESSURE VESSEL CODE (UV) CAPACITIES IN STANDARD CUBIC FEET PER MINUTE AT 60 °F

Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches					
	U	W	W2	X	Y	Z
	31.5	63.62	104.0	113.1	143.1	176.7
20	18677	37723	61666	67062	84850	104773
30	23632	47729	78023	84850	107357	132564
40	29081	58736	96016	104417	132114	163135
50	34531	69742	114009	123984	156872	193705
60	39981	80749	132001	143552	181629	224276
70	45431	91756	149994	163119	206387	254846
80	50880	102763	167987	182686	231144	285417
90	56330	113769	185980	202253	255901	315987
100	61780	124776	203973	221820	280659	346558
125	75404	152293	248955	270738	342552	422984
150	89029	179810	293937	319656	404446	499410
175	102653	207327	338919	368574	466340	575837
200	116277	234844	383901	417492	528233	652263
250	143526	289878	473865	515328	652020	805116
300	170775	344912	563829	613164	775808	957968

STEAM CAPACITIES

10% OVERPRESSURE
ASME PRESSURE VESSEL CODE (UV) CAPACITIES IN POUNDS PER HOUR AT SATURATION TEMPERATURE

Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches					
	U	W	W2	X	Y	Z
	31.5	63.62	104.0	113.1	143.1	176.7
20	52474	105981	173248	188407	238383	294355
30	66393	134093	219202	238383	238383	372434
40	81703	165016	269752	293356	371169	458320
50	97014	195939	320302	348329	440724	544206
60	112325	226861	370852	403302	510278	630092
70	127636	257784	421402	458275	579833	715979
80	142947	288707	471952	513248	649388	801865
90	158257	319630	522502	568221	718943	887751
100	173568	350553	573052	623194	788498	973638
125	211845	427861	699427	760627	962384	1188353
150	250122	505168	825802	898059	1136271	1403069
175	288399	582475	952176	1035492	1310158	1617785
200	326676	659783	1078551	1172924	1484045	1832500
250	403230	814397	1331301	1447790	1831819	2261932
300	479784	969012	1584050	1722655	2179593	2691363

WATER CAPACITIES

25% OVERPRESSURE [4]
CAPACITIES IN GALLONS PER MINUTE AT 70 °F NON CODE

Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches					
	U	W	W2	X	Y	Z
	31.5	63.62	104.0	113.1	143.1	176.7
20	3742	6962	11381	12377	15660	19337
30	4483	8527	13939	15159	19179	23683
40	5176	9846	16095	17504	22147	27347
50	5787	11008	17995	19570	24761	30575
60	6340	12059	19713	21438	27124	33493
70	6848	13025	21292	23155	29297	36177
80	7320	13924	22762	24754	31320	38674
90	7765	14769	24143	26256	33220	41020
100	8185	15568	25449	27676	35017	43239
125	9151	17405	28453	30943	39150	48343
150	—	19067	31169	33896	42887	52957
175	—	20594	33666	36612	46324	57200
200	—	22016	35991	39140	49522	61150
250	—	24615	40239	43760	55367	68368
300	—	26965	44080	47937	60652	74893

General Notes:

1. Capacities at 30 PSIG and below are based on 3 PSI overpressure.
2. For sizing purposes using the ASME actual areas, the certified coefficient of discharge K for air, gas, and steam service is 0.858.
3. For sizing purposes using the actual areas, the coefficient of discharge K for water is 0.576.
4. The “U” orifice meets the requirements of ASME Code Section VIII. Capacities listed in the table for the “U” orifice are based on 10% overpressure.

AIR CAPACITIES

10% OVERPRESSURE
ASME PRESSURE VESSEL CODE (UV) CAPACITIES IN STANDARD CUBIC METERS PER MINUTE AT 15.6 °C

Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. cm					
	U	W	W2	X	Y	Z
	203.2	410.2	670.8	729.5	923.0	1139.7
1.4	533	1077	1761	1915	2423	2992
2	655	1324	2164	2353	2978	3677
3	878	1773	2899	3153	3989	4926
4	1102	2226	3639	3957	5007	6183
5	1326	2678	4378	4761	6024	7439
6	1550	3131	5118	5566	7042	8696
7	1774	3583	5857	6370	8060	9952
8	1998	4035	6597	7174	9077	11209
9	2222	4488	7336	7978	10095	12465
10	2446	4940	8076	8783	11113	13722
12	2894	5845	9555	10391	13148	16235
14	3342	6750	11034	12000	15183	18748
16	3790	7655	12513	13608	17218	21261
18	4238	8559	13993	15217	19253	23774
20.7	4843	9781	15989	17388	22001	27167

STEAM CAPACITIES

10% OVERPRESSURE
ASME PRESSURE VESSEL CODE (UV) CAPACITIES IN KILOGRAMS PER HOUR AT SATURATION TEMPERATURE

Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. cm					
	U	W	W2	X	Y	Z
	203.2	410.2	670.8	729.5	923.0	1139.7
1.4	24003	48480	79251	86185	109046	134650
2	29501	59584	97403	105926	134023	165492
3	39520	79818	130480	141897	179535	221690
4	49600	100176	163759	178088	225326	278233
5	59679	120534	197038	214279	271117	334776
6	69759	140892	230317	250470	316908	391319
7	79839	161250	263597	286662	362699	447861
8	89919	181608	296876	322853	408490	504404
9	99999	201966	330155	359044	454281	560947
10	110078	222324	363435	395235	500072	617490
12	130238	263040	429993	467618	591654	730576
14	150398	303756	496552	540000	683237	843661
16	170557	344472	563111	612383	774819	956747
18	190717	385188	629669	684765	866401	1069833
20.7	217932	440154	719523	782482	990037	1222498

WATER CAPACITIES

25% OVERPRESSURE [4]
CAPACITIES IN LITERS PER MINUTE AT 21 °C NON CODE

Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. cm					
	U	W	W2	X	Y	Z
	203.2	410.2	670.8	729.5	923.0	1139.7
20	14166	25276	41319	44935	56854	70203
30	16968	30276	49493	53824	68101	84091
40	19593	9236	15099	16420	20775	25654
50	21906	39087	63895	69486	87918	108561
60	23997	42817	69994	76119	96309	118923
70	25920	46248	75602	82217	104026	128451
80	27709	49441	80822	87894	111208	137320
90	29390	52440	85725	93226	117954	145650
100	30980	55277	90362	98269	124335	153529
125	34637	61802	101028	109868	139011	171651
150	37943	67700	110671	120354	152279	188034
175	40983	73125	119538	129997	164480	203100
200	43813	78174	127791	138973	175836	217123
250	48984	87401	142875	155377	196591	242751
300	53660	95743	156512	170207	215355	265920

General Notes:

1. Capacities at 30 PSIG and below are based on 3 PSI overpressure.
2. For sizing purposes using the ASME actual areas, the certified coefficient of discharge K for air, gas, and steam service is 0.858.
3. For sizing purposes using the actual areas, the coefficient of discharge K for water is 0.576.
4. The “U” orifice meets the requirements of ASME Code Section VIII. Capacities listed in the table for the “U” orifice are based on 10% overpressure.

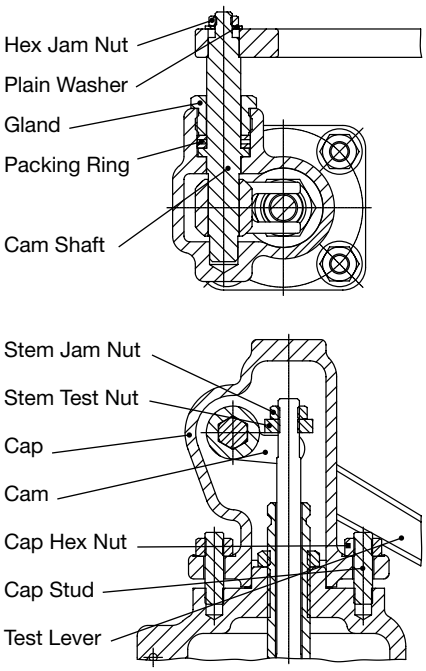
Cap Constructions
Standard Material & Material for Corrosive/Low Temperature Service - Stainless Steel

Cap Description	Part Name	Std. Materials S1, N1 -20°F to 800°F	316 St. St.	
			S3 -75°F to 800°F	S4 -450 °F to 450°F
Packed Lever	Cap	Carbon Steel	316 St.	316 St.
	Test Lever	Carbon Steel	—	—
	Cam	316 St. St.	—	—
	Cam Shaft	316 St. St.	—	—
	Gland	316 St. St.	—	—
	Stem Jam Nut	316 St. St.	—	—
	Stem Test Nut	316 St. St.	—	—
	Packing Ring	Graphite	—	—
	Plain Washer	Steel	—	—
	Lever Hex. Jam Nut	Steel	—	—
	Cap Stud	Alloy Steel	Stainless Steel	Stainless Steel
	Cap Hex. Nut	Alloy Steel	Stainless Steel	Stainless Steel
Open Lever (Single or Double Acting)	Cap	Iron	—	—
	Test Lever	Iron	—	—
	Test Lever Fork	Iron	—	—
	Stem Jam Nut	316 St. St.	—	—
	Stem Test Nut	316 St. St.	—	—
	Cap Screw	Steel, Plated	—	—
	Fork Rd. Hd. Rivet	Steel	—	—
	Lever Rd. Hd. Rivet	Steel	—	—
	Cotter Pin	Steel, Plated	—	—

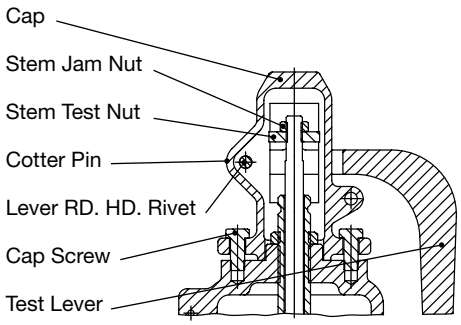
Cap Constructions
Standard Material for Corrosive Service - Monel & Hastelloy C

Cap Description	Part Name	Monel			Hastelloy C		
		M2 -20°F to 800°F		M3 & M4 -20°F to 800°F	H2 -20°F to 500°F		H3 & H4 -20°F to 500°F
		Conventional	BalanSeal	Conventional & BalanSeal	Conventional	BalanSeal	Conventional & BalanSeal
Packed Lever	Cap	—	—	Monel	—	—	Hastelloy C
	Test Lever	—	—	—	—	—	—
	Cam	Monel	—	Monel	Monel	—	Hastelloy C
	Cam Shaft	Monel	—	Monel	Monel	—	Hastelloy C
	Gland	Monel	—	Monel	Monel	—	Hastelloy C
	Stem Jam Nut	Monel	—	Monel	Monel	—	Hastelloy C
	Stem Test Nut	Monel	—	Monel	Monel	—	Graphite
	Packing Ring	Graphite	—	Graphite	Graphite	—	Not Used
	Plain Washer	—	—	—	—	—	—
	Lever Hex. Jam Nut	—	—	—	—	—	—
	Cap Stud	—	—	Hastelloy C	—	—	Hastelloy C
	Cap Hex. Nut	—	—	Hastelloy C	—	—	Hastelloy C
Open Lever (Single or Double Acting)	Cap	—	—	—	—	—	—
	Test Lever	—	—	—	—	—	—
	Test Lever Fork	—	—	—	—	—	—
	Stem Jam Nut	Monel	—	Monel	Monel	—	Hastelloy C
	Stem Test Nut	Monel	—	Monel	Monel	—	Hastelloy C
	Cap Screw	—	—	—	—	—	—
	Fork Rd. Hd. Rivet	—	—	—	—	—	—
	Lever Rd. Hd. Rivet	—	—	—	—	—	—
	Cotter Pin	—	—	—	—	—	—

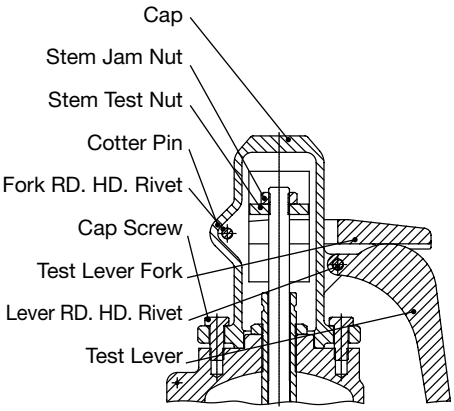
Notes:
1. Any part denoted with a dash is standard. Cap assembly materials are standard in M1 & H1 trim.
2. Cap assembly materials N1 & N4 are the same as standard BalanSeal design, except the cap studs and hex nuts are B7M & 2HM (N1 trim) and B8MA & 8MA (N4 trim) respectively.



Packed Lever
2600 Series, All Sizes

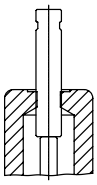


Open Lever
(Single Acting Lever)
2600 Series, Types 26( )A10, A11, A20, A21,
All Sizes Except 8x10

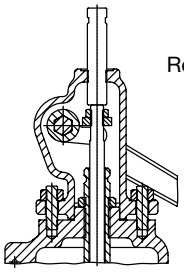


Open Lever
(Double Acting Lever)
2600 Series, Sizes 1x2 Thru 6x10 Except
Types 26( )A10, A11, A20, A21,
Sizes 8x10, All Types

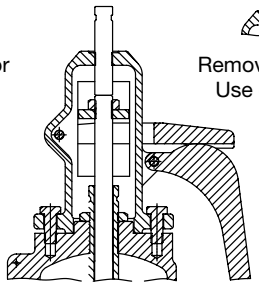
Test Gag Installations



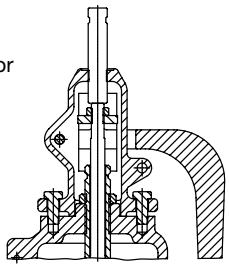
Plain Screwed Cap
2600 Series, All Sizes



Packed Lever
2600 Series, All Sizes



Open Lever
(Double Acting Lever)
2600 Series, Sizes 1x2 Thru 6x10 Except
Types 26( )A10, A11
Sizes 8x10, All Types

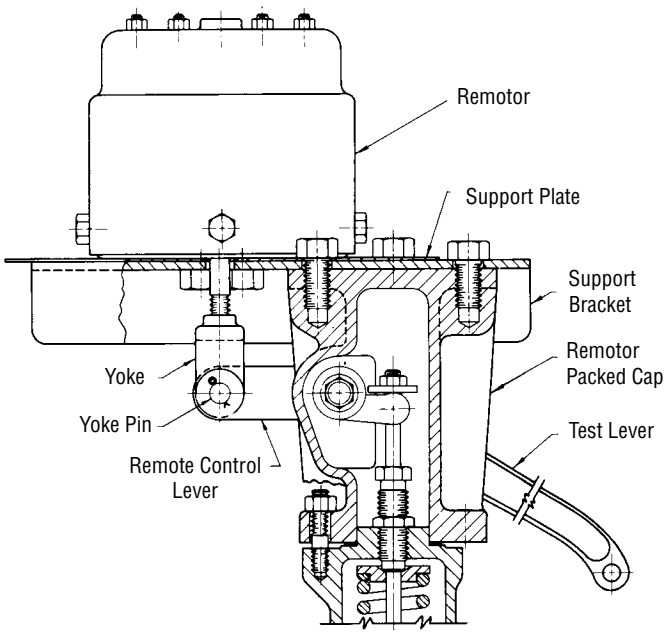


Open Lever
(Single Acting Lever)
2600 Series, Types 26( )A10, A11, A20, A21,
All Sizes Except 8x10

Remotor

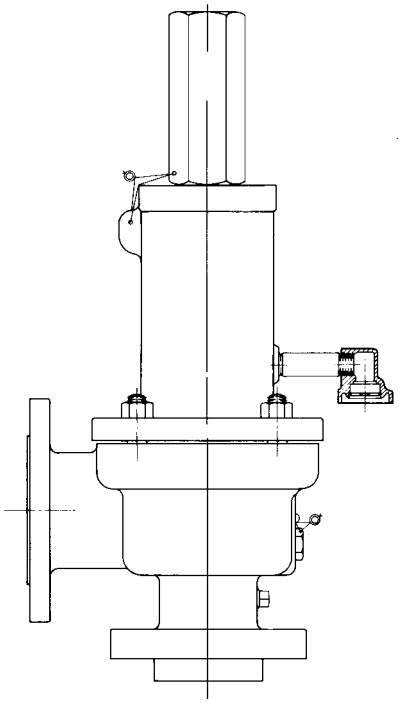
The Farris Remotor air operated depressuring unit is an economical way to rapidly depressurize vessels in the event of an emergency, combining pressure relief and drop out service in one installation.

- Operates by air pressure from remote point.
- Rapidly depressurizes vessels in service to predetermined limit or to zero psig.
- Extra power motor affords one regulated power supply for series of valve installations.
- Rolling diaphragm withstands greater pressures at constant effective area.
- Weatherproof and maintenance free.
- Compact design for easy installation.
- Allows normal use of test lever.



Valve Position Indicators (not shown)

Limit or proximity switch accessories are available. These devices mount on any cap construction and provide a signal locally or to remote locations to indicate the valve has operated. Consult Factory for details.



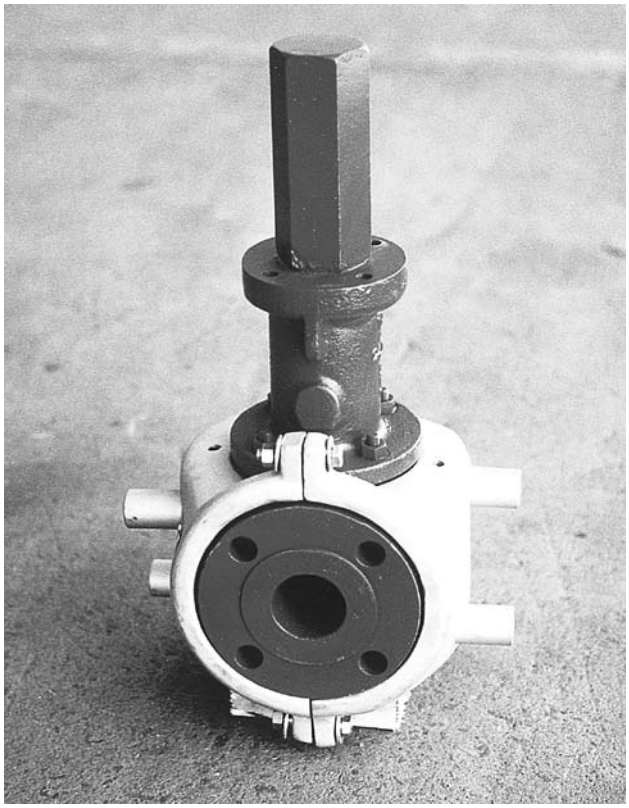
Bugproof Vent

This option is available for use on all BalanSeal bellows designs.

Steam Jacketing

Viscous or heavy residual processes that tend to freeze in relief valve nozzles can create hazardous operating conditions. Jacketing or tracing of adjacent inlet piping and the pipe-away may not be enough to prevent product solidification under the valve seat or even in the valve inlet nozzle. If a pressure surge causes the valve to relieve, some of the solidified material can stick to the seat, preventing the valve from completely re-seating. This usually results in continuous process weepage around the valve seating surface.

The solution is to keep the valve warm enough to prevent build-ups of these high-melting processes.



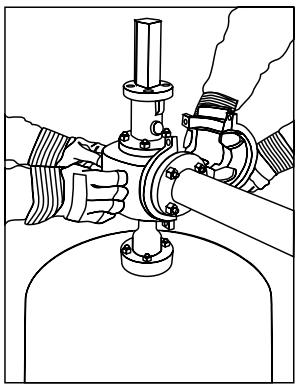
ControHeat Bolt-On Jacket

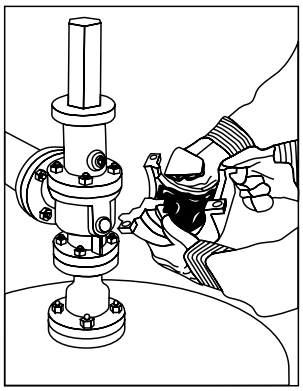
This valve jacket is easy to install and maintain. It covers the valve flange to flange, providing uniform heat to all process wetted surfaces. The jacket consists of two aluminum castings with steel pressure chambers cast into the aluminum. The steel pressure chambers receive the heating fluid (steam, hot water or hot oil) and rapidly transfer the heat through the aluminum to the valve body. The pressure chambers are designed and tested in accordance with ASME BPV Code, Section XIII.

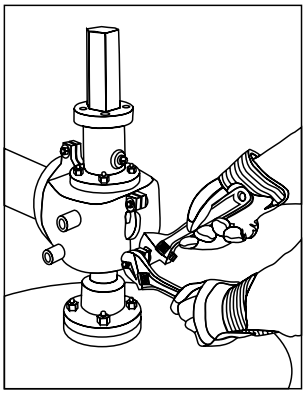
Standard service ratings for the jacket are 150 psig (10 barg) and 500°F (260°C). Higher ratings are available for service to 600 psig (40 barg) and 750°F (400°C). The jacket may be ordered with adjacent flange coverage.

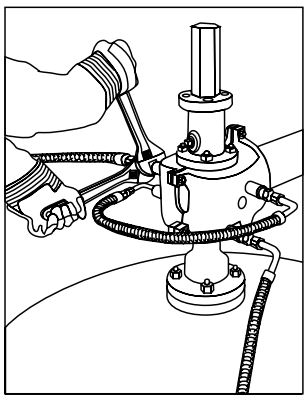
Installation

1. Install the Farris safety relief valve in the line.
2. Verify the fit of the jacket on the valve.
3. Spread heat transfer mastic (HTM) on valve body and surfaces of jacket.
4. Bolt jacket halves onto valve. Clean excess HTM from jacket.
5. Make heating medium connections to jacket.

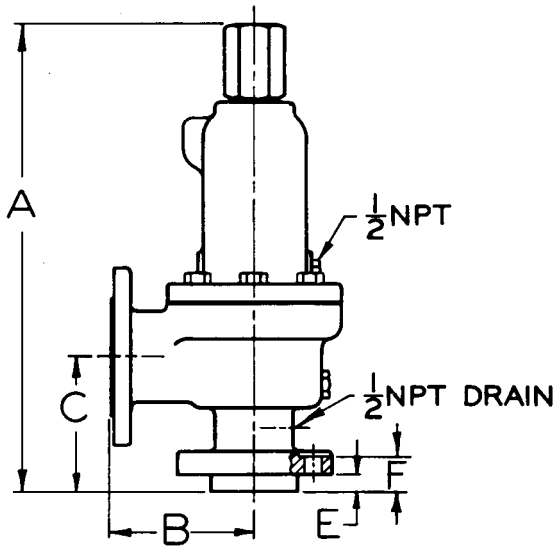








Dimensions & Weights



Size	Type	U.S. Standard Dimensions (inches)						Approx. Weight Lbs.	Metric Dimensions (millimeters)						Approx. Weight kg
Inlet x Outlet	Conventional	A		B	C	E	F		A		B	C	E	F	
		Vapor	Liquid						Vapor	Liquid					
1 x 2	26DA10	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26DA11	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26DA12	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26DA13	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 1/2 x 2	26DA14	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2	26DA15	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2 1/2	26DA16	23 1/2	23 1/2	6 1/2	5 1/2	11/16	2 7/16	80	597	597	166	140	18	62	37
1 1/2 x 3	26DA16A	23 1/2	23 1/2	7	5 1/2	11/16	2 5/8	80	597	597	178	140	18	67	37
1 x 2	26DA20	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26DA21	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26DA22	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26DA23	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 1/2 x 2	26DA24	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2	26DA25	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2 1/2	26DA26	23 1/2	23 1/2	6 1/2	5 1/2	11/16	2 7/16	80	597	597	166	140	18	62	37
1 1/2 x 3	26DA26A	23 1/2	23 1/2	7	5 1/2	11/16	2 5/8	80	597	597	178	140	18	67	37
1 x 2	26DA32	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26DA33	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 1/2 x 2	26DA34	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2	26DA35	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2 1/2	26DA36	23 1/2	23 1/2	6 1/2	5 1/2	11/16	2 7/16	80	597	597	166	140	18	62	37
1 1/2 x 3	26DA36A	23 1/2	23 1/2	7	5 1/2	11/16	2 5/8	80	597	597	178	140	18	67	37
1 x 2	26EA10	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26EA11	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26EA12	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26EA13	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 1/2 x 2	26EA14	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2	26EA15	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2 1/2	26EA16	23 1/2	23 1/2	6 1/2	5 1/2	11/16	2 7/16	80	597	597	166	140	18	62	37
1 1/2 x 3	26EA16A	23 1/2	23 1/2	7	5 1/2	11/16	2 5/8	80	597	597	178	140	18	67	37
1 x 2	26EA20	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26EA21	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26EA22	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26EA23	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 1/2 x 2	26EA24	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2	26EA25	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2 1/2	26EA26	23 1/2	23 1/2	6 1/2	5 1/2	11/16	2 7/16	80	597	597	166	140	18	62	37
1 1/2 x 3	26EA26A	23 1/2	23 1/2	7	5 1/2	11/16	2 5/8	80	597	597	178	140	18	67	37
1 x 2	26EA32	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 x 2	26EA33	19	19	4 1/2	4 1/8	1/2	1 3/16	42	483	483	115	105	13	31	20
1 1/2 x 2	26EA34	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2	26EA35	23 1/2	23 1/2	5 1/2	4 1/8	11/16	1 15/16	50	597	597	140	105	18	50	23
1 1/2 x 2 1/2	26EA36	23 1/2	23 1/2	6 1/2	5 1/2	11/16	2 7/16	80	597	597	166	140	18	62	37
1 1/2 x 3	26EA36A	23 1/2	23 1/2	7	5 1/2	11/16	2 5/8	80	597	597	178	140	18	67	37

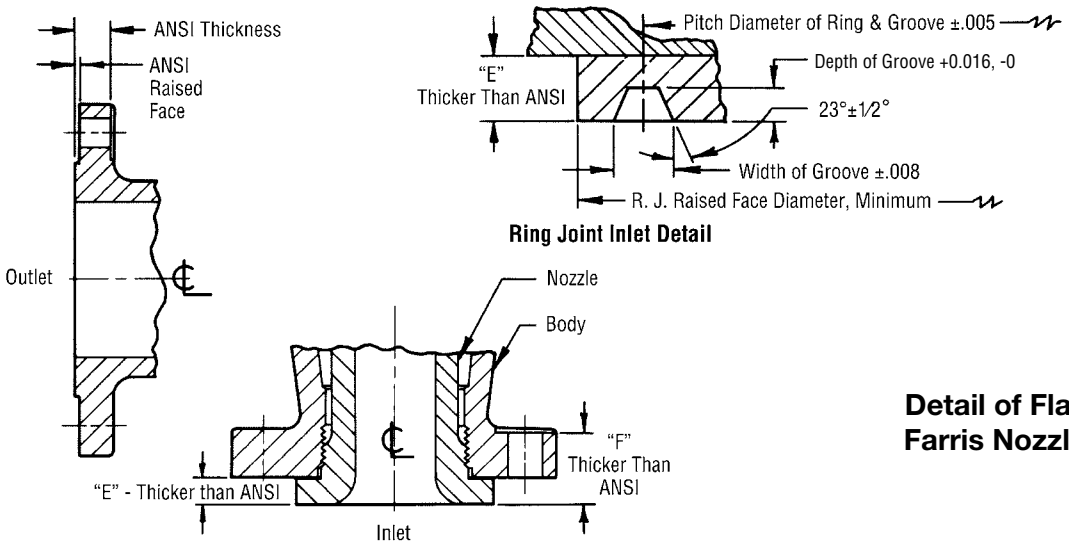
Size	Type	U.S. Standard Dimensions (inches)						Approx. Weight Lbs.	Metric Dimensions (millimeters)						Approx. Weight kg
Inlet x Outlet	Conventional	A		B	C	E	F		A		B	C	E	F	
		Vapor	Liquid						Vapor	Liquid					
1 1/2 x 2	26FA10	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 1/4	44	496	496	121	124	18	32	20
1 1/2 x 2	26FA11	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 9/16	44	496	496	121	124	18	40	20
1 1/2 x 2	26FA12	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 2	26FA13	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 2 1/2	26FA14	23 1/2	23 1/2	6	4 7/8	11/16	1 15/16	70	597	597	153	124	18	50	32
1 1/2 x 3	26FA14A	23 1/2	23 1/2	6 1/2	4 7/8	11/16	1 15/16	70	597	597	166	124	18	50	32
1 1/2 x 2 1/2	26FA15	23 1/2	23 1/2	6	4 7/8	11/16	1 15/16	70	597	597	153	124	18	50	32
1 1/2 x 3	26FA15A	23 1/2	23 1/2	6 1/2	4 7/8	11/16	1 15/16	70	597	597	166	124	18	50	32
1 1/2 x 2 1/2	26FA16	23 1/2	23 1/2	6 1/2	5 1/2	11/16	2 7/16	80	597	597	166	140	18	62	37
1 1/2 x 3	26FA16A	23 1/2	23 1/2	7	5 1/2	11/16	2 7/16	80	597	597	178	140	18	62	37
1 1/2 x 2	26FA20	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 1/4	44	496	496	121	124	18	32	20
1 1/2 x 2	26FA21	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 9/16	44	496	496	121	124	18	40	20
1 1/2 x 2	26FA22	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 2	26FA23	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 2 1/2	26FA24	23 1/2	23 1/2	6	4 7/8	11/16	1 15/16	70	597	597	153	124	18	50	32
1 1/2 x 3	26FA24A	23 1/2	23 1/2	6 1/2	4 7/8	11/16	1 15/16	70	597	597	166	124	18	50	32
1 1/2 x 2 1/2	26FA25	23 1/2	23 1/2	6	4 7/8	11/16	1 15/16	70	597	597	153	124	18	50	32
1 1/2 x 3	26FA25A	23 1/2	23 1/2	6 1/2	4 7/8	11/16	1 15/16	70	597	597	166	124	18	50	32
1 1/2 x 2 1/2	26FA26	23 1/2	23 1/2	6 1/2	5 1/2	11/16	2 7/16	80	597	597	166	140	18	62	37
1 1/2 x 3	26FA26A	23 1/2	23 1/2	7	5 1/2	11/16	2 7/16	80	597	597	178	140	18	62	37
1 1/2 x 2	26FA32	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 2	26FA33	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 2 1/2	26FA34	23 1/2	23 1/2	6	4 7/8	11/16	1 15/16	70	597	597	153	124	18	50	32
1 1/2 x 3	26FA34A	23 1/2	23 1/2	6 1/2	4 7/8	11/16	1 15/16	70	597	597	166	124	18	50	32
1 1/2 x 2 1/2	26FA35	23 1/2	23 1/2	6	4 7/8	11/16	1 15/16	70	597	597	153	124	18	50	32
1 1/2 x 3	26FA35A	23 1/2	23 1/2	6 1/2	4 7/8	11/16	1 15/16	70	597	597	166	124	18	50	32
1 1/2 x 2 1/2	26FA36	23 1/2	23 1/2	6 1/2	5 1/2	11/16	2 7/16	80	597	597	166	140	18	62	37
1 1/2 x 3	26FA36A	23 1/2	23 1/2	7	5 1/2	11/16	2 7/16	80	597	597	178	140	18	62	37
1 1/2 x 2 1/2	26GA10	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 1/4	50	496	496	121	124	18	32	23
1 1/2 x 3	26GA10A	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 1/4	50	496	496	121	124	18	32	23
1 1/2 x 2 1/2	26GA11	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 9/16	50	496	496	121	124	18	40	23
1 1/2 x 3	26GA11A	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 9/16	50	496	496	121	124	18	40	23
1 1/2 x 2 1/2	26GA12	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 3	26GA12A	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 2 1/2	26GA13	23 1/2	23 1/2	6	4 7/8	11/16	1 9/16	50	597	597	153	124	18	40	23
1 1/2 x 3	26GA13A	23 1/2	23 1/2	6	4 7/8	11/16	1 9/16	50	597	597	153	124	18	40	23
1 1/2 x 2 1/2	26GA14	23 1/2	23 1/2	6	4 7/8	11/16	1 15/16	70	597	597	153	124	18	50	32
1 1/2 x 3	26GA14A	23 1/2	23 1/2	6 1/2	4 7/8	11/16	1 15/16	70	597	597	166	124	18	50	32
2 x 3	26GA15	24	24	6 3/4	6 1/8	11/16	2 3/16	85	610	610	172	156	18	56	39
2 x 3	26GA16	24	24	6 3/4	6 1/8	11/16	2 11/16	95	610	610	172	156	18	69	44
1 1/2 x 2 1/2	26GA20	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 1/4	50	496	496	121	124	18	32	23
1 1/2 x 3	26GA20A	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 1/4	50	496	496	121	124	18	32	23
1 1/2 x 2 1/2	26GA21	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 9/16	50	496	496	121	124	18	40	23
1 1/2 x 3	26GA21A	19 1/2	19 1/2	4 3/4	4 7/8	11/16	1 9/16	50	496	496	121	124	18	40	23
1 1/2 x 2 1/2	26GA22	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 3	26GA22A	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 2 1/2	26GA23	23 1/2	23 1/2	6	4 7/8	11/16	1 9/16	50	597	597	153	124	18	40	23
1 1/2 x 3	26GA23A	23 1/2	23 1/2	6	4 7/8	11/16	1 9/16	50	597	597	153	124	18	40	23
1 1/2 x 2 1/2	26GA24	23 1/2	23 1/2	6	4 7/8	11/16	1 15/16	70	597	597	153	124	18	50	32
1 1/2 x 3	26GA24A	23 1/2	23 1/2	6 1/2	4 7/8	11/16	1 15/16	70	597	597	166	124	18	50	32
2 x 3	26GA25	24	24	6 3/4	6 1/8	11/16	2 3/16	85	610	610	172	156	18	56	39
2 x 3	26GA26	24	24	6 3/4	6 1/8	11/16	2 11/16	95	610	610	172	156	18	69	44
1 1/2 x 2 1/2	26GA32	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 3	26GA32A	23	23	6	4 7/8	11/16	1 9/16	50	585	585	153	124	18	40	23
1 1/2 x 2 1/2	26GA33	23 1/2	23 1/2	6	4 7/8	11/16	1 9/16	50	597	597	153	124	18	40	23
1 1/2 x 3	26GA33A	23 1/2	23 1/2	6	4 7/8	11/16	1 9/16	50	597	597	153	124	18	40	23
1 1/2 x 2 1/2	26GA34	23 1/2	23 1/2	6	4 7/8	11/16	1 15/16	70	597	597	153	124	18	50	32
1 1/2 x 3	26GA34A	23 1/2	23 1/2	6 1/2	4 7/8	11/16	1 15/16	70	597	597	166	124	18	50	32
2 x 3	26GA35	24	24	6 3/4	6 1/8	11/16	2 3/16	85	610	610	172	156	18	56	39
2 x 3	26GA36	24	24	6 3/4	6 1/8	11/16	2 11/16	95	610	610	172	156	18	69	44
1 1/2 x 3	26HA10	20	20	4 7/8	5 1/8	11/16	1 1/4	54	508	508	124	131	18	32	25
1 1/2 x 3	26HA11	20	20	4 7/8	5 1/8	11/16	1 1/2	54	508	508	124	131	18	39	25
2 x 3	26HA12	23	23	4 7/8	5 1/8	11/16	1 11/16	70	585	585	124	131	18	43	32
2 x 3	26HA13	24	24	6 3/8	6 1/16	11/16	1 11/16	70	610	610	162	154	18	43	32
2 x 3	26HA14	24	24	6 3/8	6 1/16	11/16	2 3/16	85	610	610	162	154	18	56	39
2 x 3	26HA15	24	24	6 3/8	6 1/16	11/16	2 3/16	85	610	610	162	154	18	56	39

Dimensions & Weights

Size Inlet x Outlet	Type Conventional	U.S. Standard Dimensions (inches) A Vapor	A Liquid	B	C	E	F	Approx. Weight Lbs.	Metric Dimensions (millimeters) A Vapor	A Liquid	B	C	E	F	Approx. Weight kg
1 1/2 x 3	26HA20	20	20	4 7/8	5 1/8	11/16	1 1/4	54	508	508	124	131	18	32	25
1 1/2 x 3	26HA21	20	20	4 7/8	5 1/8	11/16	1 1/2	54	508	508	124	131	18	39	25
2 x 3	26HA22	23	23	4 7/8	5 1/8	11/16	1 11/16	70	585	585	124	131	18	43	32
2 x 3	26HA23	24	24	6 3/8	6 1/16	11/16	1 11/16	70	610	610	162	154	18	43	32
2 x 3	26HA24	24	24	6 3/8	6 1/16	11/16	2 3/16	85	610	610	162	154	18	56	39
2 x 3	26HA25	24	24	6 3/8	6 1/16	11/16	2 3/16	85	610	610	162	154	18	56	39
2 x 3	26HA32	23	23	4 7/8	5 1/8	11/16	1 11/16	70	585	585	124	131	18	43	32
2 x 3	26HA33	23	23	6 3/8	6 1/16	11/16	1 11/16	70	585	585	162	154	18	43	32
2 x 3	26HA34	24	24	6 3/8	6 1/16	11/16	2 3/16	85	610	610	162	154	18	56	39
2 x 3	26HA35	24	24	6 3/8	6 1/16	11/16	2 3/16	85	610	610	162	154	18	56	39
2 x 3	26JA10	23	23	4 7/8	5 3/8	11/16	1 5/16	58	585	585	124	137	18	34	27
2 x 3	26JA11	23	23	4 7/8	5 3/8	11/16	1 11/16	58	585	585	124	137	18	43	27
2 1/2 x 4	26JA12	25	27	5 5/8	5 3/8	11/16	1 13/16	150	635	686	143	137	18	47	69
3 x 4	26JA12A	26	28 1/2	7 1/8	7 1/4	11/16	2 1/8	150	661	724	181	185	18	54	69
2 1/2 x 4	26JA13	27 1/2	34 1/2	6 3/4	6 1/8	11/16	1 13/16	150	699	877	172	156	18	47	69
3 x 4	26JA13A	28 1/2	35 1/2	7 1/8	7 1/4	11/16	2 1/8	150	724	902	181	185	18	54	69
3 x 4	26JA14	36	36	7 1/8	7 1/4	11/16	2 3/16	175	915	915	181	185	18	56	80
3 x 4	26JA15	36	36	7 1/8	7 1/4	11/16	2 9/16	175	915	915	181	185	18	66	80
2 x 3	26JA20	23	23	4 7/8	5 3/8	11/16	1 5/16	58	585	585	124	137	18	34	27
2 x 3	26JA21	23	23	4 7/8	5 3/8	11/16	1 11/16	58	585	585	124	137	18	43	27
2 1/2 x 4	26JA22	25	27	5 5/8	5 3/8	11/16	1 13/16	150	635	686	143	137	18	47	69
3 x 4	26JA22A	26	28 1/2	7 1/8	7 1/4	11/16	2 1/8	150	661	724	181	185	18	54	69
2 1/2 x 4	26JA23	27 1/2	34 1/2	6 3/4	6 1/8	11/16	1 13/16	150	699	877	172	156	18	47	69
3 x 4	26JA23A	28 1/2	35 1/2	7 1/8	7 1/4	11/16	2 1/8	150	724	902	181	185	18	54	69
3 x 4	26JA24	36	36	7 1/8	7 1/4	11/16	2 3/16	175	915	915	181	185	18	56	80
3 x 4	26JA25	36	36	7 1/8	7 1/4	11/16	2 3/16	175	915	915	181	185	18	56	80
2 1/2 x 4	26JA32	25	27	5 5/8	5 3/8	11/16	1 13/16	150	635	686	143	137	18	47	69
3 x 4	26JA32A	26	28 1/2	7 1/8	7 1/4	11/16	2 1/8	150	661	724	181	185	18	54	69
2 1/2 x 4	26JA33	27 1/2	34 1/2	5 5/8	5 3/8	11/16	1 13/16	150	699	877	143	137	18	47	69
3 x 4	26JA33A	28 1/2	35 1/2	7 1/8	7 1/4	11/16	2 1/8	150	724	902	181	185	18	54	69
2 1/2 x 4	26JA34	25	25	6 3/4	6 1/8	11/16	2 5/16	175	635	635	172	156	18	59	80
3 x 4	26JA34A	26	26	7 1/8	7 1/4	11/16	2 3/8	175	661	661	181	185	18	61	80
3 x 4	26JA35	36	36	7 1/4	7 1/8	11/16	2 9/16	175	915	915	185	181	18	66	80
3 x 4	26KA10	26 1/2	28 1/2	6 3/8	6 1/8	11/16	1 1/2	145	674	724	162	156	18	39	66
3 x 4	26KA11	26 1/2	28 1/2	6 3/8	6 1/8	11/16	1 15/16	145	674	724	162	156	18	50	66
3 x 4	26KA12	28 1/2	32	6 3/8	6 1/8	11/16	1 15/16	160	724	813	162	156	18	50	73
3 x 4	26KA13	34	34	7 1/8	7 1/4	11/16	1 15/16	160	864	864	181	185	18	50	73
3 x 6	26KA14	37 1/2	37 1/2	8 1/2	7 13/16	11/16	2 3/16	230	953	953	216	199	18	56	105
3 x 6	26KA15	37 1/2	37 1/2	8 1/2	7 3/4	11/16	2 9/16	230	953	953	216	197	18	66	105
3 x 4	26KA20	26 1/2	28 1/2	6 3/8	6 1/8	11/16	1 1/2	145	674	724	162	156	18	39	66
3 x 4	26KA21	26 1/2	28 1/2	6 3/8	6 1/8	11/16	1 15/16	145	674	724	162	156	18	50	66
3 x 4	26KA22	28 1/2	32	6 3/8	6 1/8	11/16	1 15/16	160	724	813	162	156	18	50	73
3 x 4	26KA23	34	34	7 1/8	7 1/4	11/16	1 15/16	160	864	864	181	185	18	50	73
3 x 6	26KA24	37 1/2	37 1/2	8 1/2	7 13/16	11/16	2 3/16	230	953	953	216	199	18	56	105
3 x 6	26KA25	37 1/2	37 1/2	8 1/2	7 3/4	11/16	2 9/16	230	953	953	216	197	18	66	105
3 x 4	26KA32	28 1/2	32	6 3/8	6 1/8	11/16	1 15/16	160	724	813	162	156	18	50	73
3 x 4	26KA33	28 1/2	28 1/2	6 3/8	6 1/8	11/16	1 15/16	160	724	724	162	156	18	50	73
3 x 4	26KA34	34	34	7 1/8	7 1/4	11/16	2 3/16	230	864	864	181	185	18	56	105
3 x 6	26KA34A	34	34	8 1/2	7 13/16	11/16	2 3/8	175	864	864	216	199	18	61	80
3 x 6	26KA35	37 1/2	37 1/2	8 1/2	7 3/4	11/16	2 9/16	230	953	953	216	197	18	66	105
3 x 4	26LA10	26 1/2	28 1/2	6 1/2	6 1/8	11/16	1 1/2	145	674	724	166	156	18	39	66
3 x 4	26LA11	26 1/2	28 1/2	6 1/2	6 1/8	11/16	1 15/16	145	674	724	166	156	18	50	66
4 x 6	26LA12	37 1/2	37 1/2	7 1/8	7 1/16	11/16	1 15/16	230	953	953	181	180	18	50	105
4 x 6	26LA13	37 1/2	37 1/2	8	7 1/16	11/16	2 3/16	230	953	953	204	180	18	56	105
4 x 6	26LA14	43	43	8 3/4	7 3/4	11/16	2 7/16	250	1093	1093	223	197	18	62	114
3 x 4	26LA20	26 1/2	28 1/2	6 1/2	6 1/8	11/16	1 1/2	145	674	724	166	156	18	39	66
3 x 4	26LA21	26 1/2	28 1/2	6 1/2	6 1/8	11/16	1 15/16	145	674	724	166	156	18	50	66
4 x 6	26LA22	37 1/2	37 1/2	7 1/8	7 1/16	11/16	1 15/16	230	953	953	181	180	18	50	105
4 x 6	26LA23	37 1/2	37 1/2	8	7 1/16	11/16	2 3/16	230	953	953	204	180	18	56	105
4 x 6	26LA24	43	43	8 3/4	7 3/4	11/16	2 7/16	250	1093	1093	223	197	18	62	114
4 x 6	26LA25	43	43	8 3/4	7 3/4	11/16	2 13/16	250	1093	1093	223	197	18	72	114
4 x 6	26LA32	37 1/2	37 1/2	7 1/8	7 1/16	11/16	1 15/16	230	953	953	181	180	18	50	105
4 x 6	26LA33	37 1/2	37 1/2	8	7 1/16	11/16	2 3/16	230	953	953	204	180	18	56	105
4 x 6	26LA34	43	43	8 3/4	7 3/4	11/16	2 7/16	250	1093	1093	223	197	18	62	114
4 x 6	26LA35	43	43	8 3/4	7 3/4	11/16	2 13/16	250	1093	1093	223	197	18	72	114

Size	Type	U.S. Standard Dimensions (inches)						Approx. Weight	Metric Dimensions (millimeters)						Approx. Weight
Inlet x Outlet	Conventional	A		B	C	E	F	Lbs.	A		B	C	E	F	kg
		Vapor	Liquid						Vapor	Liquid					
4 x 6	26MA10	31 1/2	37 1/2	7 1/4	7	11/16	1 15/16	190	801	953	185	178	18	50	87
4 x 6	26MA11	31 1/2	37 1/2	7 1/4	7	11/16	1 15/16	190	801	953	185	178	18	50	87
4 x 6	26MA12	37 1/2	37 1/2	7 1/4	7	11/16	1 15/16	230	953	953	185	178	18	50	105
4 x 6	26MA13	43	43	8	7	11/16	2 3/16	250	1093	1093	204	178	18	56	114
4 x 6	26MA20	31 1/2	37 1/2	7 1/4	7	11/16	1 15/16	190	801	953	185	178	18	50	87
4 x 6	26MA21	31 1/2	37 1/2	7 1/4	7	11/16	1 15/16	190	801	953	185	178	18	50	87
4 x 6	26MA22	37 1/2	37 1/2	7 1/4	7	11/16	1 15/16	230	953	953	185	178	18	50	105
4 x 6	26MA23	43	43	8	7	11/16	2 3/16	250	1093	1093	204	178	18	56	114
4 x 6	26MA24	43	43	8 3/4	7 3/4	11/16	2 7/16	250	1093	1093	223	197	18	62	114
4 x 6	26MA32	37 1/2	37 1/2	7 1/4	7	11/16	1 15/16	230	953	953	185	178	18	50	105
4 x 6	26MA33	37 1/2	37 1/2	8	7	11/16	2 3/16	250	953	953	204	178	18	56	114
4 x 6	26MA34	43	43	8 3/4	7 3/4	11/16	2 7/16	250	1093	1093	223	197	18	62	114
4 x 6	26NA10	31 1/2	37 1/2	8 1/4	7 3/4	11/16	1 15/16	190	801	953	210	197	18	50	87
4 x 6	26NA11	31 1/2	37 1/2	8 1/4	7 3/4	11/16	1 15/16	190	801	953	210	197	18	50	87
4 x 6	26NA12	37 1/2	37 1/2	8 1/4	7 3/4	11/16	1 15/16	230	953	953	210	197	18	50	105
4 x 6	26NA13	43	43	8 3/4	7 3/4	11/16	2 3/16	250	1093	1093	223	197	18	56	114
4 x 6	26NA14	43	43	8 3/4	7 3/4	11/16	2 7/16	250	1093	1093	223	197	18	62	114
4 x 6	26NA20	31 1/2	37 1/2	8 1/4	7 3/4	11/16	1 15/16	190	801	953	210	197	18	50	87
4 x 6	26NA21	31 1/2	37 1/2	8 1/4	7 3/4	11/16	1 15/16	190	801	953	210	197	18	50	87
4 x 6	26NA22	37 1/2	37 1/2	8 1/4	7 3/4	11/16	1 15/16	230	953	953	210	197	18	50	105
4 x 6	26NA23	43	43	8 3/4	7 3/4	11/16	2 15/16	250	1093	1093	223	197	18	75	114
4 x 6	26NA24	43	43	8 3/4	7 3/4	11/16	2 7/16	250	1093	1093	223	197	18	62	114
4 x 6	26NA32	37 1/2	37 1/2	8 1/4	7 3/4	11/16	1 15/16	230	953	953	210	197	18	50	105
4 x 6	26NA33	37 1/2	43	8 3/4	7 3/4	11/16	2 3/16	250	953	1093	223	197	18	56	114
4 x 6	26NA34	43	43	8 3/4	7 3/4	11/16	2 7/16	250	1093	1093	223	197	18	62	114
4 x 6	26PA10	31 1/2	37 1/2	9	7 1/8	11/16	1 5/8	190	801	953	229	181	18	42	87
4 x 6	26PA11	31 1/2	37 1/2	9	7 1/8	11/16	1 15/16	190	801	953	229	181	18	50	87
4 x 6	26PA12	37 1/2	37 1/2	10	8 7/8	11/16	2 3/16	230	953	953	254	226	18	56	105
4 x 6	26PA13	43	43	10	8 7/8	11/16	2 3/16	250	1093	1093	254	226	18	56	114
4 x 6	26PA14	43	43	10	8 7/8	11/16	2 7/16	250	1093	1093	254	226	18	62	114
4 x 6	26PA20	31 1/2	37 1/2	9	7 1/8	11/16	1 5/8	190	801	953	229	181	18	42	87
4 x 6	26PA21	31 1/2	37 1/2	9	7 1/8	11/16	1 15/16	190	801	953	229	181	18	50	87
4 x 6	26PA22	37 1/2	37 1/2	10	8 7/8	11/16	2 3/16	230	953	953	254	226	18	56	105
4 x 6	26PA23	43	43	10	8 7/8	11/16	2 3/16	250	1093	1093	254	226	18	56	114
4 x 6	26PA24	43	43	10	8 7/8	11/16	2 7/16	250	1093	1093	254	226	18	62	114
4 x 6	26PA32	37 1/2	37 1/2	10	8 7/8	11/16	2 3/16	230	953	953	254	226	18	56	105
4 x 6	26PA33	43	43	10	8 7/8	11/16	2 3/16	250	1093	1093	254	226	18	56	114
4 x 6	26PA34	43	43	10	8 7/8	11/16	2 7/16	250	1093	1093	254	226	18	62	114
6 x 8	26QA10	40 1/2	51	9 1/2	9 7/16	13/16	1 7/8	345	1029	1296	242	240	21	48	157
6 x 8	26QA11	40 1/2	51	9 1/2	9 7/16	13/16	2 1/4	345	1029	1296	242	240	21	58	157
6 x 8	26QA12	45	51	9 1/2	9 7/16	13/16	2 1/4	430	1143	1296	242	240	21	58	196
6 x 8	26QA13	51	51	9 1/2	9 7/16	13/16	2 11/16	430	1296	1296	242	240	21	69	196
6 x 8	26QA20	40 1/2	51	9 1/2	9 7/16	13/16	1 7/8	345	1029	1296	242	240	21	48	157
6 x 8	26QA21	40 1/2	51	9 1/2	9 7/16	13/16	2 1/4	345	1029	1296	242	240	21	58	157
6 x 8	26QA22	45	51	9 1/2	9 7/16	13/16	2 1/4	430	1143	1296	242	240	21	58	196
6 x 8	26QA23	51	51	9 1/2	9 7/16	13/16	2 11/16	430	1296	1296	242	240	21	69	196
6 x 8	26QA32	45	51	9 1/2	9 7/16	13/16	2 1/4	430	1143	1296	242	240	21	58	196
6 x 8	26QA33	51	51	9 1/2	9 7/16	13/16	2 11/16	430	1296	1296	242	240	21	69	196
6 x 8	H26QA13, 23, 33	51	51	9 1/2	9 7/16	13/16	2 11/16	530	1296	1296	242	240	21	69	241
6 x 8	26RA10	40 1/2	51	9 1/2	9 7/16	13/16	1 7/8	345	1029	1296	242	240	21	48	157
6 x 8	26RA11	40 1/2	51	9 1/2	9 7/16	13/16	2 1/4	345	1029	1296	242	240	21	58	157
6 x 10	26RA12	45	51	10 1/2	9 7/16	13/16	2 1/4	500	1143	1296	267	240	21	58	227
6 x 10	26RA13	51	51	10 1/2	9 7/16	13/16	2 11/16	500	1296	1296	267	240	21	69	227
6 x 8	26RA20	40 1/2	51	9 1/2	9 7/16	13/16	1 7/8	345	1029	1296	242	240	21	48	157
6 x 8	26RA21	40 1/2	51	9 1/2	9 7/16	13/16	2 1/4	345	1029	1296	242	240	21	58	157
6 x 10	26RA22	45	51	10 1/2	9 7/16	13/16	2 1/4	500	1143	1296	267	240	21	58	227
6 x 10	26RA23	51	51	10 1/2	9 7/16	13/16	2 11/16	500	1296	1296	267	240	21	69	227
6 x 8	26RA32	45	51	9 1/2	9 7/16	13/16	2 1/4	430	1143	1296	242	240	21	58	196
6 x 10	26RA33	51	51	10 1/2	9 7/16	13/16	2 11/16	500	1296	1296	267	240	21	69	227
6 x 10	H26RA13, 23, 33	51	51	10 1/2	9 7/16	13/16	2 11/16	600	1296	1296	267	240	21	69	273
8 x 10	26TA10	49	54 1/2	11	10 7/8	13/16	2 7/16	600	1245	1385	280	277	21	62	273
8 x 10	26TA11	49	54 1/2	11	10 7/8	13/16	2 7/16	650	1245	1385	280	277	21	62	295
8 x 10	26TA12	49	54 1/2	11	10 7/8	13/16	2 7/16	650	1245	1385	280	277	21	62	295
8 x 10	26TA20	49	54 1/2	11	10 7/8	13/16	2 7/16	600	1245	1385	280	277	21	62	273
8 x 10	26TA21	49	54 1/2	11	10 7/8	13/16	2 7/16	650	1245	1385	280	277	21	62	295
8 x 10	26TA22	49	54 1/2	11	10 7/8	13/16	2 7/16	650	1245	1385	280	277	21	62	295
8 x 10	26TA32	49	54 1/2	11	10 7/8	13/16	2 7/16	650	1245	1385	280	277	21	62	295
8 x 10	H26TA12, 22, 32	54 1/2	54 1/2	11	10 7/8	13/16	2 7/16	750	1385	1385	280	277	21	62	341

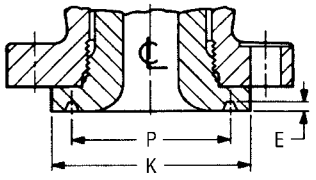
ANSI Flange Images



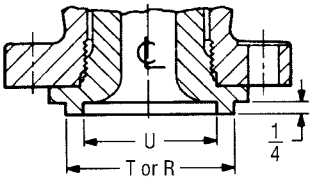
Ring Joint Inlet Detail

Detail of Flanges on Farris Nozzle Valves

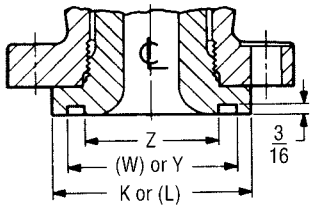
Full Nozzle Inlet Facings (Reference ANSI B16.5)



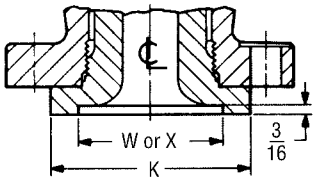
Ring Joint - 9 ( ) ( )



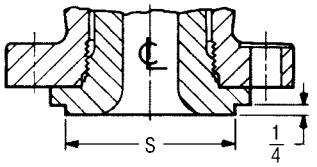
Large Tongue - 5 ( ) ( )
Small Tongue - 7 ( ) ( )



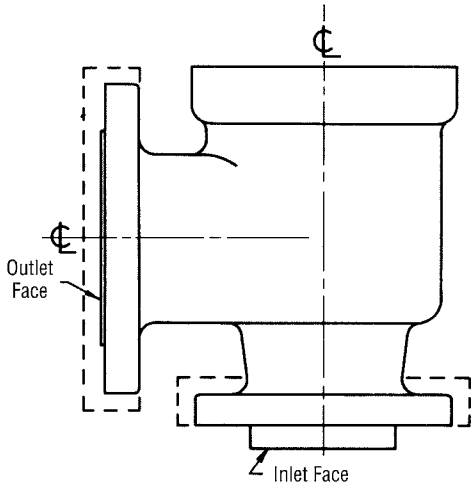
Large Groove - 6 ( ) ( )
Small Groove - 8 ( ) ( )



Large Female - 2 ( ) ( )
Small Female - 4 ( ) ( )



Small Male - 3 ( ) ( )



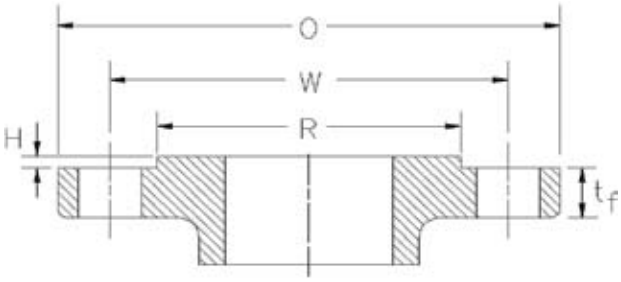
Full Nozzle Valve Flange Changes Altering Center-to-Face Dimensions

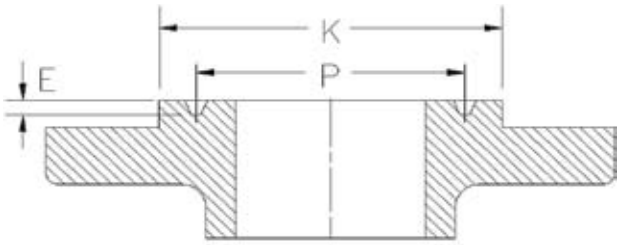
1. **Ring Joint Inlet** face and other facings have the same dimension from center line of outlet to face of inlet flange as the raised face inlet flange.
2. **Ring Joint Outlet** face and other facings increase the dimensions from center line of inlet to face of outlet flange by the difference in ANSI total flange thickness.
3. **Heavier Than Standard Outlet** flanges increase the dimension from center line of inlet to face of outlet flange by the difference in ANSI total flange thickness.
4. **Heavier Than Standard Inlet** flanges have the same dimension from center line of outlet to face of inlet flange as the standard inlet flanges.

Note: Optional connections shown may not be available in all sizes. Consult the Factory.

Steel flanges conform to ANSI Standard B16.5-2003.

ANSI Flange Dimensions



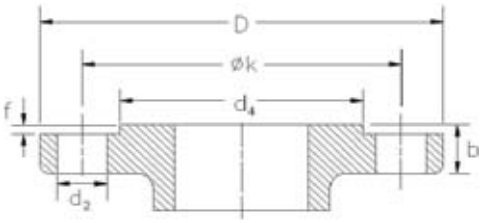


Class	Dimensions of ANSI Raised Face Flange Facings (inches)								Dimensions of Ring Joint Facings (inches)				
	Size	OD of Flange O	Min. Thickness of Flange t_f	Diam. of Bolt Circle W	Diam. of Bolt Holes	Number of Bolts	Diam. of Bolts	Diam. of Raised Face R	Diam. of Raised Face K	Pitch Diam. P	Depth of Groove E	Width of Groove	Ring Number
CLASS 150 FLANGES	1	4.25	0.56	3.12	0.62	4	1/2	2.00	2.50	1.875	0.250	0.344	R15
	1½	5.00	0.69	3.88				2.88	3.25	2.562			R19
	2	6.00	0.75	4.75	0.75		5/8	3.62	4.00	3.250			R22
	2½	7.00	0.88	5.50				4.12	4.75	4.000			R25
	3	7.50	0.94	6.00				5.00	5.25	4.500			R29
	4	9.00		7.50		8		6.19	6.75	5.875			R36
	6	11.00	1.00	9.50	0.88		3/4	8.50	8.62	7.625			R43
	8	13.50	1.12	11.75				10.62	10.75	9.750			R48
	10	16.00	1.19	14.25	1.00	12	7/8	12.75	13.00	12.000			R52
CLASS 300 FLANGES	1	4.88	0.69	3.50	0.75	4	5/8	2.00	Use Class 600 dimensions in these sizes				
	1½	6.12	0.81	4.50	0.88		3/4	2.88					
	2	6.50	0.88	5.00	0.75	8	5/8	3.62					
	2½	7.50	1.00	5.88	0.88		3/4	4.12					
	3	8.25	1.12	6.62				5.00					
	4	10.00	1.25	7.88				6.19					
	6	12.50	1.44	10.62		12		8.50					
	8	15.00	1.62	13.00	1.00		7/8	10.62					
	10	17.50	1.88	15.25	1.12	16	1	12.75					
CLASS 600 FLANGES	1	4.88	0.69	3.50	0.75	4	5/8	2.00	2.75	2.000	0.250	0.344	R16
	1½	6.12	0.88	4.50	0.88		3/4	2.88	3.56	2.688			R20
	2	6.50	1.00	5.00	0.75	8	5/8	3.62	4.25	3.250	0.312	0.469	R23
	2½	7.50	1.12	5.88	0.88		3/4	4.12	5.00	4.000			R26
	3	8.25	1.25	6.62				5.00	5.75	4.625			R30
	4	10.75	1.50	8.50	1.00		7/8	6.19	6.88	5.875			R37
	6	14.00	1.88	11.50	1.12	12	1	8.50	9.50	8.312			R45
	8	16.50	2.19	13.75	1.25		1-1/8	10.62	11.88	10.625			R49
	10	20.00	2.50	17.00	1.38	16	1-1/4	12.75	14.00	12.750			R53
CLASS 900 FLANGES	1	Use Class 1500 dimensions in these sizes											
	1½												
	2												
	2½												
	3	9.50	1.50	7.50	1.00	8	7/8	5.00	6.12	4.875	0.312	0.469	R31
	4	11.50	1.75	9.25	1.25		1-1/8	6.19	7.12	5.875			R37
	6	15.00	2.19	12.50		12		8.50	9.50	8.312			R45
CLASS 1500 FLANGES	1	5.88	1.12	4.00	1.00	4	7/8	2.00	2.81	2.000	0.250	0.344	R16
	1½	7.00	1.25	4.88	1.12		1	2.88	3.62	2.688			R20
	2	8.50	1.50	6.50	1.00	8	7/8	3.62	4.88	3.750	0.312	0.469	R24
	2½	9.62	1.62	7.50	1.12		1	4.12	5.38	4.250			R27
	3	10.50	1.88	8.00	1.25		1-1/8	5.00	6.62	5.375			R35
	4	12.25	2.12	9.50	1.38		1-1/4	6.19	7.62	6.375			R39
	6	15.50	3.25	12.50	1.50	12	1-3/8	8.50	9.75	8.312	0.375	0.531	R46
CLASS 2500 FLANGES	1	6.25	1.38	4.25	1.00	4	7/8	2.00	3.25	2.375	0.250	0.344	R18
	1½	8.00	1.75	5.75	1.25		1-1/8	2.88	4.50	3.250	0.312	0.469	R23
	2	9.25	2.00	6.75	1.12	8	1	3.62	5.25	4.000			R26
	2½	10.50	2.25	7.75	1.25		1-1/8	4.12	5.88	4.375	0.375	0.531	R28
	3	12.00	2.62	9.00	1.38		1-1/4	5.00	6.62	5.000			R32

General Notes:

1. Feature C' applies to flange class 600 and above, class 150 and 300 use C.
2. Feature H equals 0.06 inches for class 150 and 300 flanges; 0.25 inches for class 600 and above.
3. Dimensions taken from ASME/ANSI B16.4 for flanged fittings.

DIN Flange Dimensions



Class	Size (DN)	Dimensions of DIN Flange Facings (millimeters)							
		Flange			Raised Face		Bolts		
		OD of Flange D	Min. Thickness of Flange b	Dia. of Bolt Circle k	Dia. of Raised Face d_4	Raised Face Height f	Number of Bolts	Thread	Dia. of Bolt Holes d_2
NOMINAL PRESSURE 10	25	Use nominal pressure 16 dimensions for these sizes							
	40								
	50								
	65								
	80								
	100								
	150								
	200	340	24	295	268	3	8	M 20	22
	250	395	26	350	320		12		
NOMINAL PRESSURE 16	25	Use nominal pressure 40 dimensions for these sizes							
	40								
	50								
	65	185	18	145	122	3	4	M 16	18
	80	200	20	160	138		8		
	100	220	20	180	158				
	150	285	22	240	212			M 20	22
	200	340	24	295	268		12		
	250	405	26	355	320			M 24	26
NOMINAL PRESSURE 25	25	Use nominal pressure 40 dimensions for these sizes							
	40								
	50								
	65								
	80								
	100								
	150								
	200	350	30	310	278	3	12	M 24	26
	250	425	32	370	335			M 27	30
NOMINAL PRESSURE 40	25	115	18	85	68	2	4	M 12	14
	40	150	18	110	88	3		M 16	18
	50	165	20	125	102				
	65	185	22	145	122		8		
	80	200	24	160	138				
	100	235	24	190	162			M 20	22
	150	300	28	250	218			M 24	26
	200	375	34	320	285		12	M 27	30
	250	450	38	385	345			M 30	33
NOMINAL PRESSURE 64	25	Use nominal pressure 160 dimensions for these sizes							
	40								
	50	180	26	135	102	3	4	M 20	22
	65	205	26	160	122		8		
	80	215	28	170	138				
	100	250	30	200	162			M 24	26
	150	345	36	280	218			M 30	33
NOMINAL PRESSURE 100	25	Use nominal pressure 160 dimensions for these sizes							
	40								
	50								
	65								
	80								
	100								
	150	355	44	290	218	3	12	M 30	33
NOMINAL PRESSURE 160	25	140	24	100	68	2	4	M 16	18
	40	170	28	125	88	3		M 20	22
	50	195	30	145	102			M 24	26
	65	220	34	170	122		8		
	80	230	36	180	138				
	100	265	40	210	162			M 27	30
	150	355	50	290	218		12	M 30	33

Austenitic Stainless Steel: ASME SA-351 Grade CF8M[1]--316 St. St

Orifice Letter	Valve Size	ANSI Flange Class		Maximum Pressure (psig)						
				Temperature Range					Back Pressure Limit[6]	
	Inlet by Orifice by Outlet	Inlet	Outlet	-450°F to -76°F	-75°F to 100°F	450°F	800°F	1000°F	Conventional Type	BalanSeal Type
D	1D2	150	150	275	275	180	80	20	275	230
	1D2 [2]	300	150	275	275	275	275	275	275	230
	1D2	300	150	720	720	495	420	350	275	230
	1D2	600	150	1440	1440	990	845	700	275	230
	1½D2	900	300	2160	2160	1485	1265	1050	600	500
	1½D2	1500	300	3600	3600	2480	2110	1750	600	500
	1½D3	2500	300	4000	6000	4130	3520	2915	720	500
E	1E2	150	150	275	275	180	80	20	275	230
	1E2 [2]	300	150	275	275	275	275	275	275	230
	1E2	300	150	720	720	495	420	350	275	230
	1E2	600	150	1440	1440	975	845	700	275	230
	1½E2	900	300	2160	2160	1485	1265	1050	600	500
	1½E2	1500	300	3600	3600	2480	2110	1750	600	500
	1½E3	2500	300	4000	6000	4130	3520	2915	720	500
F	1½F2	150	150	275	275	180	80	20	275	230
	1½F2 [2]	300	150	275	275	275	275	275	275	230
	1½F2	300	150	720	720	495	420	350	275	230
	1½F2	600	150	1440	1440	975	845	700	275	230
	1½F3	900	300	2160	2160	1485	1265	1050	600	500
	1½F3	1500	300	2200	3600	2480	2110	1750	600	500
	1½F3	2500	300	3400	5000	4130	3520	2915	720	500
G	1½G3	150	150	275	275	180	80	20	275	230
	1½G3 [2]	300	150	275	275	275	275	275	275	230
	1½G3	300	150	720	720	495	420	350	275	230
	1½G3	600	150	1440	1440	975	845	700	275	230
	1½G3	900	300	2160	2160	1485	1265	1050	600	470
	2G3	1500	300	2450	3600	2480	2110	1750	600	470
	2G3	2500	300	2600	3600	3600	3520	2915	720	470
H	1½H3	150	150	275	275	180	80	20	275	230
	1½H3 [2]	300	150	275	275	275	275	275	275	230
	2H3	300	150	720	720	495	420	350	275	230
	2H3	600	150	1440	1440	975	845	700	275	230
	2H3	900	150	1485	2160	1485	1265	1050	275	230
	2H3	1500	300	1600	2750	2480	2110	1750	600	415
J	2J3	150	150	275	275	180	80	20	275	230
	2J3 [2]	300	150	275	275	275	275	275	275	230
	3J4	300	150	500	720	495	420	350	275	230
	3J4	600	150	625	1440	975	845	700	275	230
	3J4	900	150	800	2160	1485	1265	1050	275	230
	3J4	1500	300	800	2700	2480	2110	1750	600	230

General Notes:

1. Material limited to 1500°F.
2. Pressure less than rating for 300# class flange to designate maximum pressure limit when used on Farris 300# lightweight design valves.
3. High pressure version
4. Material commonly designated as 316 Stainless Steel.
5. Pressures shown represent values shown in API Standard 526 and/or ASME B16.34.
6. Back pressure limits based on temperature of 100°F.

Austenitic Stainless Steel: ASME SA-351 Grade CF8M[1]--316 St. St

Orifice Letter	Valve Size	ANSI Flange Class		Maximum Pressure (psig)						
				Temperature Range					Back Pressure Limit[6]	
	Inlet by Orifice by Outlet	Inlet	Outlet	-450°F to -76°F	-75°F to 100°F	450°F	800°F	1000°F	Conventional Type	BalanSeal Type
K	3K4	150	150	275	275	180	80	20	275	150
	3K4 [2]	300	150	275	275	275	275	275	275	150
	3K4	300	150	525	720	495	420	350	275	150
	3K4	600	150	600	1440	975	845	700	275	200
	3K6	900	150	600	2160	1485	1265	1050	275	200
	3K6	1500	300	750	2220	2220	2110	1750	600	200
L	3L4	150	150	275	275	180	80	20	275	100
	3L4 [2]	300	150	275	275	275	275	275	275	100
	4L6	300	150	535	720	495	420	350	275	170
	4L6	600	150	535	1000	975	845	700	275	170
	4L6	900	150	700	1500	1485	1265	1050	275	170
	4L6	1500	150	700	1500	1500	1500	1500	275	170
M	4M6	150	150	275	275	180	80	20	275	80
	4M6 [2]	300	150	275	275	275	275	275	275	80
	4M6	300	150	525	720	495	420	350	275	160
	4M6	600	150	600	1000	975	845	700	275	160
	4M6	900	150	600	1100	1100	1100	1050	275	160
N	4N6	150	150	275	275	180	80	20	275	80
	4N6 [2]	300	150	275	275	275	275	275	275	80
	4N6	300	150	450	720	495	420	350	275	160
	4N6	600	150	500	1000	975	845	700	275	160
	4N6	900	150	500	1000	1000	1000	1000	275	160
P	4P6	150	150	175	275	180	80	20	275	80
	4P6 [2]	300	150	175	275	275	275	275	275	80
	4P6	300	150	300	525	495	420	350	275	150
	4P6	600	150	480	1000	975	845	700	275	150
	4P6	900	150	480	1000	1000	1000	1000	275	150
Q	6Q8	150	150	165	165	165	80	20	115	70
	6Q8 [2]	300	150	165	165	165	165	165	115	70
	6Q8	300	150	250	300	300	300	300	115	115
	6Q8	600	150	300	600	600	600	600	115	115
	6Q8 [3]	600	150	300	900	900	845	700	275	200
R	6R8	150	150	55	100	100	80	20	60	60
	6R8 [2]	300	150	55	100	100	100	100	60	60
	6R10	300	150	150	230	230	230	230	100	100
	6R10	600	150	200	300	300	300	300	100	100
	6R10 [3]	600	150	200	600	600	600	600	275	200
T	8T10	150	150	50	65	65	65	20	30	30
	8T10 [2]	300	150	50	65	65	65	65	30	30
	8T10	300	150	65	120	120	120	120	60	60
	8T10 [3]	300	150	65	300	300	300	300	100	100

General Notes:

1. Material limited to 1500°F.
2. Pressure less than rating for 300# class flange to designate maximum pressure limit when used on Farris 300# lightweight design valves.
3. High pressure version
4. Material commonly designated as 316 Stainless Steel.
5. Pressures shown represent values shown in API Standard 526 and/or ASME B16.34.
6. Back pressure limits based on temperature of 100°F.

Nickel Alloy: ASME SA-494 Grade CX2MW[1]-- Hastelloy C

Orifice Letter	Valve Size	ANSI Flange Class		Maximum Pressure (psig)				
				Temperature Range			Back Pressure Limit[6]	
	Inlet by Orifice by Outlet	Inlet	Outlet	-20°F to 100°F	450°F	500°F	Conventional Type	BalanSeal Type
D	1D2	150	150	230	180	170	230	230
	1D2[2]	300	150	230	230	230	230	230
	1D2	300	150	600	477	465	230	230
	1D2	600	150	1200	952	925	230	230
	1½D2	900	300	1800	1430	1390	600	500
	1½D2	1500	300	3000	2382	2315	600	500
	1½D3	2500	300	5000	3970	3860	600	500
E	1E2	150	150	230	180	170	230	230
	1E2[2]	300	150	230	230	230	230	230
	1E2	300	150	600	477	465	230	230
	1E2	600	150	1200	952	925	230	230
	1½E2	900	300	1800	1430	1390	600	500
	1½E2	1500	300	3000	2382	2315	600	500
	1½E3	2500	300	5000	3970	3860	600	500
F	1½F2	150	150	230	180	170	230	230
	1½F2[2]	300	150	230	230	230	230	230
	1½F2	300	150	600	477	465	230	230
	1½F2	600	150	1200	952	925	230	230
	1½F3	900	300	1800	1430	1390	600	500
	1½F3	1500	300	3000	2382	2315	600	500
	1½F3	2500	300	5000	3970	3860	600	500
G	1½G3	150	150	230	180	170	230	230
	1½G3[2]	300	150	230	230	230	230	230
	1½G3	300	150	600	477	465	230	230
	1½G3	600	150	1200	952	925	230	230
	1½G3	900	300	1800	1430	1390	600	470
	2G3	1500	300	3000	2382	2315	600	470
	2G3	2500	300	3705	3705	3705	600	470
H	1½H3	150	150	230	180	170	230	230
	1½H3[2]	300	150	230	230	230	230	230
	2H3	300	150	600	477	465	230	230
	2H3	600	150	1200	952	925	230	230
	2H3	900	150	1800	1430	1390	230	230
	2H3	1500	300	2750	2382	2315	600	415
J	2J3	150	150	230	180	170	230	230
	2J3[2]	300	150	230	230	230	230	230
	3J4	300	150	600	477	465	230	230
	3J4	600	150	1200	952	925	230	230
	3J4	900	150	1800	1430	1390	230	230
	3J4	1500	300	2700	2382	2315	600	230

General Notes:

1. Valve limited to 500°F.
2. Pressure less than rating for 300# class flange to designate maximum pressure limit when used on Farris 300# lightweight design valves.
3. High pressure version.
4. Material commonly sold under the trade name of Hastelloy C ™.
5. Pressure shown represent the carbon steel valve limits or Hastelloy C flange limit (per ASME B16.34), whichever is lower.
6. Back pressure limits based on temperature of 100°F.

Nickel Alloy: ASME SA-494 Grade CX2MW[1] -- Hastelloy C

Orifice Letter	Valve Size	ANSI Flange Class		Maximum Pressure (psig)				
				Temperature Range			Back Pressure Limit[6]	
	Inlet by Orifice by Outlet	Inlet	Outlet	-20°F to 100°F	450°F	500°F	Conventional Type	BalanSeal Type
K	3K4	150	150	230	180	170	230	150
	3K4[2]	300	150	230	230	230	230	150
	3K4	300	150	600	477	465	230	150
	3K4	600	150	1200	952	925	230	200
	3K6	900	150	1800	1430	1390	230	200
	3K6	1500	300	2220	2220	2220	600	200
L	3L4	150	150	230	180	170	230	100
	3L4[2]	300	150	230	230	230	230	100
	4L6	300	150	600	477	465	230	170
	4L6	600	150	1000	952	925	230	170
	4L6	900	150	1500	1430	1390	230	170
	4L6	1500	150	1500	1500	1500	230	170
M	4M6	150	150	230	180	170	230	80
	4M6[2]	300	150	230	230	230	230	80
	4M6	300	150	600	477	465	230	160
	4M6	600	150	1100	952	925	230	160
	4M6	900	150	1100	1100	1100	230	160
N	4N6	150	150	230	180	170	230	80
	4N6[2]	300	150	230	230	230	230	80
	4N6	300	150	600	477	465	230	160
	4N6	600	150	1000	952	925	230	160
	4N6	900	150	1000	1000	1000	230	160
P	4P6	150	150	230	180	170	230	80
	4P6[2]	300	150	230	230	230	230	80
	4P6	300	150	525	477	465	230	150
	4P6	600	150	1000	952	925	230	150
	4P6	900	150	1000	1000	1000	230	150
Q	6Q8	150	150	165	165	140	140	70
	6Q8[2]	300	150	165	165	165	115	70
	6Q8	300	150	300	300	300	115	115
	6Q8	600	150	600	600	600	115	115
	6Q8[3]	600	150	900	900	900	230	200
R	6R8	150	150	100	100	100	100	60
	6R8[2]	300	150	100	100	100	60	60
	6R10	300	150	230	230	230	100	100
	6R10	600	150	300	300	300	100	100
	6R10[3]	600	150	600	600	600	230	200
T	8T10	150	150	65	65	65	65	30
	8T10[2]	300	150	65	65	65	30	30
	8T10	300	150	120	120	120	60	60
	8T10[3]	300	150	300	300	300	100	100

General Notes:

1. Valve limited to 500°F.
2. Pressure less than rating for 300# class flange to designate maximum pressure limit when used on Farris 300# lightweight design valves.
3. High pressure version.
4. Material commonly sold under the trade name of Hastelloy C ™.
5. Pressures shown represent the carbon steel valve limits or Hastelloy C flange limit (per ASME B16.34), whichever is lower.
6. Back pressure limits based on temperature of 100°F.

Nickel / Copper Alloy: ASME SA-494 Grade M-35-1[1] – Monel

Orifice Letter	Valve Size	ANSI Flange Class		Maximum Pressure (psig)					
				Temperature Range				Back Pressure Limit [5]	
	Inlet by Orifice by Outlet	Inlet	Outlet	-20°F to 100°F	450°F	800°F	900°F	Conventional Type	BalanSeal Type
D	1D2	150	150	230	175	80	50	230	230
	1D2 [2]	300	150	230	230	230	230	230	230
	1D2	300	150	600	475	460	275	230	230
	1D2	600	150	1200	945	915	550	230	230
E	1E2	150	150	230	175	80	50	230	230
	1E2 [2]	300	150	230	230	230	230	230	230
	1E2	300	150	600	475	460	275	230	230
	1E2	600	150	1200	945	915	550	230	230
F	1½F2	150	150	230	175	80	50	230	230
	1½F2 [2]	300	150	230	230	230	230	230	230
	1½F2	300	150	600	475	460	275	230	230
	1½F2	600	150	1200	945	915	550	230	230
G	1½G3	150	150	230	175	80	50	230	230
	1½G3 [2]	300	150	230	230	230	230	230	230
	1½G3	300	150	600	475	460	275	230	230
	1½G3	600	150	1200	945	915	550	230	230
H	1½H3	150	150	230	175	80	50	230	230
	1½H3 [2]	300	150	230	230	230	230	230	230
	2H3	300	150	600	475	460	275	230	230
	2H3	600	150	1200	945	915	550	230	230
J	2J3	150	150	230	175	80	50	230	230
	2J3 [2]	300	150	230	230	230	230	230	230
	3J4	300	150	600	475	460	275	230	230
	3J4	600	150	1200	945	915	550	230	230
K	3K4	150	150	230	175	80	50	230	150
	3K4 [2]	300	150	230	230	230	230	230	150
	3K4	300	150	600	475	460	275	230	150
	3K4	600	150	1200	945	915	550	230	200
L	3L4	150	150	230	175	80	50	230	100
	3L4 [2]	300	150	230	230	230	230	230	100
	4L6	300	150	600	475	460	275	230	170
	4L6	600	150	1200	945	915	550	230	170
M	4M6	150	150	230	175	80	50	230	80
	4M6 [2]	300	150	230	230	230	230	230	80
	4M6	300	150	600	475	460	275	230	160
	4M6	600	150	1100	945	915	550	230	160
N	4N6	150	150	230	175	80	50	230	80
	4N6 [2]	300	150	230	230	230	230	230	80
	4N6	300	150	600	475	460	275	230	160
	4N6	600	150	1000	945	915	550	230	160
P	4P6	150	150	230	175	80	50	230	80
	4P6 [2]	300	150	230	230	230	230	230	80
	4P6	300	150	600	475	460	275	230	160
	4P6	600	150	1000	945	915	550	230	160
Q	6Q8	150	150	140	165	80	50	115	70
	6Q8 [2]	300	150	140	165	165	165	115	70
	6Q8	300	150	300	300	300	275	115	115
	6Q8	600	150	600	600	600	550	115	115
R	6R8	150	150	100	100	80	50	60	60
	6R8 [2]	300	150	100	100	100	100	60	60
	6R10	300	150	230	230	230	230	100	100
	6R10	600	150	300	300	300	300	100	100
T	8T10	150	150	65	65	65	65	30	30
	8T10 [2]	300	150	65	65	65	65	30	30
	8T10	300	150	120	120	120	120	60	60

General Notes:

1. Valve material limited to 900°F.
2. Pressure less than rating for 300# class flange to designate maximum pressure limit when used on Farris 300# lightweight design valves.
3. Material commonly sold under the trade name of Monel™.
4. Pressure and temperature limits per API Standard 526.
5. Back pressure limits based on temperature of 100°F.

General Equations

Before beginning any calculations, it is necessary to establish the general category of the pressure relief valve to be used. This section covers conventional spring-loaded types and BalanSeal spring-loaded types. Pilot-operated valves are covered in a separate catalog.

Given the rate of fluid flow to be relieved, the usual procedure is to first calculate the minimum area required in the valve orifice for the conditions contained in one of the following equations. In the case of steam, air or water, the selection of an orifice may be made directly from the capacity tables.

The second step is to select the specific type of valve that meets the pressure and temperature requirements.

General equations are given first, to identify the basic terms that correlate with ASME Pressure Vessel Code, Section VIII.

Since these equations are conservative, it is recommended that computations of relieving loads avoid cascading of safety factors or multiple contingencies beyond the reasonable flow needed to protect the pressure vessel.

Conventional Valves Constant Back Pressure Only

The conventional valve may be used when the variation in back pressure does not exceed 10% of the set pressure, provided the corresponding variation in set pressure is acceptable.

Orifice Area Calculations

VAPORS or GASES – Lbs./hr. –

$$A = \frac{W\sqrt{T}\sqrt{Z}}{CK_dP\sqrt{M}K_b}$$

CONSTANT BACK PRESSURE

K_b = 1 when back pressure is below 55% of abs. relieving pressure.

VAPORS or GASES – S.C.F.M. –

$$A = \frac{V\sqrt{G}\sqrt{T}\sqrt{Z}}{1.175\,CK_dP\,K_b}$$

CONSTANT BACK PRESSURE

K_b = 1 when back pressure is below 55% of abs. relieving pressure.

STEAM – Lbs./hr. –

$$A = \frac{W_s}{51.5\,K_dP\,K_b\,K_{sh}\,K_n}$$

CONSTANT BACK PRESSURE

K_b = 1 when back pressure is below 55% of abs. relieving pressure.

K_{sh} = 1 for Sat. Steam

AIR – S.C.F.M. –

$$A = \frac{V_a\sqrt{T}}{418\,K_dPK_b}$$

CONSTANT BACK PRESSURE

K_b = 1 when back pressure is below 55% of abs. relieving pressure.

LIQUIDS – G.P.M –
ASME Code (2600L Series)

$$A = \frac{V_L\sqrt{G}}{38.0\,K_d\sqrt{\Delta P}\,K_u}$$

CONSTANT BACK PRESSURE

K_p = 1 at 25% overpressure
K_u = 1 at normal viscosities

Non-ASME Code (2600 Series)

$$A = \frac{V_L\sqrt{G}}{38.0\,K_d\sqrt{1.25\,P_1\text{-}P_2}\,K_p\,K_u}$$

Nomenclature

A = Required orifice area in square inches. This value may be compared with the API effective areas included in this catalog and defined in ANSI/API Standard 526 or the ASME actual area.

W = Required vapor capacity in pounds per hour.

W_s = Required steam capacity in pounds per hour.

V = Required gas capacity in S.C.F.M.

V_a = Required air capacity in S.C.F.M.

V_L = Required liquid capacity in U.S. gallons per minute.

G = Specific gravity of gas (air=1) or specific gravity of liquid (water=1) at actual discharge temperature will obtain a safe valve size.

M = Average molecular weight of vapor.

P = Relieving pressure in pounds per square inch absolute=set pressure+overpressure+14.7. Minimum overpressure is 3 psi.

P_1 = Set pressure at inlet, psig.

P_2 = Back pressure at outlet, psig.

ΔP = Set pressure + overpressure, psig – back pressure, psig. At 10% overpressure $\Delta P=1.1P_1 - P_2$. Below 30 psig set, $\Delta P=P_1 + 3 - P_2$.

T = Inlet temperature absolute (°F+460).

Z = Compressibility factor corresponding to T and P (if this factor is not available, compressibility correction can be safely ignored by using a value of Z=1.0).

C = Gas or vapor flow constant. Select from table on page 86 or use the curve and table on page 85.

k = Ratio of specific heats, C_p/C_v. This value is constant for an ideal gas. If this ratio is unknown, the value k=1.001, C=315 will result in a safe valve size. Isentropic coefficient n may be used instead of k. See curve and table on page 85.

K_p = Liquid capacity correction factor for overpressures lower than 25%. See curve on page 89. Non-Code equations only.

K_b = Vapor or gas flow correction factor for constant back pressures above critical pressure. See curve on page 87.

K_v = Vapor or gas flow factor for variable back pressures. See curve on page 87. BalanSeal valves only.

K_w = Liquid flow factor for variable and constant back pressures. See curve on page 89. BalanSeal valves only.

K_u = Liquid viscosity correction factor. See chart on page 90 or curve on page 91.

K_{sh} = Steam superheat correction factor. See table on page 88.

K_n = Napier steam correction factor for set pressures between 1500 and 2900 psig. See table on page 88.

K_d =

Service Fluid	Coeffcient of Discharge When Sizing Using	
	API Effective Areas	ASME Actual Areas
Air, Steam, Vapor & Gas	0.953	0.858
Liquid (2600L, ASME Code)	0.724	0.652
Liquid (2600 Non Code)	0.640	0.576

BalanSeal Valves
Variable or Constant Back Pressure

The BalanSeal (balanced bellows) valve is used to prevent corrosion of the guiding surfaces of a pressure relief valve, to confine the lading fluid and prevent contamination, or to make the valve suitable for variable back pressure service. When the BalanSeal valve is under constant or variable back pressure conditions, the valve capacity is affected. Depending on the percentage of maximum back pressure to the flowing pressure of the valve, a factor for the correction of valve capacity is necessary. The effect on valve capacity is different in liquid service than in vapor and gas service, so correction factors vary. In the calculations that follow, use K_v for vapors and gases as shown on page 87 and K_w for liquids as shown on page 89.

When sizing and selecting a BalanSeal valve, follow the same procedures as for conventional valves, but use the following equations that incorporate the correction factors K_v and K_w.

The BalanSeal valve must be used when the variation in back pressure exceeds 10% of set pressure.

Orifice Area Calculations

VAPORS or GASES – Lbs./hr. –

$$A = \frac{W\sqrt{T}\sqrt{Z}}{CK_dP\sqrt{M}\,K_v}$$

VAPORS or GASES – S.C.F.M. –

$$A = \frac{V\sqrt{G}\sqrt{T}\sqrt{Z}}{1.175\,CK_dP\,K_v}$$

STEAM – Lbs./hr. –

$$A = \frac{W_s}{51.5\,K_dP\,K_v\,K_{sh}\,K_n}$$

AIR – S.C.F.M. –

$$A = \frac{V_a\sqrt{T}}{418\,K_dPK_v}$$

LIQUIDS – G.P.M –
ASME Code (2600L Series)

$$A = \frac{V_L\sqrt{G}}{38.0\,K_d\sqrt{\Delta P}\,K_w\,K_u}$$

Non-ASME Code (2600 Series)

$$A = \frac{V_L\sqrt{G}}{38.0\,K_d\sqrt{1.25\,P_1\text{-}P_2}\,K_p\,K_w\,K_u}$$

Capacity Correction Factors

K_g = Sizing Factor for specific gravity

$$= \frac{1}{\sqrt{G}}$$

K_g = 1 for air and water

K_m = Sizing Factor for molecular weight

$$= \sqrt{M}$$

K_t = Sizing Factor for temperature

$$= \frac{\sqrt{520}}{\sqrt{T}}$$

K_c = Sizing Factor for specific heat ratio

$$= \frac{C}{315}$$

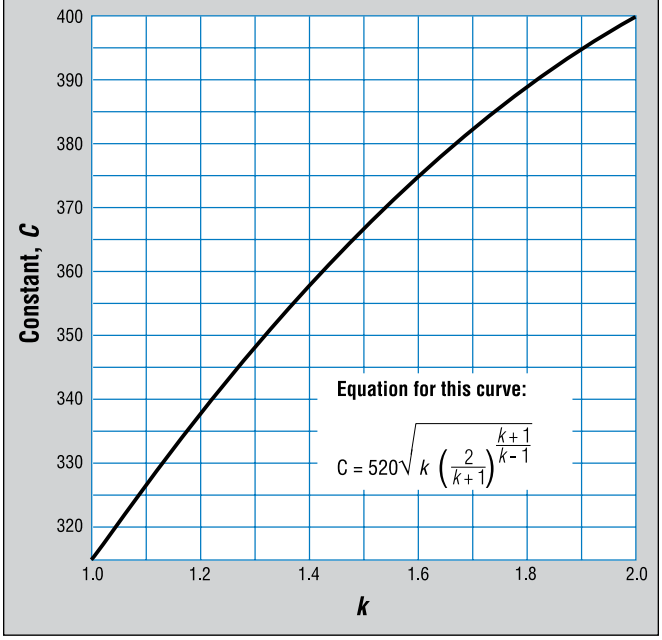
*If specific heat ratio is unknown, use conservative value of K_c = 1.

Note: When back pressure P_2 is variable, use the maximum value.

Gas or Vapor Flow Constant C for Gas or Vapor Related to Ratio of Specific Heats ($k = C_p/C_v$)

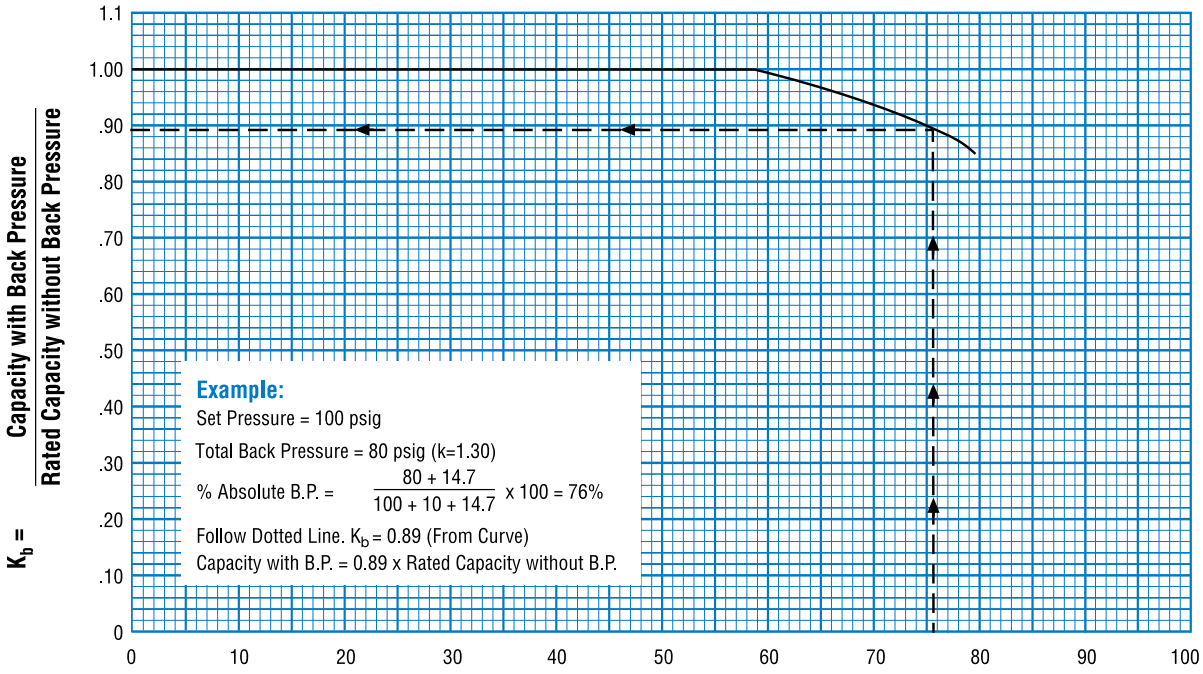
k	Constant C	k	Constant C	k	Constant C
1.00	315	1.26	343	1.52	366
1.02	318	1.28	345	1.54	368
1.04	320	1.30	347	1.56	369
1.06	322	1.32	349	1.58	371
1.08	324	1.34	351	1.60	372
1.10	327	1.36	352	1.62	374
1.12	329	1.38	354	1.64	376
1.14	331	1.40	356	1.66	377
1.16	333	1.42	358	1.68	379
1.18	335	1.44	359	1.70	380
1.20	337	1.46	361	2.00	400
1.22	339	1.48	363	2.20	412
1.24	341	1.50	364	—	—

Constant C for Gas or Vapor Related to Ratio of Specific Heats ($k = C_p/C_v$)



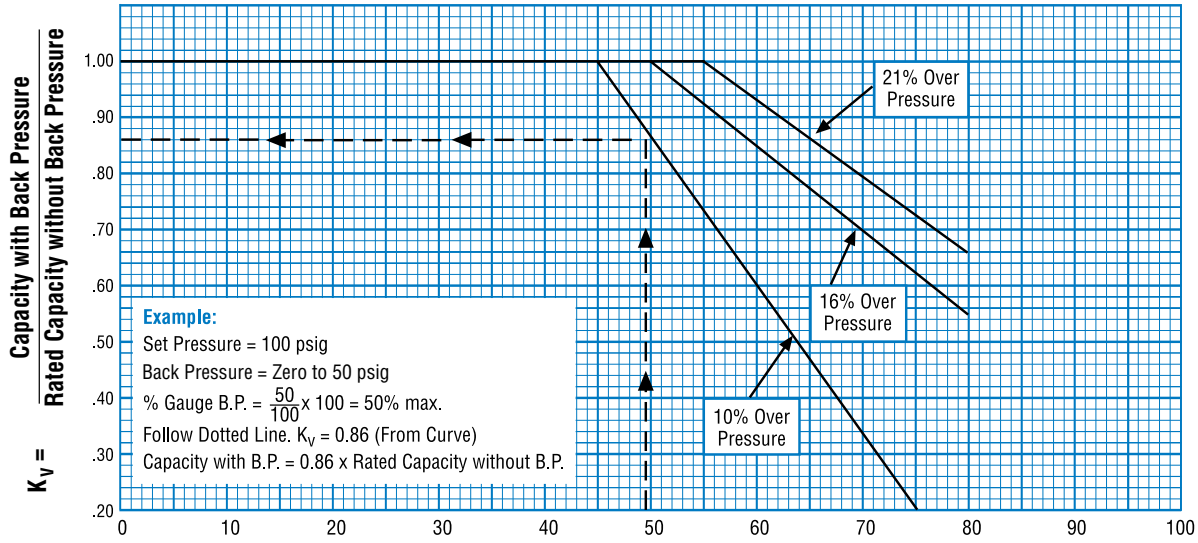
Fluid	Formula	Molecular Weight	Specific Gravity		k	C
			Liquid	Gas	(C_p/C_v)	(Constant)
Acetic Acid	$HC_2H_3O_2$	60.05	1.049	2.073	1.15	332
Acetone	C_3H_6O	58.08	0.791	-	-	-
Acetylene	C_2H_2	26.04	0.62	0.899	1.26	343
Air	-	28.97	0.86	1	1.4	356
Ammonia	NH_3	17.03	0.817	0.588	1.33	350
Argon	A	39.94	1.65	1.388	1.67	378
Benzene	C_6H_6	78.11	0.879	2.696	1.12	329
Butane/n-Butane	C_4H_{10}	58.12	0.579	2.006	1.094	326
Carbon Dioxide	CO_2	44.01	1.101	1.519	1.3	347
Carbon Disulfide	CS_2	76.13	1.263	2.628	1.21	338
Carbon Monoxide	CO	28	0.814	0.966	1.4	356
Chlorine	Cl_2	70.9	1.58	2.45	1.36	353
Cyclohexane	C_6H_{12}	84.16	0.779	2.905	1.09	326
Dowtherm A	-	165	1.064	-	-	-
Dowtherm J	-	134	0.931	-	-	-
Ethane	C_2H_6	30.07	0.546	1.04	1.22	339
Ethyl Alcohol (Ethanol)	C_2H_6O	46.07	0.789	1.59	1.13	330
Ethyl Chloride	C_2H_5Cl	64.52	0.903	2.227	1.19	336
Ethylene (Ethene)	C_2H_4	28.05	0.566	0.968	1.26	343
Freon 12	CCl_2F_2	120.9	1.35	4.17	1.14	331
Helium	He	4	-	0.138	1.66	377
Hexane	C_6H_{14}	86.17	0.659	2.974	1.06	322
Hydrochloric Acid	HCl	36.5	1.64	-	-	-
Hydrofluoric Acid	HF	20.01	0.92	-	-	-
Hydrogen	H_2	2.016	0.0709	0.069	1.41	357
Hydrogen Sulfide	H_2S	34.07	0.79	1.176	1.32	349
Kerosene	C_9H_2O	128.3	0.815	-	-	-
Methane	CH_4	16.04	0.415	0.554	1.31	348
Methyl Alcohol	CH_4O	32.04	0.792	1.11	1.2	337
Methyl Chloride	CH_3Cl	50.49	0.952	1.743	1.2	337
Natural Gas (typical)	-	19	0.45	0.656	1.27	344
Nitric Acid	HNO_3	63.02	1.502	-	-	-
Nitrogen	N_2	28	1.026	0.967	1.4	356
Nitrous Oxide	N_2O	44	1.226	1.519	1.3	347
Oxygen	O_2	32	1.426	1.104	1.4	356
Pentane	C_5H_{12}	72.15	0.631	2.49	1.07	323
Propane	C_3H_8	44.09	0.585	1.522	1.13	330
Styrene	C_8H_8	104.14	0.906	3.6	1.07	323
Sulfur Dioxide	SO_2	64.06	1.434	2.21	1.29	346
Sulfuric Acid	H_2SO_4	98.08	1.83	-	-	-
Therminol D-12	-	162	0.76	-	-	-
Therminol VP-1	-	166	1.061	-	-	-
Toluene	C_7H_8	92.1	0.87	3.18	1.1	327
Water	H_2O	18.02	1	0.622	1.31	348

Back Pressure Sizing Factor K_b



$$\% \text{ Absolute Back Pressure} = \frac{\text{Back Pressure, psia}}{\text{Set Pressure + Over Pressure, psia}} \text{ X } 100$$

Back Pressure Sizing Factor K_v
BalanSeal Valves Only - Vapors and Gases



$$\% \text{ Gauge Back Pressure} = \frac{\text{Back Pressure, psig}}{\text{Set Pressure, psig}} \text{ X } 100$$

K_n Napier Correction Factor for Set Pressures Between 1500 and 2900 psig at 10% Overpressure

Equation:

$$K_n = \frac{0.1906P - 1000}{0.2292P - 1061}$$

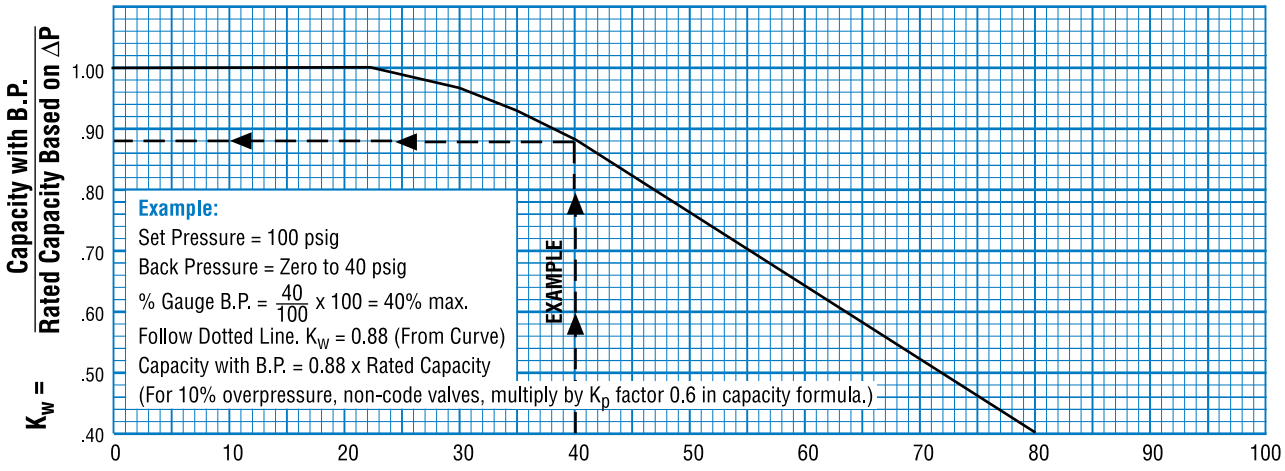
Where P = relieving pressure, psia

Set Press. psig	K_n	Set Press. psig	K_n	Set Press. psig	K_n	Set Press. psig	K_n	Set Press. psig	K_n	Set Press. psig	K_n	Set Press. psig	K_n	Set Press. psig	K_n	Set Press. psig	K_n	Set Press. psig	K_n	Set Press. psig	K_n
1500	1.005	1640	1.014	1780	1.025	1920	1.037	2060	1.050	2200	1.066	2340	1.083	2480	1.104	2620	1.128	2760	1.157
1510	1.005	1650	1.015	1790	1.026	1930	1.038	2070	1.051	2210	1.067	2350	1.085	2490	1.105	2630	1.130	2770	1.159
1520	1.006	1660	1.016	1800	1.026	1940	1.039	2080	1.052	2220	1.068	2360	1.086	2500	1.107	2640	1.132	2780	1.161
1530	1.007	1670	1.016	1810	1.027	1950	1.040	2090	1.053	2230	1.069	2370	1.087	2510	1.109	2650	1.134	2790	1.164
1540	1.007	1680	1.017	1820	1.028	1960	1.040	2100	1.054	2240	1.070	2380	1.089	2520	1.110	2660	1.136	2800	1.166
1550	1.008	1690	1.018	1830	1.029	1970	1.041	2110	1.055	2250	1.072	2390	1.090	2530	1.112	2670	1.138	2810	1.169
1560	1.009	1700	1.019	1840	1.030	1980	1.042	2120	1.057	2260	1.073	2400	1.092	2540	1.114	2680	1.140	2820	1.171
1570	1.009	1710	1.019	1850	1.031	1990	1.043	2130	1.058	2270	1.074	2410	1.093	2550	1.115	2690	1.142	2830	1.174
1580	1.010	1720	1.020	1860	1.031	2000	1.044	2140	1.059	2280	1.075	2420	1.095	2560	1.117	2700	1.144	2840	1.176
1590	1.011	1730	1.021	1870	1.032	2010	1.045	2150	1.060	2290	1.077	2430	1.096	2570	1.119	2710	1.146	2850	1.179
1600	1.011	1740	1.022	1880	1.033	2020	1.046	2160	1.061	2300	1.078	2440	1.098	2580	1.121	2720	1.148	2860	1.181
1610	1.012	1750	1.023	1890	1.034	2030	1.047	2170	1.062	2310	1.079	2450	1.099	2590	1.122	2730	1.150	2870	1.184
1620	1.013	1760	1.023	1900	1.035	2040	1.048	2180	1.063	2320	1.081	2460	1.101	2600	1.124	2740	1.152	2880	1.187
1630	1.014	1770	1.024	1910	1.036	2050	1.049	2190	1.064	2330	1.082	2470	1.102	2610	1.126	2750	1.155	2890	1.189
																		2900	1.192

K_{sh} Superheat Correction Factor

Set. Press psig	Saturated Steam Temp. °F.	Total Temperature in Degrees Fahrenheit																																				
		280	300	320	340	360	380	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	720	740	760	780	800	820	840	860	880	900	920	940	960	980	1000
15	250	1.00	1.00	1.00	.99	.99	.98	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.83	.82	.81	.81	.80	.79	.79	.78	.78	.77	.76	.76	.75	.75
20	259	1.00	1.00	1.00	.99	.99	.98	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.83	.82	.81	.81	.80	.79	.79	.78	.78	.77	.77	.76	.75	.75
40	287	–	1.00	1.00	1.00	.99	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.87	.86	.85	.84	.84	.83	.82	.82	.81	.80	.79	.79	.78	.78	.77	.77	.76	.75	.75
60	308	–	–	1.00	1.00	.99	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.87	.86	.85	.84	.84	.83	.82	.82	.81	.80	.80	.79	.78	.78	.77	.77	.76	.76	.75
80	324	–	–	–	1.00	1.00	.99	.99	.98	.97	.96	.94	.93	.92	.91	.90	.89	.89	.88	.87	.86	.85	.84	.84	.83	.82	.82	.81	.80	.80	.79	.78	.78	.77	.77	.76	.76	.75
100	338	–	–	–	–	1.00	1.00	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82	.82	.81	.80	.80	.79	.78	.78	.77	.77	.76	.76	.75
120	350	–	–	–	–	1.00	1.00	.99	.98	.97	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82	.82	.81	.80	.80	.79	.78	.78	.77	.77	.76	.76	.75
140	361	–	–	–	–	–	1.00	1.00	.99	.98	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82	.82	.81	.80	.80	.79	.78	.78	.77	.77	.76	.76	.75
160	371	–	–	–	–	–	1.00	1.00	.99	.98	.97	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.82	.82	.81	.80	.80	.79	.79	.78	.77	.77	.76	.76	.75
180	380	–	–	–	–	–	–	1.00	.99	.98	.97	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.82	.82	.81	.80	.80	.79	.79	.78	.77	.77	.76	.76	.75
200	388	–	–	–	–	–	–	1.00	.99	.99	.97	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.83	.82	.81	.81	.80	.79	.79	.78	.77	.77	.76	.76	.75
220	395	–	–	–	–	–	–	1.00	1.00	.99	.98	.96	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.84	.83	.82	.81	.81	.80	.79	.79	.78	.78	.77	.76	.76	.75
240	403	–	–	–	–	–	–	–	1.00	.99	.98	.97	.95	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.84	.83	.82	.81	.81	.80	.79	.79	.78	.78	.77	.76	.76	.75
260	409	–	–	–	–	–	–	–	1.00	.99	.98	.97	.96	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82	.81	.81	.80	.79	.79	.78	.78	.77	.76	.76	.75
280	416	–	–	–	–	–	–	–	1.00	1.00	.99	.97	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.85	.85	.84	.83	.82	.82	.81	.80	.80	.79	.78	.78	.77	.77	.76	.75
300	422	–	–	–	–	–	–	–	–	1.00	.99	.98	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.86	.85	.84	.83	.82	.82	.81	.80	.80	.79	.78	.78	.77	.77	.76	.75
350	436	–	–	–	–	–	–	–	–	1.00	1.00	.99	.97	.96	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83	.83	.82	.81	.81	.80	.79	.78	.78	.77	.77	.76	.76
400	448	–	–	–	–	–	–	–	–	–	1.00	.99	.98	.96	.95	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.84	.83	.82	.81	.81	.80	.79	.79	.78	.77	.77	.76	.76
450	460	–	–	–	–	–	–	–	–	–	–	1.00	.99	.97	.96	.94	.93	.92	.91	.89	.88	.87	.86	.86	.85	.84	.83	.82	.82	.81	.80	.79	.79	.78	.78	.77	.76	.76
500	470	–	–	–	–	–	–	–	–	–	–	1.00	.99	.98	.96	.94	.93	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83	.82	.82	.81	.80	.79	.79	.78	.78	.77	.76	.76
550	480	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.97	.95	.94	.92	.91	.90	.89	.88	.87	.86	.85	.84	.83	.82	.82	.81	.80	.80	.79	.78	.78	.77	.76	.76
600	489	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.98	.96	.94	.93	.92	.90	.89	.88	.87	.86	.86	.85	.84	.84	.83	.82	.81	.80	.80	.79	.78	.78	.77	.76	.76
650	497	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.97	.95	.94	.92	.91	.90	.89	.87	.86	.86	.85	.84	.83	.82	.81	.81	.80	.79	.78	.78	.77	.77	.76
700	506	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.97	.96	.94	.93	.91	.90	.89	.88	.87	.86	.85	.84	.83	.82	.81	.81	.80	.79	.79	.78	.77	.77	.76
750	513	–	–	–	–	–	–	–	–	–	–	–	–	1.00	1.00	.98	.96	.95	.93	.92	.90	.89	.88	.87	.86	.85	.84	.83	.83	.82	.81	.80	.79	.79	.78	.77	.77	.76
800	520	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.97	.95	.94	.92	.91	.90	.88	.87	.86	.85	.84	.84	.83	.82	.81	.80	.80	.79	.78	.78	.77	.76
850	527	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.98	.96	.94	.93	.92	.90	.89	.88	.87	.86	.85	.84	.83	.82	.81	.81	.80	.79	.78	.78	.77	.76
900	533	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	1.00	.99	.97	.95	.93	.92	.90	.89	.88	.87	.86	.85	.84	.83	.82	.81	.81	.80	.79	.79	.78	.77	.77
950	540	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.97	.95	.94	.92	.91	.89	.88	.87	.86	.85	.84	.83	.82	.82	.81	.80	.79	.79	.78	.77	.77
1000	546	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.98	.96	.94	.93	.91	.90	.89	.87	.86	.85	.84	.83	.83	.82	.81	.80	.79	.79	.78	.77	.77
1050	552	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	1.00	.99	.97	.95	.93	.92	.90	.89	.88	.87	.86	.85	.84	.83	.82	.81	.80	.80	.79	.78	.77	.77
1100	558	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.98	.95	.94	.92	.91	.89	.88	.87	.86	.85	.84	.83	.82	.81	.81	.80	.79	.78	.78	.77
1150	563	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.98	.96	.94	.92	.91	.90	.88	.87	.86	.85	.84	.83	.82	.81	.81	.80	.79	.78	.78	.77
1200	569	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.98	.97	.95	.93	.91	.90	.89	.87	.86	.85	.84	.83	.82	.81	.81	.80	.79	.78	.78	.77
1250	574	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.97	.95	.93	.92	.90	.89	.88	.87	.85	.85	.84	.83	.82	.81	.80	.79	.79	.78	.77
1300	579	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.98	.96	.94	.92	.91	.89	.88	.87	.86	.85	.84	.83	.82	.81	.80	.79	.79	.78	.77
1350	584	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.98	.96	.94	.93	.91	.90	.88	.87	.86	.85	.84	.83	.82	.81	.80	.80	.79	.78	.78
1400	588	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	1.00	.99	.97	.95	.93	.92	.90	.89	.88	.86	.85	.84	.83	.82	.81	.81	.80	.79	.78	.78
1450	593	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.97	.95	.94	.92	.90	.89	.88	.86	.85	.84	.83	.82	.81	.81	.80	.79	.78	.78
1500	597	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.97	.96	.94	.92	.91	.89	.88	.87	.86	.84	.84	.83	.82	.81	.80	.79	.78	.78
1600	606	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.98	.97	.96	.94	.93	.91	.89	.88	.86	.85	.84	.83	.82	.81	.80	.79	.78	.78	.77
1700	615	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.99	.97	.96	.95	.93	.91	.89	.88	.86	.85	.84	.83	.82	.81	.79	.79	.78	.77	.77
1800	622	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	.99	.98	.97	.95	.93	.91	.89	.88	.86	.85	.84	.82	.81	.80	.79	.79	.78	.77	.76
1900	630	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.98	.97	.96	.93	.91	.89	.88	.86	.85	.84	.82	.81	.80	.79	.78	.78	.77	.76
2000	636	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.98	.96	.93	.91	.89	.87	.86	.84	.83	.82	.81	.80	.79	.78	.77	.76	.76
2100	644	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.98	.95	.93	.91	.89	.87	.86	.84	.83	.82	.81	.79	.78	.77	.77	.76	.75
2200	650	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.98	.95	.93	.91	.89	.87	.85	.84	.82	.81	.80	.79	.78	.77	.76	.75	.74
2300	658	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.98	.95	.93	.91	.89	.87	.85	.84	.82	.81	.79	.78	.77	.76	.75	.75	.74
2400	663	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	.98	.95	.93	.91	.89	.87	.85	.83	.82	.80	.79	.78	.77	.76	.75	.74	.73
2500	669	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	.98	.95	.93	.90	.88	.86	.84	.83	.81	.80	.78	.77	.76	.75	.74	.73	.72
2600	675	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.96	.93	.90	.88	.85	.84	.82	.80	.79	.77	.76	.75	.74	.73	.72	.71
2700	680	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.95	.90	.88	.85	.83	.81	.79	.78	.76	.75	.74	.73	.72	.71	.70
2800	686	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.95	.90	.88	.85	.82	.80	.78	.76	.75	.74	.73	.72	.71	.70	.69
2900	691	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.00	.90	.87	.84	.82	.80	.78	.76	.75	.73	.72	.71	.70	.69	.68

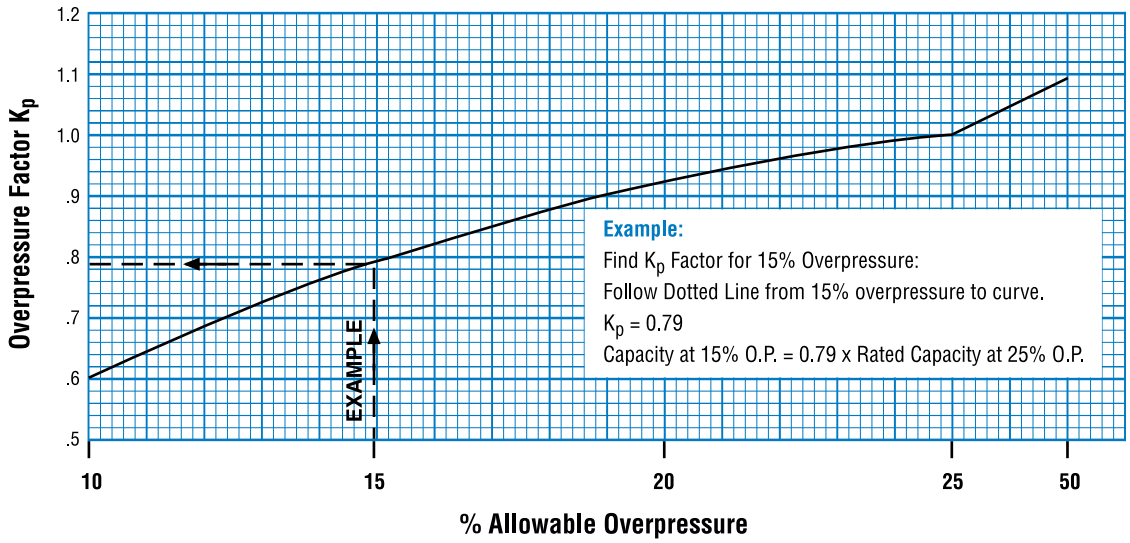
Variable or Constant Back Pressure Sizing Factor K_W
(BalanSeal Valves Only)



$$\% \text{ Gauge Back Pressure} = \frac{\text{Back Pressure, psig}}{\text{Set Pressure, psig}} \text{ X } 100$$

Overpressure Sizing Factor K_p
Other Than 25% Overpressure

Conventional and BalanSeal Valves: Non-Code Liquids Only



Note: Pressure relief valve liquid capacities cannot be predicted by a general curve for overpressures below 10%.

Viscosity Correction Using Chart Method

Sizing Method
Since the viscosity correction factor depends on the actual orifice area, direct solution is not possible and a trial orifice size must be found before the K_u can be determined accurately.

Example (ASME Code liquid application. If non-ASME Code is required, substitute appropriate equation):

Viscosity-Saybolt Universal Secs.....1250 SSU@100°F
Capacity Required.....800 gpm
Set Pressure ..... 100 psig
Constant Back pressure..... 10 psig
Differential Pressure (1.25 P_1 -P_2) ..... 115 psig
Allowable Overpressure.....25%
Specific Gravity .....0.98@100°F
Relieving Temperature.....100°F

Step 1 Calculate Trial Orifice: Calculate the trial orifice area from the liquid equation on page 84:

$$A = \frac{V_L\sqrt{G}}{38.0\ K_d\sqrt{\Delta P}\ K_u} = \frac{800\ (0.99)}{38.0\ (0.652)\ \sqrt{124.7\text{-}10}\ (1)} = 2.98 \text{ sq. in. Actual Area}$$

If BalanSeal valve construction is used and variable back pressure conditions exist, use the maximum back pressure to determine P_2 in the equation, and correct K_w factor. See curve on page 89. Use the following equation:

$$A = \frac{V_L\sqrt{G}}{38.0\ K_d\sqrt{\Delta P}\ K_w\ K_u}$$

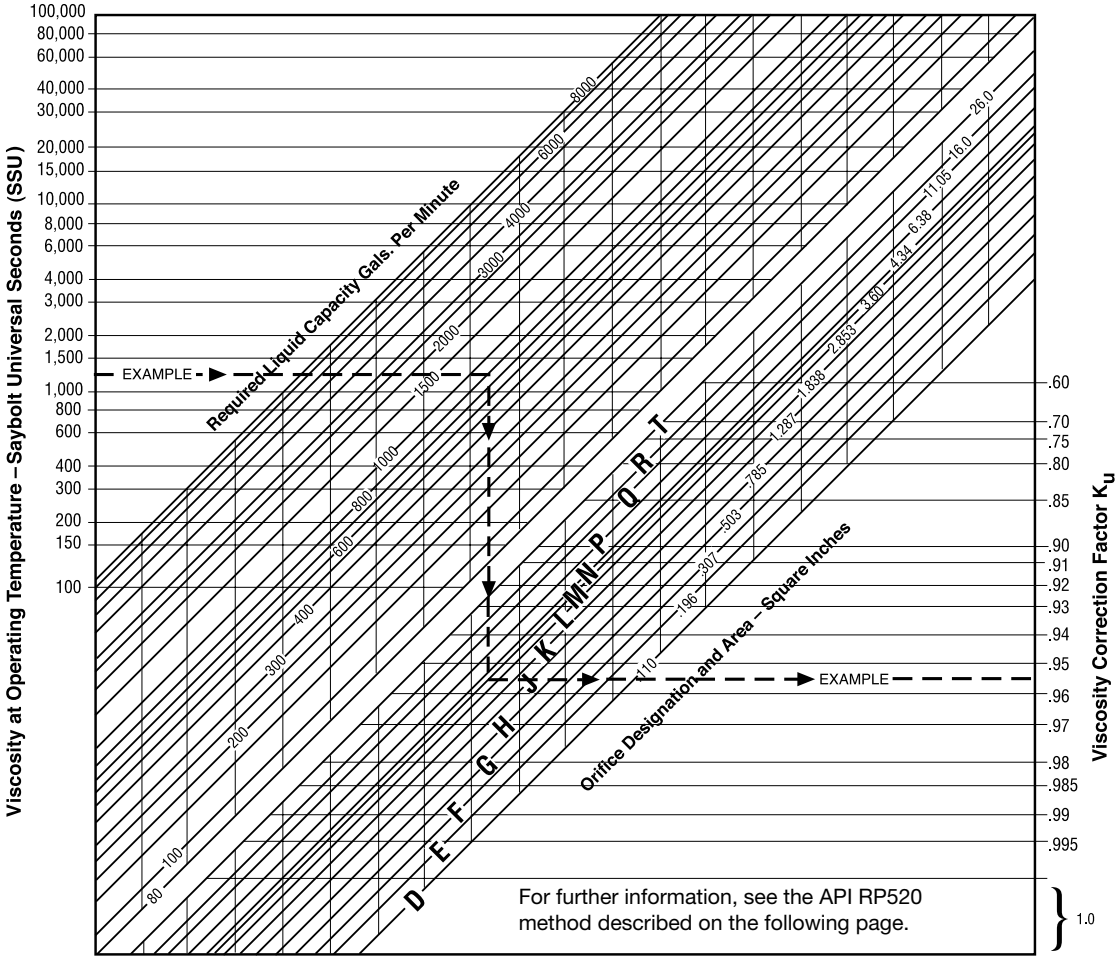
Select the next larger orifice size or an M orifice with 4.0 sq. in. orifice area (this should be about 20% greater than the calculated area to allow for reduction of capacity due to viscosity correction factor K_u).

Step 2 Use Chart to Find K_u: Enter the Viscosity Correction Chart from the left, reading 1250 SSU. Follow the example line horizontally to the required 800 gpm. Drop vertically to the selected trial orifice M, and proceed horizontally right to the K_u scale, reading K_u = 0.955.

Step 3 Verify Orifice Selection: This chart is designed to minimize the trial and error required for solution. Note that the exit from the chart is from the orifice line to the K_u scale. By looking vertically, the next larger or smaller orifice show alternate values of the A term and the corresponding K_u term without repeating all the steps.

The viscosity of the liquid may reduce the velocity and capacity enough to require a larger orifice size than the usual liquid service capacity equation would indicate. Use this simplified viscosity chart and the K_u viscosity correction factors obtainable from it to properly size relief valves intended for viscous liquid service. Equations and graphs used in preparing this chart reflect conservative engineering data on this subject.

For viscous liquid service, it is advisable to allow 25% over-pressure where permissible, to size conservatively, and to consider the use of the bellows and/or steam jacketed bodies for the purpose of isolating the moving parts and to prevent freezing of the lading fluid.



Viscosity Correction Using Reynold's Number Method of API RP520

As an alternative to the sizing method discussed on the previous page, you may use the method given in API RP520 for sizing viscous liquids.

When a relief valve is sized for viscous liquid services, it is suggested that it be sized first as a nonviscous type application in order to obtain a preliminary required discharge area, A. From manufacturer's standard orifice sizes, the next larger orifice size should be used to determine the Reynold's number R from either one of the following:

$$R = \frac{V_L\,(2800G)}{\mu\sqrt{A}}$$

or

$$*R = \frac{12700\,V_L}{U\sqrt{A}}$$

*Use of this equation is not recommended for viscosities less than 100 SSU.

After the value of R is determined, the factor K_V** is obtained from the graph. Factor K_V is applied to correct the preliminary required discharge area. If the corrected area exceeds the chosen standard orifice area, the calculations should be repeated using the next larger standard orifice size.

**K_v of API = K_u of Farris Engineering

Nomenclature

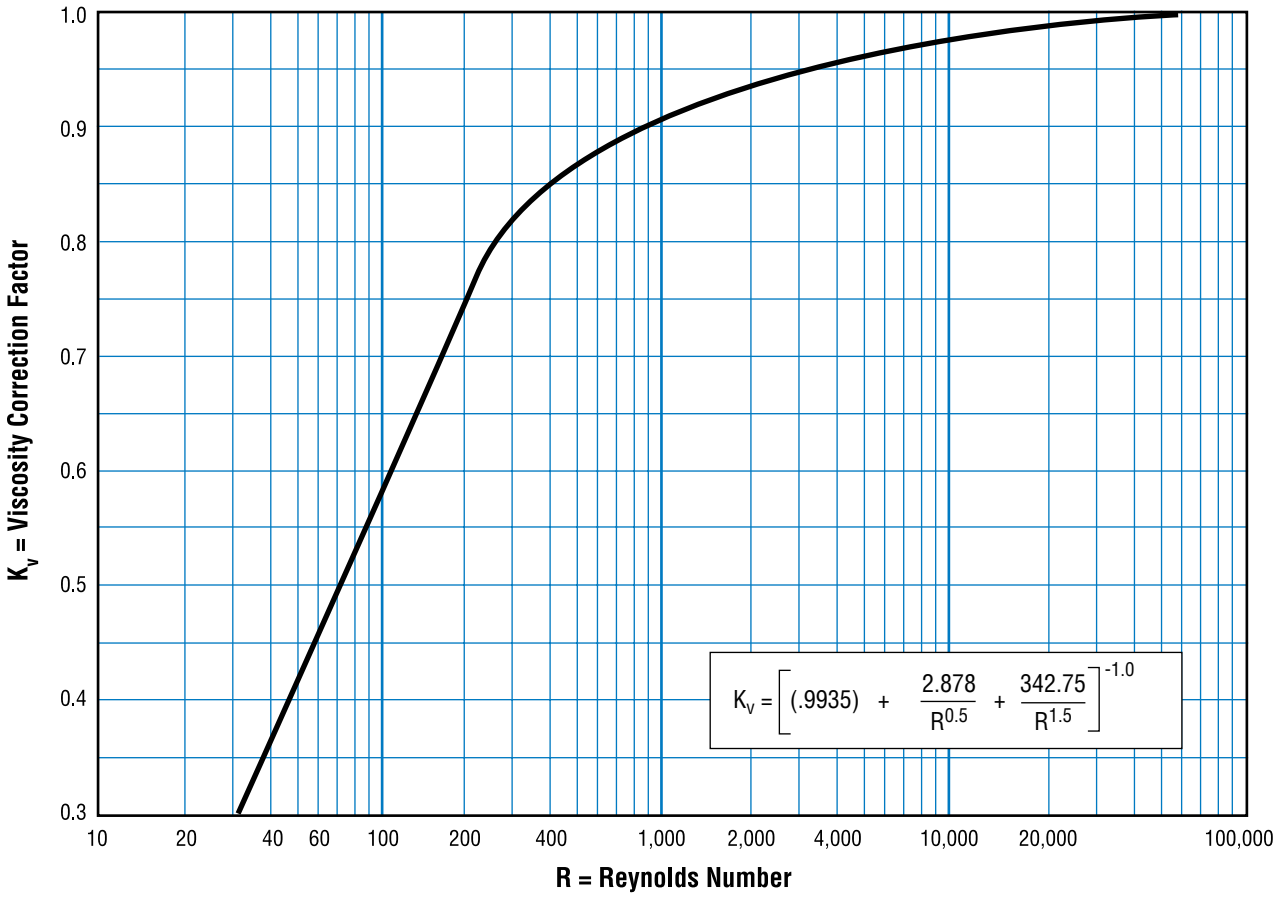
V_L = Flow rate at the flowing temperature in the U.S. gallon per minute.

G = Specific gravity of the liquid at the flowing temperature referred to water = 1.00 at 70ºF.

μ = Absolute viscosity at the flowing temperature in centipoises.

A = Discharge area in square inches from manufacturer's standard orifice areas[1].

U = Viscosity at the flowing temperature in Saybolt Universal Seconds.



General Notes:

1. Select using either API effective area or ASME actual area depending on the sizing method being used.

Conversion Factors

To find desired value, multiply "Given" value by factor below

Pressure Conversion				
Given	**psi**	**kPa**	**Bar**	**kg/cm^2**
psi	1	6.8948	0.0689	0.0703
kPa	0.145	1	0.01	0.0102
Bar	14.504	100	1	1.0197
kg/cm^2	14.223	97.905	0.9	1

Liquid Flow Rate Conversion				
Given	**gpm**	**bbl/day**	**l/min**	**m^3/hr**
gpm	1	34.29	3.785	0.2271
bbl/day	0.02917	1	0.1104	0.006624
l/min	0.2642	9.057	1	0.06
m^3/hr	4.403	151	16.667	1

Mass Conversion				
Given	**lb**	**tons**	**kg**	**tonnes**
lb	1	0.0005	0.4536	0.00045
tons	2000	1	907.18	0.90718
kg	2.2046	0.0011	1	0.001
tonnes	2204.6	1.102	1000	1

Viscosity Conversion				
Given	**cP**	**g/cm-s**	**centistoke**	**SSU**
cP	1	0.01	1/G	4.63/G
g/cm-s	100	1	100/G	463/G
centistoke	G	(0.01)G	1	4.63
SSU	(0.216)G	(21.6)G	0.216	1

where G is liquid specific gravity

Volume Conversion				
Given	**ft^3**	**m^3**	**gal**	**liter**
ft^3	1	0.02832	7.481	28.32
m^3	35.31	1	264.2	1000
gal	0.1337	0.00379	1	3.785
liter	0.03532	0.001	0.2642	1

Density Conversion				
Given	**lb/ft^3**	**kg/m^3**	**g/cm^3**	**lb/gal**
lb/ft^3	1	16.018	0.016	0.1337
kg/m^3	0.0624	1	0.001	0.0083
g/cm^3	62.428	1000	1	8.345
lb/gal	7.481	119.83	0.1198	1

Area Conversion				
Given	**in^2**	**ft^2**	**mm^2**	**cm^2**
in^2	1	0.00694	645.16	6.4516
ft^2	144	1	92903	929.03
mm^2	0.00155	1.08E-05	1	0.01
cm^2	0.155	0.0011	100	1

Temperature Conversion	
Fahrenheit (F) =	(1.8 x C) + 32
Celsius (C) =	0.555 x (F - 32)
Rankin (R) =	F + 459.67
Kelvin (K) =	C + 273.15

Length Conversion				
Given	**ft**	**in**	**mm**	**m**
ft	1	12	304.8	0.3048
in	0.0833	1	25.4	0.0254
mm	0.0033	0.0394	1	0.001
m	3.281	39.37	1000	1

Miscellaneous Conversions		
From	**To**	**Multiply By**
Specific Gravity-Gas	Molecular Wt-Gas	28.97
Density-Liq	Specific Gravity-Liq	1/(ρ Water)

CURTISS WRIGHT
Flow Control Corporation

Farris

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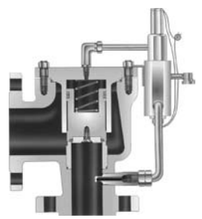
Farris Engineering Products

Process Pressure Relief Valves

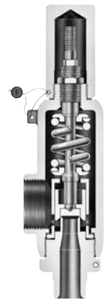
SERIES 2600/2600L

- ASME NB Certified: Air, Steam & Water
- Sizes: 1" x 2" to 20" x 24"
- Pressure Range: 15 psig to 6000 psig
- Temperature Range: -450°F to +1500°F
- Materials: Carbon Steel, Stainless, Monel & Hastelloy C
- Options: Balanced Bellows, O-Ring Seat, Open Bonnet



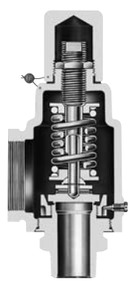
SERIES 3800 Pilot Operated

- ASME NB Certified: Air, Steam & Water
- Sizes: 1" x 2" to 12" x 16"
- Pressure Range: 15 psig to 6170 psig
- Temperature Range: -450°F to +500°F
- Materials: Steel Body & Bonnet, Stainless Steel Trim
- Options: Modulating Pilot Control, Complete 316 Stainless Steel Construction



SERIES 2700

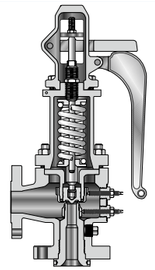
- ASME NB Certified: Air, Steam & Water
- Sizes: 1/2" x 1" to 1-1/2" x 2-1/2"
- Pressure Range: 15 psig to 6500 psig
- Temperature Range: -450°F to +750°F
- Materials: Stainless Steel Body & Trim, Carbon Steel Bonnet
- Options: Stainless Steel, Monel & Hastelloy Materials, O-Ring Seats, Flanged, Socket Weld, Welding Nipple, & Sanitary Connections



SERIES 2850/2856

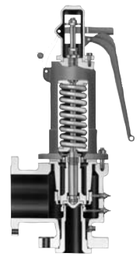
- ASME NB Certified: Air & Steam
- Sizes: 3/4" x 1" to 1-1/2" x 2" (2850)
  3/4" x 1-1/4" to 2" x 3" (2856)
- Pressure Range: 15 psig to 300 psig
- Temperature Range:
  -20° F to +750°F (2850)
  -450° F to +400°F (2856)
- Materials: Stainless Steel Body & Trim
  Steel Bonnet (2850)
  Brass Body & Trim, Bronze Bonnet (2856)

Steam Safety Valves



SERIES 4200

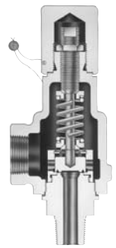
- ASME NB Section I & VIII Certified: Steam & Air
- Sizes 1 1/4" x 1 1/2" to 6" x 8"
- Pressure Range: 15 psig to 1000 psig
- Temperature Range: -20°F to +1000°F
- Materials: Carbon / Alloy St. & Stainless Steel.



SERIES 6400/6600

- ASME NB Section I & VIII Certified: Steam & Air
- Sizes: 1" x 2" to 4" x 6"
- Pressure Range: 15 psig to 1500 psig
- Temperature Range: -20°F to +1000°F
- Materials: Carbon and Stainless Steel
- Options: Exposed Spring & Closed Bonnet

Special Purpose Pressure Relief Valves



SERIES 1890/1896M

- ASME NB Certified: Air, Steam & Water
- Sizes: 1/2" x 1" & 3/4" x 1" (1890)
  1/2" x 3/4" & 3/4" x 3/4" (1896M)
- Pressure Range:
  15 psig to 800 psig (1890)
  15 psig to 300 psig (1896M)
- Temperature Range:
  -20°F to +750°F (1890)
  -450°F to +400°F (1896M)
- Materials:
  Stainless Steel Body & Trim (1890)
  Brass Body & Trim, Bronze Bonnet (1896M)

Test Stands

MODELS T1500 & T6000

- Air & Water Testing
- Maximum Pressures of 1500 psig and 6000 psig
- Test Valves to 8" Inlet Size
- Stainless Steel Test Drum & Test Table
- Digital Test Gauge

Design D4 Control Valve Assembly

Contents

Figure 1. Design D4 Control Valve

Introduction

Scope of Manual

This instruction manual provides installation, maintenance, and parts information for the Design D4 control valve.

Do not install, operate, or maintain a Design D4 control valve without first ● being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance, and ● carefully reading and understanding the contents of this manual. If you have any questions about these instructions, contact your Emerson Process Management™ sales office before proceeding.

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

Description

The Design D4 control valve is a compact, rugged valve designed primarily for high-pressure throttling applications. This valve is ideal for use on pressure and flow control applications within the oil and gas production industry. The Design D4 valve also makes an excellent dump valve for high-pressure separators and scrubbers.

The Design D4 control valve meets the metallurgical requirements of NACE MR0175/ISO 15156 without environmental limits for temperatures below 135°C (275°F). If the temperature is above 135°C (275°F), the N07718 Belleville washers will impose some limits, as shown in table 3.

Specifications

Table 1 lists specifications for the Design D4 control valve. Some of the specifications for a given control valve as it originally comes from the factory are stamped on a nameplate located on the actuator spring barrel.

Table 1. Specifications

Available Configurations

Spring-to-Close
Spring-to-Open

Valve Body Sizes and End Connection Styles(1)

See table 2

Maximum Inlet Pressures and Temperatures(1)

If the valve nameplate shows an ASME pressure-temperature class, maximum inlet pressure and temperature is consistent with the applicable class per ASME B16.34. If the nameplate does not show an ASME class, it will show a maximum cold working pressure at 38°C (100°F) (for example, 293 bar [4250 psi])

Maximum Pressure Drops(1)

See tables 4, 5, 6, and 7

Input Signal to Actuator

See tables 4, 5, 6, and 7

Actuator Maximum Casing Pressure(1)

3.4 bar (50 psig)

Shutoff Classification per ANSI/FCI 70-2 and IEC 60534-4

Class IV

Material Temperature Capabilities(1)

Actuator Assembly: –40 to 93°C (–40 to 200°F)

Valve Body Assembly:
Standard Bonnet O-Ring: –46 to 149°C (–50 to 300°F)
Optional Fluorocarbon Bonnet O-Ring: –23 to 204°C (–10 to 400°F)

Flow Characteristic

Equal percentage

Flow Direction

Flow up only

Port Diameters

See table 2

Valve Plug Travel

19 mm (0.75 inch)

Valve Plug Style

Micro-Form valve plug

Actuator Diaphragm Effective Area

452 cm^2 (69 $inches^2$)

Actuator Pressure Connection Size

1/4 NPT internal

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.

Table 2. Valve Sizes and Connection Styles

VALVE SIZE, NPS	PORT DIAMETER, (INCHES)	SCREWED	RAISED FACE (RF) FLANGED				RING TYPE JOINT (RTJ) FLANGED	
		4250 psi	CL150	CL300	CL600	CL900 and CL1500	CL600	CL900 and CL1500
1	0.25, 0.375, 0.5, 0.75	X	X	X	X	X	X	X
2	0.25, 0.375, 0.5 0.75, 1, 1.25	X	X	X	X	X	X	X

X = Available construction.

Table 3. Design D4 Environmental Limits for NACE MR0175/ISO 15156 with Sour Trim

MAXIMUM TEMPERATURE		MAXIMUM H_2S PARTIAL PRESSURE		COMPATIBLE WITH ELEMENTAL SULFUR?
°C	°F	MPa	psia	
204	400	1.4	200	No
199	390	2.3	330	No
191	375	2.5	360	No
149	300	2.8	400	No
135	275	No Limit		Yes

Table 4. Maximum Shutoff Pressure Drops(1) for Design D4 Control Valves (Spring-to-Close) When Used with Typical Control Instrumentation(2)

INPUT SIGNAL TO ACTUATOR		0 to 1.2 Bar (0 to 18 Psig)		0 to 1.4 Bar (0 to 20 Psig)		0 to 2.0 Bar (0 to 30 Psig)		0 to 2.3 Bar (0 to 33 Psig)		0 to 2.4 Bar (0 to 35 Psig)		0 to 3.4 Bar (0 to 50 Psig)	
SPRING		Light Rate				Heavy Rate							
INITIAL SPRING SETTING		0.77 Bar (11.2 Psig)		0.77 Bar (11.2 Psig)		0.85 Bar (12.4 Psig)		1.05 Bar (15.3 Psig)		1.18 Bar (17.1 Psig)		1.18 Bar (17.1 Psig)	
PORT DIAMETER		Maximum Pressure Drop											
mm	Inches	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi
6.4	0.25	293(3)	4250(3)	293(3)	4250(3)	293	4250	293	4250	293	4250	293	4250
9.5	0.375	293(3)	4250(3)	293(3)	4250(3)	293	4250	293	4250	293	4250	293	4250
12.7	0.5	191	2765	191	2765	219	3180	288	4180	293	4250	293	4250
19.1	0.75	80	1160	80	1160	92	1340	123	1785	143	2080	143	2080
25.4	1	42	610	42	610	49	715	67	965	78	1130	78	1130
31.8	1.25	25	365	25	365	30	430	41	590	48	700	48	700

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, use the column marked 0-1.4 bar (0-20 psig) for a 0.21-1.0 bar (3-15 psig) pneumatic controller with 1.4 bar (20 psig) supply pressure.
3. For applications with downstream pressure in excess of 196 bar (2845 psig), use 196 bar (2845 psig) for Maximum Shutoff Pressure.

Table 5. Maximum Shutoff Pressure Drops(1) for Design D4 Control Valves (Spring-to-Close) When Used with Instrumentation with Restricted Output Range(2)

INPUT SIGNAL TO ACTUATOR		0.4 to 2.0 Bar (6 to 30 Psig)		0.14 to 2.3 Bar (2 to 33 Psig)	
SPRING		Heavy Rate		Heavy Rate	
INITIAL SPRING SETTING		0.97 Bar (14.0 Psig)		1.17 Bar (17.0 Psig)	
PORT DIAMETER		Maximum Pressure Drop			
mm	Inches	Bar	Psi	Bar	Psi
6.4	0.25	259(3)	3750(3)	293	4250
9.5	0.375	210(3)	3045(3)	293	4250
12.7	0.5	113	1635	282	4095
19.1	0.75	45	655	120	1750
25.4	1	23	330	65	945
31.8	1.25	13	185	39	580

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, an Electro-Pneumatic Transducer calibrated for 0.4-2.0 bar (6-30 psig) output pressure.
3. For applications with downstream pressure in excess of 118 bar (1715 psig), use 118 bar (1715 psig) for Maximum Shutoff Pressure.

Table 6. Maximum Shutoff Pressure Drops(1) for Design D4 Control Valves (Spring-to-Open) When Used with Typical Control Instrumentation(2)

INPUT SIGNAL TO ACTUATOR		0 to 1.2 Bar (0 to 18 Psig)		0 to 1.4 Bar (0 to 20 Psig)		0 to 2.0 Bar (0 to 30 Psig)		0 to 2.3 Bar (0 to 33 Psig)		0 to 2.4 Bar (0 to 35 Psig)		0 to 3.4 Bar (0 to 50 Psig)	
SPRING		Light Rate				Heavy Rate							
INITIAL SPRING SETTING		0.23 Bar (3.4 Psig)		0.23 Bar (3.4 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)	
PORT DIAMETER		Maximum Pressure Drop											
mm	Inches	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi
6.4	0.25	293(3)	4250(3)	293(3)	4250(3)	293	4250	293	4250	293	4250	293	4250
9.5	0.375	293(3)	4250(3)	293(3)	4250(3)	293	4250	293	4250	293	4250	293	4250
12.7	0.5	187	2715	233	3380	293	4250	293	4250	293	4250	293	4250
19.1	0.75	78	1135	99	1430	147	2130	178	2575	198	2875	293	4250
25.4	1	41	600	53	765	80	1160	97	1410	109	1575	195	2830
31.8	1.25	24	355	32	465	49	715	60	875	68	985	123	1785

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, use the column marked 0-1.4 bar (0-20 psig) for a 0.21-1.0 bar (3-15 psig) pneumatic controller with 1.4 bar (20 psig) supply pressure.
3. For applications with downstream pressure in excess of 190 bar (2760 psig), use 190 bar (2760 psig) for Maximum Shutoff Pressure.

Table 7. Maximum Shutoff Pressure Drops(1) for Design D4 Control Valves (Spring-to-Open) When Used with Instrumentation with Restricted Output Range(2)

INPUT SIGNAL TO ACTUATOR		0.4 to 2.0 Bar (6 to 30 Psig)		0.14 to 2.3 Bar (2 to 33 Psig)	
SPRING		Heavy Rate		Heavy Rate	
INITIAL SPRING SETTING		0.69 Bar (10.0 Psig)		0.42 Bar (6.1 Psig)	
PORT DIAMETER		Maximum Pressure Drop			
mm	Inches	Bar	Psi	Bar	Psi
6.4	0.25	259(3)	3750(3)	293	4250
9.5	0.375	259(3)	3750(3)	293	4250
12.7	0.5	196	2845	293	4250
19.1	0.75	82	1195	156	2265
25.4	1	43	630	85	1235
31.8	1.25	26	380	52	765

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, an Electro-Pneumatic Transducer calibrated for 0.4-2.0 bar (6-30 psig) output pressure.
3. For applications with downstream pressure in excess of 202 bar (2925 psig), use 202 bar (2925 psig) for Maximum Shutoff Pressure.

Installation

WARNING

Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.

To avoid personal injury or property damage caused by bursting of pressure-retaining parts or by uncontrolled process fluid, be certain the service conditions do not exceed the limits shown on the valve nameplate and in tables 1, 4, 5, 6, and 7. Use pressure-relieving devices required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

WARNING

When ordered, the valve configuration and construction materials were selected to meet particular pressure, temperature, pressure drop, and controlled fluid conditions. Responsibility for the safety of process media and compatibility of valve materials with process media rests solely with the purchaser and

end-user. Since some body/trim material combinations are limited in their pressure drop and temperature ranges, do not apply any other conditions to the valve without first contacting your Emerson Process Management sales office.

CAUTION

To avoid product damage, inspect the valve before installation for any damage or any foreign material that may have collected in the valve body. Also remove any pipe scale, welding slag, or other foreign material from the pipeline.

1. Before installing the control valve assembly, inspect it for any damage and for any foreign material that may have collected in the valve body.

2. Remove any pipe scale, welding slag, and other foreign material from the pipeline.

3. The control valve can be installed in any position, but normally the actuator is vertical above the valve. Install the valve so the flow direction arrow on the side of the valve indicates the direction of the process flow.

4. Install the valve following local and national piping codes when they apply to the application. For screwed connections, treat the external pipe threads with a good grade pipe compound. For flanged valves, use suitable gaskets between valve and pipeline flanges.

5. If continuous operation is required during maintenance and inspection, install a conventional three-valve bypass around the valve.

6. Connect loading pressure for the Spring-to-Open configuration to the 1/4-18 NPT connection in the upper casing assembly (key 23) as shown in figure 5. The Spring-to-Close configuration loading pressure connection is in the lower casing assembly (key 39) as shown in figure 4.

Spring Adjustment

The spring has a fixed pressure span over which loading pressure will stroke the valve. Adjustment of the spring compression shifts the span so that more or less loading pressure is required to start travel. Since the span does not change, there will be a corresponding increase or decrease in the pressure requirements at the end of the valve stroke.

In order to maximize shutoff pressure drop values, the actuator spring must be accurately adjusted for each Input Signal Pressure Range. If the actuator has been disassembled or pressure conditions have changed, the spring may require adjustment. Refer to tables 2 and 4 to determine the Initial Spring Set values based on the Input Signal range that is available to the actuator. These values include packing friction.

Spring-to-Close

Refer to figure 4.

1. Loosen the adjusting screw nut (key 44).

2. Turn the adjusting screw (key 31) clockwise to compress the spring or counterclockwise to decrease spring compression.

3. After adjustment, tighten the adjusting screw nut (key 44).

Spring-to-Open

Refer to figure 5.

1. Unscrew the spring case assembly (key 27).

2. Turn the adjusting stem nut (key 44) clockwise to compress the spring or counterclockwise to decrease spring compression.

3. After adjustment, replace the spring case assembly (key 27).

Maintenance

Refer to figure 4.

Valve parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and maintenance depends on the severity of the service conditions.

WARNING

Avoid personal injury from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:

- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.**
- **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from both sides of the valve.**
- **Vent the power actuator loading pressure and relieve any actuator spring precompression.**
- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
- **The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

Valve Plug and Seat Ring

The Design D4 control valve is designed to allow easy access to the valve plug and seat ring without disturbing the packing. Refer to other sections of this instruction manual if additional maintenance is required.

Disassembly

1. Remove the loading pressure tubing and any accessories that may hamper disassembly.

2. Break the hammer nut (key 6) loose with a hammer. Continue turning the hammer nut by using a hammer or a large adjustable wrench, tightened around one ear of the hammer nut. If the bonnet is stuck on the valve, continue to unscrew the hammer nut. The hammer nut will contact the spring pins (key 7) and will force the bonnet out of the valve. Carefully lift the actuator, bonnet, and valve plug assembly from the valve body.

WARNING

The spring pins must always be in place during valve operation. They provide a safeguard against injury when the unit is being disassembled.

3. Use a socket wrench to loosen the seat ring (key 3).

4. Remove the seat ring (key 3) and seat ring gasket (key 9) from the valve body.

5. Inspect parts for wear or damage that would prevent proper operation of the valve body. Carefully clean the seat ring gasket surfaces and seat ring threads.

WARNING

Be careful to avoid damaging the seating surface on the valve plug or seat ring as damage in these areas will allow excessive leakage at shutoff. Avoid damaging the highly polished valve stem surface. A damaged valve stem could cut the packing and allow process fluid to leak to the atmosphere.

Table 8. Torque for Seat Ring (Key 3)

VALVE SIZE	RECOMMENDED TORQUE	
NPS	N•m	Lbf•ft
1	407	300
2	698	515

6. **For spring-to-close only:** To remove the valve plug (key 2), drive out the groove pin (key 4) and unscrew the valve plug from the stem (key 47). If the groove pin (key 4) is not exposed, verify that downward movement of the stem is not restricted by instrument linkages attached to the stem (key 47).

If the valve plug cannot be easily unscrewed from the stem, use a punch to keep the stem from turning as the plug is removed.

7. **For spring-to-open only:** To remove the valve plug (key 2), first remove the spring case assembly (key 27). Remove the adjustment screw nut (key 44), the upper spring seat (key 29), and the spring (key 30). Push the adjustment stem (key 31) fully downward until the diaphragm plate (key 40) contacts the cap screws (key 38), exposing the groove pin (key 4) in the plug. If the groove pin (key 4) is not exposed, verify that downward movement of the stem is not restricted by instrument linkages attached to the stem (key 47). Drive out the groove pin (key 4) and unscrew the valve plug from the stem (key 47).

If the valve plug cannot be easily unscrewed from the stem, use a punch to keep the stem from turning as the plug is removed.

Assembly

1. Make sure the bonnet O-ring (key 8) is on the bonnet and lubricated with lithium grease (key 49).

2. Install the plug (key 2) on the stem (key 47) and insert a new groove pin (key 4).

3. Thoroughly clean the seat ring and bonnet threads in the valve body (key 1). Also clean the valve body seat ring gasket surfaces.

4. Apply anti-seize lubricant (key 54) to the threads of the seat ring (key 3), and its mating threads in the valve body.

5. Apply anti-seize lubricant (key 54) to the seat ring gasket (key 9) and install into the valve body.

6. Screw the seat ring into the valve body. Use a socket wrench to tighten the seat ring to the torque values shown in table 8. Remove all excess lubricant after tightening.

7. Lubricate (key 54) the threads on the valve body and hammer nut and the contact surfaces of the bonnet and hammer nut flange. Install the bonnet and actuator assembly with pinned valve plug onto the valve body. Tighten the hammer nut using an adjustable wrench until the nut stops turning. A few hammer blows will be required to ensure that the assembly is tight.

8. See the actuator assembly and spring adjustment sections of this manual.

Valve Packing

WARNING

Observe the warning at the start of the Maintenance section.

The valve stem packing can only be accessed from within the valve body. If packing maintenance is required, first disassemble per steps 1, 2, and 6 or 7 in the Valve Plug and Seat Ring Disassembly section of this document.

Disassembly

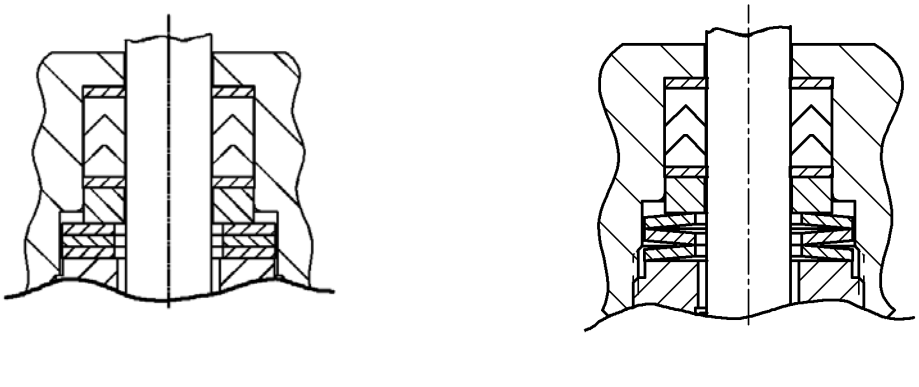
1. Loosen the packing retainer locknut (key 22) with a spanner wrench or with a punch and hammer.

2. Unscrew the packing retainer (key 10) from the bonnet (key 5).

3. Remove the three Belleville springs (key 11), packing spacer (key 14), packing (key 13), and two anti-extrusion rings (key 12) from the bonnet, using a formed wire hook.

4. Clean and inspect the packing box wall to ensure that the packing surfaces are not damaged. If the surface condition is damaged, and cannot be improved by light sanding, replace the bonnet by contacting your Emerson Process Management sales office.

5. Inspect the valve stem for scratches or wear, and valve plug for wear or damage. Replace if necessary.

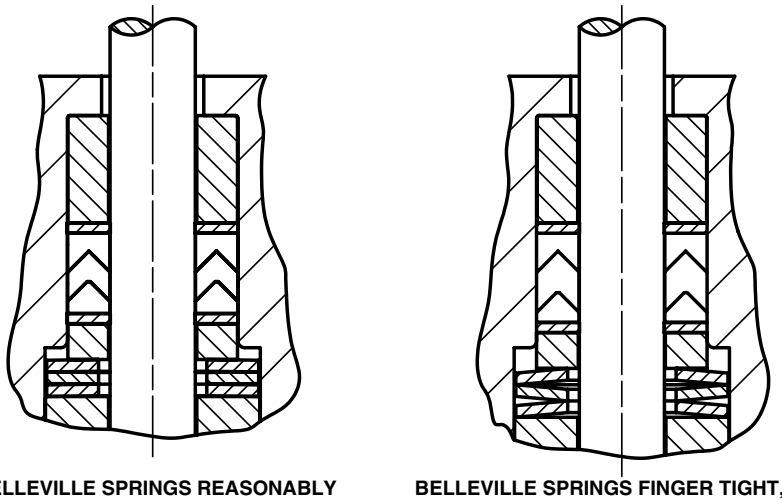


E0862

BELLEVILLE SPRINGS REASONABLY TIGHT TO SEAT THE PACKING

BELLEVILLE SPRINGS FINGER TIGHT, THEN TIGHTEN 1/2 TURN (3 FLATS ON THE RETAINER)

BONNET DESIGN PRE 2006



E1024

BELLEVILLE SPRINGS REASONABLY TIGHT TO SEAT THE PACKING

BELLEVILLE SPRINGS FINGER TIGHT, THEN TIGHTEN 1/2 TURN (3 FLATS ON THE RETAINER)

BONNET DESIGN 2006 AND NEWER

NOTE: RECOMMENDED SPARE PARTS, INCLUDING PACKING KITS, ARE THE SAME FOR BOTH BONNET DESIGNS.

Figure 2. Design D4 Belleville Spring Procedure

Assembly

Refer to figures 2, 3, 4, and 5.

1. Install new packing and Belleville springs according to the packing arrangement shown in figure 2.

2. Using a non-marring installation tool, such as a 12-inch length of 1/2 inch PVC pipe, push the first anti-extrusion washer (key 12) fully into the packing box by hand. Then, use the packing spacer (key 14) to fully seat the anti-extrusion washer by firmly tapping the packing spacer against the anti-extrusion washer with a hammer and the PVC pipe.

3. Remove the packing spacer from the packing bore.

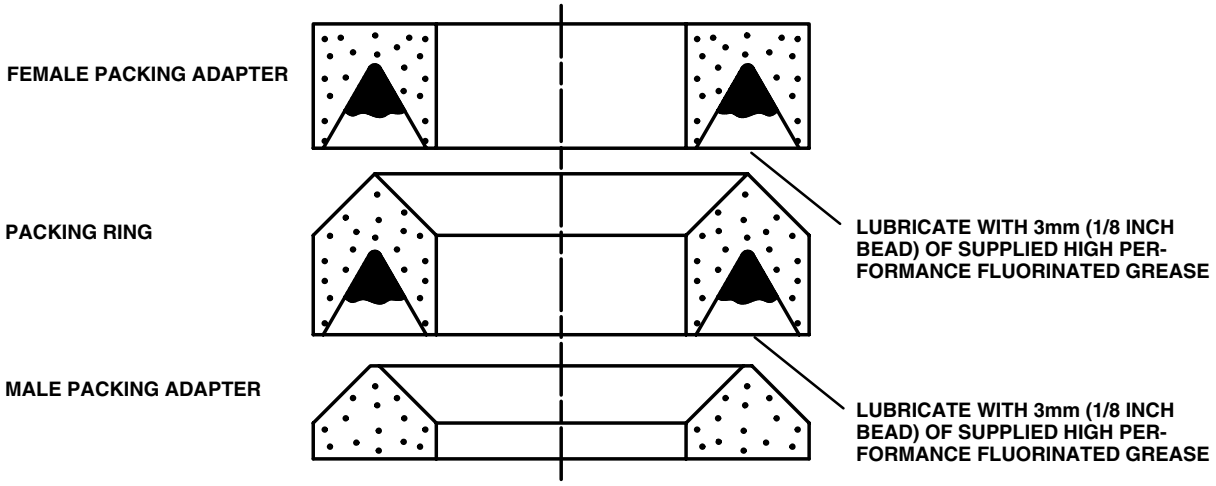


Figure 3. Lubrication Locations on Packing

CAUTION

All D4 packing kits include a single use packet of high performance fluorinated grease. This is the only acceptable D4 packing lubricant.

WARNING

To avoid possible personal injury, exercise appropriate caution consistent with using any chemical. Contact your Emerson Process Management sales office with any questions regarding use of the supplied high performance fluorinated grease.

Note

In the following procedure, carefully install each packing ring individually over the valve stem and push completely into the packing box with a non-marring tube. A 12-inch length of 1/2 inch PVC pipe works well for this. It is recommended that the lubricated packing rings be installed individually rather than pushed in as a set.

4. Using a needle point syringe filled with the supplied high performance fluorinated grease, apply a continuous bead of approximately 5mm (3/16 inch) diameter inside the V-groove of the female adaptor ring. See figure 3. Take care to keep the lubricant confined to only the V-groove. Do not lubricate the other surfaces of the packing ring, the stem, or the packing box.

5. Install the female adaptor ring using the packing spacer and PVC pipe to push the ring against the anti-extrusion washer. Apply only enough force to cause the female adaptor to make contact.

6. Remove the packing spacer from the packing bore.

7. Using a needle point syringe filled with the supplied high performance fluorinated grease, apply a continuous bead of approximately 5mm (3/16 inch) diameter inside the V-groove of the white V-ring. See figure 3. Take care to keep the lubricant confined to only the V-groove. Do not lubricate the other surfaces of the packing ring, the stem, or the packing box.

8. Install the V-ring using the packing spacer and PVC pipe to push the V-ring against the female adaptor. Apply only enough force to cause the female adaptor to make contact.

9. Remove the packing spacer from the packing bore.

10. Install the male adaptor.

11. Using the PVC pipe, push the second anti-extrusion washer (key 12) fully into the packing box by hand. Then, use the packing spacer (key 14) to fully seat the anti-extrusion washer by firmly tapping the packing spacer against the anti-extrusion washer with a hammer and the PVC pipe.

12. Do not remove the packing spacer (key 14) from the packing bore.

13. Install the Belleville springs(key 11). The Belleville springs (key 11) should be single stacked with the I.D. of the inner spring contacting the

packing spacer (key 14) and the O.D. of the outer spring contacting the packing retainer (key 10). The final Belleville spring should be within the 1.26 inch diameter bore of the bonnet.

14. Adjust the packing retainer by hand until it makes contact with the Belleville springs. Do not tighten by hand, simply install the packing retainer until it makes contact with the Belleville springs. Tighten the packing retainer clockwise precisely 1.16 turns (7 flats on the retainer) to seat the packing. This should fully compress the Belleville springs as detected by an increase in torque between 6 and 7 flats.

15. Loosen the packing retainer completely. Adjust the packing retainer by hand until it makes contact with the Belleville springs. Do not tighten by hand, simply install the packing retainer until it makes contact with the Belleville springs. Tighten the packing retainer clockwise precisely 1/2 turn (3 s on the retainer).

16. Lock the packing retainer (key 10) solidly in place by tightening the packing retainer locknut (key 22) using a spanner wrench or a hammer and punch or chisel.

Actuator (Spring-to-Close)

WARNING

Observe the warning at the start of the Maintenance section.

Refer to figure 4.

Before disassembling the actuator, disassemble the valve plug, seat ring, and packing according to instructions in this manual.

Disassembly

1. Loosen the adjusting screw nut (key 44) and turn the adjusting screw (key 31) counterclockwise to remove all spring compression.

2. Unscrew the casing cap screws and hex nuts (keys 45 and 46), and remove the upper casing assembly (key 23) from the lower casing (key 39).

3. Remove the spring seat (key 29) and actuator spring (key 30).

4. Lift out the diaphragm, diaphragm plate, and stem assembly. Remove the travel indicator (key 32) when the bottom of the stem enters the yoke window.

5. To replace the diaphragm (key 15), separate the diaphragm assembly by using a wrench on the hex nuts (key 42) to unscrew the assembly.

6. Separate the parts--diaphragm washer, actuator O-ring (keys 41 and 25), diaphragm, and diaphragm plate, (keys 15 and 40).

7. Inspect the diaphragm and the actuator O-ring for damage or deterioration, and replace if necessary. If the diaphragm is replaced, a new O-ring should also be installed.

8. Inspect the stem O-ring (key 19) and bonnet bushing (key 20); replace if necessary. To inspect the casing O-ring (key 18), remove the cap screws (key 38) and lift off the lower casing (key 39). Replace the O-ring if necessary.

9. If the hammer nut needs to be removed from the bonnet, the spring pins (key 7) can be removed with locking pliers.

Assembly

1. Before starting assembly, make sure all parts are clean and in good condition. There should be no burrs or sharp edges on any threads or surfaces that might cut or damage an O-ring, bushing, the packing, or the diaphragm. When replacing O-rings and bushings, be sure the O-ring or bushing groove is clean and undamaged. Using a general purpose lubricant (key 49), lubricate all bushings and O-rings and the threads of parts that have to pass through the bushings and O-rings.

CAUTION

The threads on factory-produced valve stems have been specially machined to avoid O-ring, bushing, or packing damage during trim maintenance. Use of other than a factory-produced valve stem may result in early stem O-ring, bushing, and packing failure.

Note

Do not lubricate cap screws (key 38) before inserting them in the following procedure.

2. Place the hammer nut and spring pins on the bonnet, if removed. Install the casing O-ring (key 18), the stem O-ring (key 19), and the bonnet

bushing (key 20). Position the lower casing (key 39) on the bonnet. Insert the nonlubricated cap screws (key 38), and torque to 49 N•m (36 lbf•ft).

WARNING

The spring pins must always be in place during valve operation. They provide a safeguard against injury when the unit is being disassembled.

3. Assemble the diaphragm plate assembly. Place the patterned side of the diaphragm (key 15) against the diaphragm plate (key 40). Be sure to turn the diaphragm washer (key 41) so that the side that is beveled on the inside diameter is against the O-ring (key 25). Also, make sure that it is assembled for installation with the diaphragm on the loading pressure side and the lockwasher (key 43) and lower spring seat (key 28) are on the spring side.

4. Fasten the diaphragm and diaphragm plate assembly on the stem with hex nuts (key 42). Place the diaphragm and diaphragm plate, and stem assembly into the lower casing and bonnet. Install the travel indicator (key 32) on the stem as the bottom of the stem enters the yoke window.

CAUTION

Over-tightening the diaphragm casing cap screws and nuts (keys 45 and 46) can damage the diaphragm. Do not exceed 27 N•m (20 lbf•ft) torque.

5. Replace the spring (key 30) on the diaphragm plate (key 40). Replace the upper spring seat (key 29). Position the upper casing (key 23) on the lower casing (key 39). Insert the cap screws (key 45) and tighten the hex nuts (key 46). Torque the casing cap screws evenly to 27 N•m (20 lbf•ft) using a crisscross pattern.

6. Adjust the initial spring set per the Spring Adjustment section in this manual.

Actuator (Spring-to-Open)

WARNING

Observe the warning at the start of the Maintenance section.

Refer to figure 5.

Before disassembling the actuator, disassemble the valve plug, seat ring, and packing according to instructions in this manual.

Disassembly

1. Unscrew the spring case assembly (key 27). Turn the adjusting screw nut (key 44) counterclockwise to remove all spring compression. Remove the adjusting screw nut, upper spring seat, and spring (keys 44, 29, and 30)

2. Unscrew the casing cap screws and hex nuts (keys 45 and 46), and remove the upper casing assembly (key 23) from the lower casing (key 39). Remove the cotter pin (key 36) and unscrew the adjusting stem (key 31).

3. Lift out the diaphragm (key 15), diaphragm plate (key 40), and stem assembly. Remove the travel indicator (key 32) when the bottom of the stem enters the yoke window.

4. To replace the diaphragm (key 15), separate the diaphragm assembly by using a wrench on the hex nuts (key 42) to unscrew the assembly.

5. Separate the parts--diaphragm washer, actuator O-ring (keys 41 and 25), diaphragm, and diaphragm plate, (keys 15 and 40).

6. Inspect the diaphragm and the actuator O-ring for damage or deterioration, and replace if necessary. If the diaphragm is replaced, a new O-ring should also be installed.

7. Inspect the stem O-ring (key 19) and bonnet bushing (key 20); replace if necessary. To inspect the casing O-ring (key 18), remove the cap screws (key 38) and lift off the lower casing (key 39). Replace the O-ring if necessary. Inspect the adjusting stem bushing (key 26) and actuator stem O-ring (key 53). Replace if necessary.

8. If the hammer nut needs to be removed from the bonnet, the spring pins (key 7) can be removed with locking pliers.

Assembly

1. Before starting assembly, make sure all parts are clean and in good condition. There should be no burrs or sharp edges on any threads or surfaces that might cut or damage an O-ring, bushing, the packing, or the diaphragm. When replacing O-rings and bushings, be sure the O-ring or bushing groove is clean and undamaged. Using a general purpose lubricant (key 49), lubricate all bushings and O-rings and the threads of parts that have to pass through the bushings and O-rings.

CAUTION

The threads on factory-produced valve stems have been specially machined to avoid O-ring, bushing, or packing damage during trim maintenance. Use of other than a factory-produced valve stem may result in early stem O-ring, bushing, and packing failure.

Note

Do not lubricate cap screws (key 38) before inserting them in the following procedure.

2. Place the hammer nut and spring pins on the bonnet, if removed. Install the casing O-ring (key 18), the stem O-ring (key 19), and the bonnet bushing (key 20). Position the lower casing (key 39) on the bonnet. Insert the nonlubricated cap screws (key 38), and torque to 49 N•m (36 lbf•ft).

3. Assemble the diaphragm plate assembly. Place the patterned side of the diaphragm (key 15) against the diaphragm plate (key 40). Be sure to turn the diaphragm washer (key 41) so that the side that is beveled on the inside diameter is against the O-ring (key 25). Also, make sure that it is assembled for installation with the diaphragm on the loading pressure side and the lockwasher (key 43) and diaphragm washer (key 41) are on the upper side.

WARNING

The spring pins must always be in place during valve operation. They provide a safeguard against injury when the unit is being disassembled.

4. Fasten the diaphragm and diaphragm plate assembly on the stem with hex nuts (key 42). Place the diaphragm and diaphragm plate, and stem assembly into the lower casing and bonnet. Install the travel indicator (key 32) on the stem as the bottom of the stem enters the yoke window.

5. Screw the adjusting stem (key 31) onto the stem (key 47) and secure the cotter pin (key 36). Make sure the bushing and O-ring are in place in the upper casing.

CAUTION

Over-tightening the diaphragm casing cap screws and nuts (keys 45 and 46) can damage the diaphragm. Do not exceed 27 N•m (20 lbf•ft) torque.

6. Position the upper casing (key 23) on the lower casing (key 39). Insert the cap screws (key 45) and tighten the hex nuts (key 46). Torque the casing cap screws evenly to 27 N•m (20 lbf•ft) using a crisscross pattern.

7. Replace the spring (key 30), spring seat (key 29), and adjusting stem nut (key 44) over the adjusting stem. Replace the spring case assembly (key 27).

8. Adjust the initial spring set per the Spring Adjustment section in this manual.

Parts Ordering

Each Design D4 control valve is assigned a serial number, which can be found on the nameplate. Refer to the number when contacting your Emerson Process Management sales office for assistance or when ordering replacement parts.

WARNING

Use only genuine Fisher® replacement parts. Components that are not supplied by Emerson Process Management should not, under any circumstances, be used in any Fisher valve, because they will void your warranty, might adversely affect the performance of the valve, and could give rise to personal injury and property damage.

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use and maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end-user.

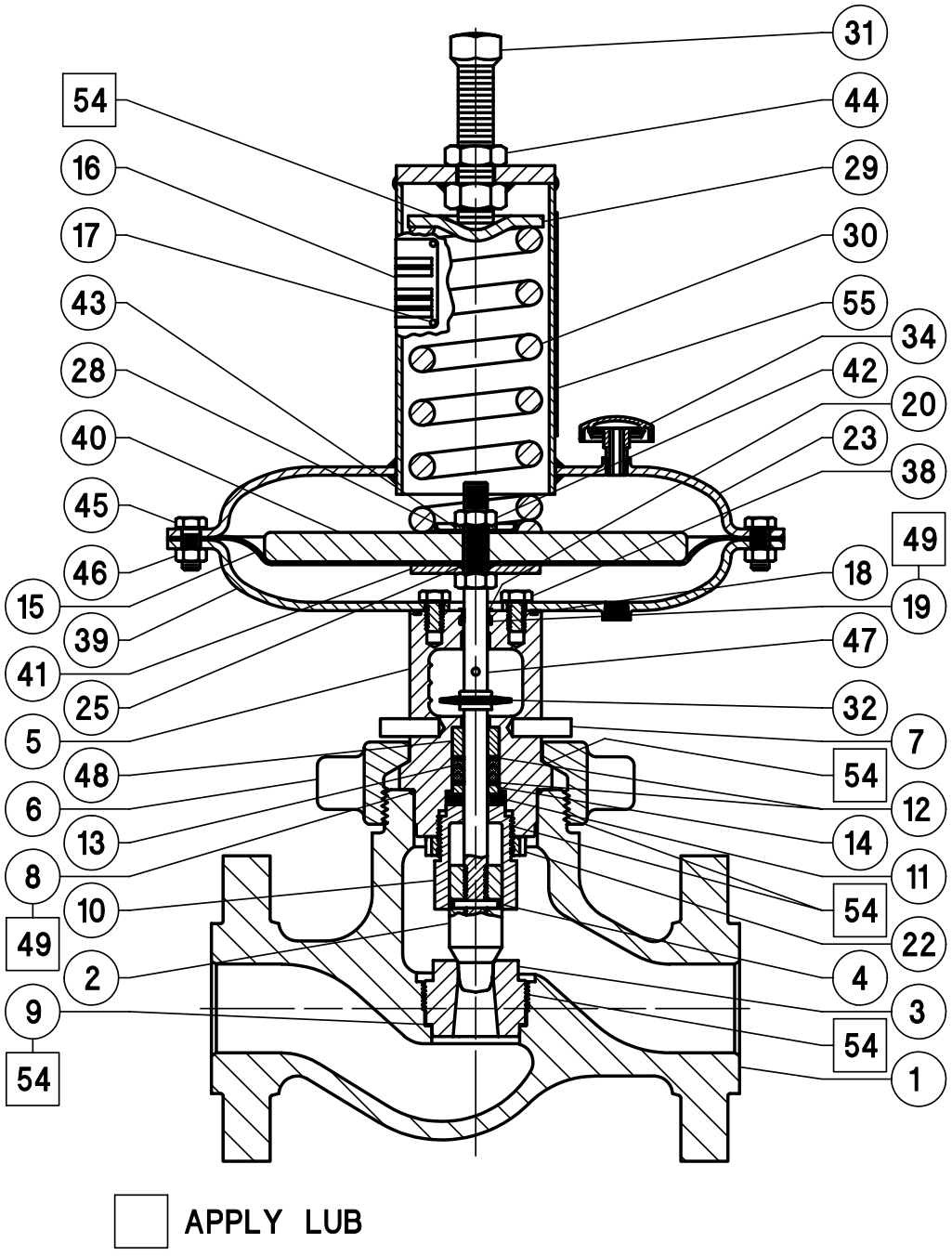


Figure 4. Design D4 Valve Assembly (Spring-to-Close)

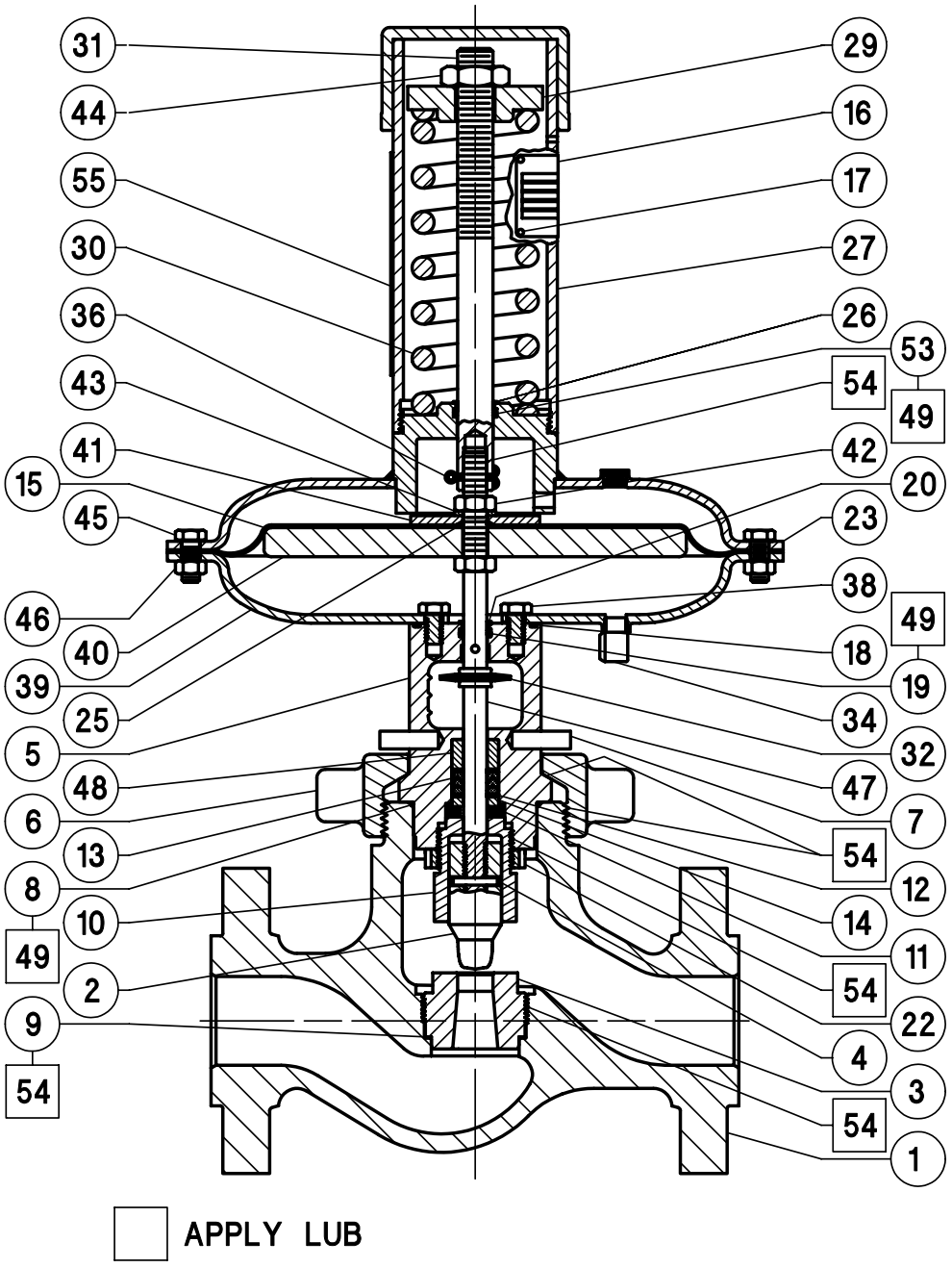


Figure 5. Design D4 Valve Assembly (Spring-to-Open)

Repair Kits

Note

All repair kits are supplied with hydrogenated nitrile bonnet O-ring. FKM (fluorocarbon) bonnet O-ring must be ordered separately when required.

	Description	Part Number
*	Packing Repair Kit Includes key numbers 4, 8, 12 (2 req'd), 13, and high performance fluorinated grease	RD4X0000012
*	Actuator Repair Kit Includes key numbers 4, 8, 12 (2 req'd), 13, 15, 18, 19, 20, 25, 26, 36, 53, and high performance fluorinated grease	RD4X0000022

Parts List

Note

For part numbers not shown, contact your Emerson Process Management sales office.

Key	Description	Part Number
1	Valve Body	
2*	Valve Plug	
	S41000 / S41600 HT	
	NPS 1 valve	
	0.25 inch port diameter	20C3692X012
	0.375 inch port diameter	20C3693X012
	0.5 inch port diameter	20C3694X012
	0.75 inch port diameter	GE01557X012
	NPS 2 valve	
	0.25 inch port diameter	GE00992X012
	0.375 inch port diameter	GE00993X012
	0.5 inch port diameter	GE00994X012
	0.75 inch port diameter	GE01558X012
	1-inch port diameter	GE01561X012
	1.25 inch port diameter	GE01555X012
	S17400 H1150 Dbl	
	NPS 1 valve	
	0.25 inch port diameter	20C3692X032
	0.375 inch port diameter	20C3693X032
	0.5 inch port diameter	20C3694X032
	0.75 inch port diameter	GE01557X032
	NPS 2 valve	
	0.25 inch port diameter	GE00992X032
	0.375 inch port diameter	GE00993X032
	0.5 inch port diameter	GE00994X032
	0.75 inch port diameter	GE01558X032
	1-inch port diameter	GE01561X032
	1.25 inch port diameter	GE01555X032
	Tungsten Carbide	
	NPS 1 valve	
	0.25 inch port diameter	20C3696X012
	0.375 inch port diameter	20C3697X012
	0.5 inch port diameter	20C3698X012
	0.75 inch port diameter	20C3699X012
	NPS 2 valve	
	0.25 inch port diameter	20C3682X012
	0.375 inch port diameter	20C3683X012
	0.5 inch port diameter	20C3685X012
	0.75 inch port diameter	20C3686X012
	1-inch port diameter	20C3687X012
	1.25 inch port diameter	20C3688X012
3*	Seat Ring	
	S17400 H1150 Dbl	
	NPS 1 valve	
	0.25 inch port diameter	GE00982X032
	0.375 inch port diameter	GE00983X032
	0.5 inch port diameter	GE00984X032
	0.75 inch port diameter	GE00985X032
	NPS 2 valve	
	0.25 inch port diameter	GE00986X032
	0.375 inch port diameter	GE00987X032
	0.5 inch port diameter	GE00988X032
	0.75 inch port diameter	GE00989X032
	1-inch port diameter	GE00990X032
	1.25 inch port diameter	GE00991X032
	Tungsten Carbide	
	NPS 1 valve	
	0.25 inch port diameter	GE07347X012
	0.375 inch port diameter	GE07363X012
	0.5 inch port diameter	GE07364X012
	0.75 inch port diameter	GE07365X012
	NPS 2 valve	
	0.25 inch port diameter	GE07389X012
	0.375 inch port diameter	GE07394X012
	0.5 inch port diameter	GE07397X012
	0.75 inch port diameter	GE07398X012
	1-inch port diameter	GE07399X012
	1.25 inch port diameter	GE07406X012
4*	Groove Pin	GE01163X012
5	Bonnet	
6	Hammer Nut	
7	Spring Pin	
8*	Bonnet O-ring	
	Hydrogenated Nitrile	
	–46 to 149°C (–50 to 300°F)	10C3680X012
	FKM, –23 to 204°C (–10 to 400°F)	10C3680X022
9*	Seat Ring Gasket	
	For NPS 1 valve	1B198636042
	For NPS 2 valve	1B198836042
10	Packing Retainer	
11	Belleville Springs	
12*	Anti-Extrusion Washer, 2 req'd	12B6335X022
13*	Packing Set	12B6667X012
14	Packing Spacer	
15*	Diaphragm	22B3521X012
16	Nameplate	
17	Drive Screw	
18*	Casing O-ring	1F9141X0142
19*	Stem O-ring	1K7561X0072
20*	Bonnet Bushing	17A7112X012
22	Locknut	
23	Upper Casing Assembly	
25*	Actuator O-ring	1K7561X0072
26*	Adjusting Stem Bushing (spring-to-open only)	17A4059X012
27	Spring Case Assembly	
28	Lower Spring Seat	
29	Upper Spring Seat	
30	Spring	
	Spring-to-Close, Light Rate	1F176827092
	Spring-to-Close, Heavy Rate	1E792427082
	Spring-to-Open, Light Rate	1F176727032
	Spring-to-Open, Heavy Rate	1F714327092
31	Adjustment Screw or Stem	
32	Travel Indicator	
34	Vent Assembly	

*Recommended spare parts

D4 Valve

Key	Description	Part Number
36*	Cotter Pin (spring-to-open only)	1C608035022
37	Pipe Plug	
38	Cap Screw	
39	Lower Casing	
40	Diaphragm Plate	
41	Diaphragm Washer	
42	Hex Nut	
43	Lockwasher	
44	Adjustment Screw Nut	
45	Cap Screw	
46	Hex Nut	
47*	Valve Stem	
	S20910, Reverse Acting	20C3681X022
	S20910, Direct Acting	20C3716X022
49	Lubricant (lithium grease)	
51	Drive Screw	
53*	Actuator Stem O-ring (spring-to-open only)	1C7821X0182
54	Lubricant (anti-seize)	
55	Spring Setting Label (not shown)	
*	High Performance Fluorinated Grease Packing Lubricant	

*Recommended spare parts

Emerson Process Management
Marshalltown, Iowa 50158 USA
Cernay 68700 France
Sao Paulo 05424 Brazil
Singapore 128461

www.Fisher.com

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there is always a better way

THE CHALLENGE: The JAG partnership is underpinned by nearly 75 years of flow control experience in the Western Canada basin. The shared vision that lead to JAG's creation, was a fusion of three key elements: 1) Create an intelligently designed family of ball valves that addressed many concerns of today's users, 2) Offer as many features and innovations as possible, and 3) Deliver world-class economics.

THE RESULT:

The JAG line of ball valves represents the most comprehensive product line launch in memory, and we are exceedingly proud of the competitive position each of these products will be recognized for:

* JAG Class 800 models T2 and B3 (1/4" - 3")
* JAG Class 1500 model T3 (1/4" - 3")
* JAG Class 2500 model T3 (1/4" - 2")
* JAG Flanged Floaters, Class 150 - 1500 (1/4" - 10")
* JAG Trunnions, Class 150 - 2500 (2" - 36")

Supported by over 850,000 sq. ft. of modern, highly efficient manufacturing, JAG has the quality discipline and capacity to allow its Distributors to support any requirements or projects the end user may contemplate. Our belief in continuous improvement gives us the platform to prove "...there is always a better way."

JAG trunnion features:

* Forged 3-piece construction
* ISO mounting pads
* Emergency Sealant Injection for stem and seats
* Double block and bleed
* Lifting lugs and support stands on 6" and larger

Design and Quality Specifications:

ASME B16.10

ASME B16.34

API 6D

MSS SP - 110

NACE MR-01-75

API 598

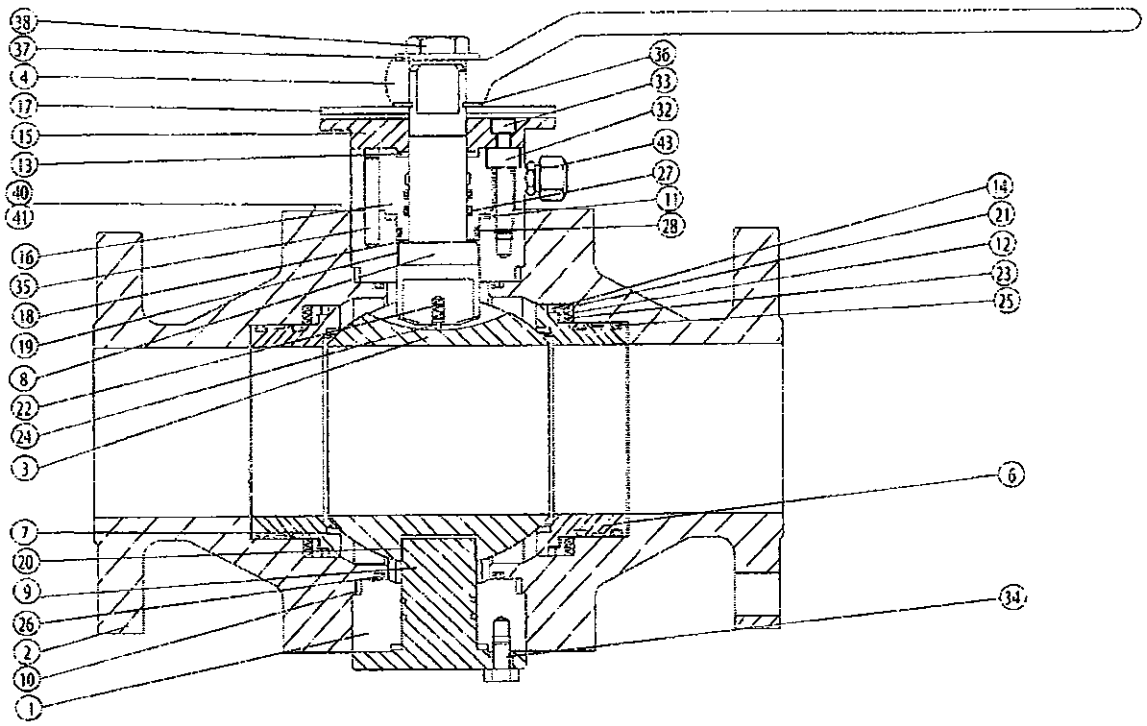
API 607, 4th edition

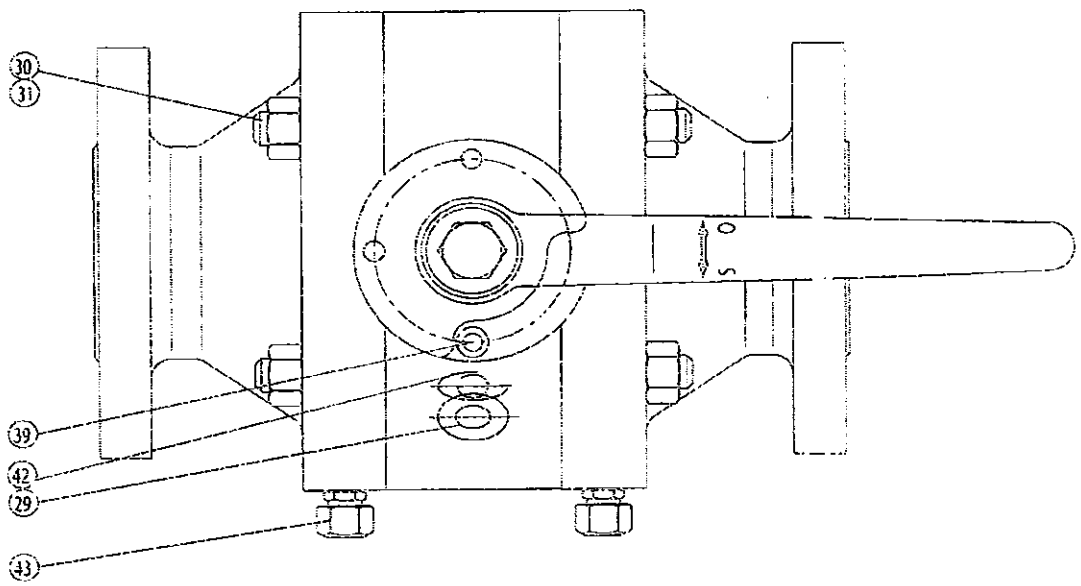
ISO 9001

Canadian Registration Numbers (CRN)

JAG

3-PIECE FORGED STEEL, BOLTED BODY CONSTRUCTION, FIRE SAFE DESIGN, ANTI-STATIC, SEAT & STEM INJECTION, ASTM A350-LF2 TRIM , LEVER OPERATED, LOCKING DEVICE, ISO MOUNTING PAD.

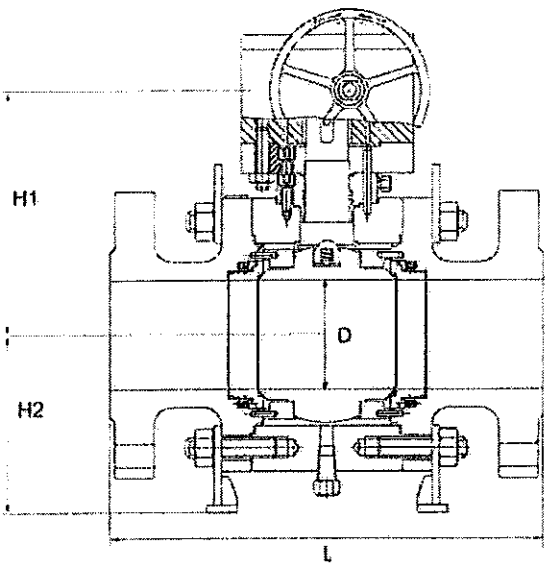


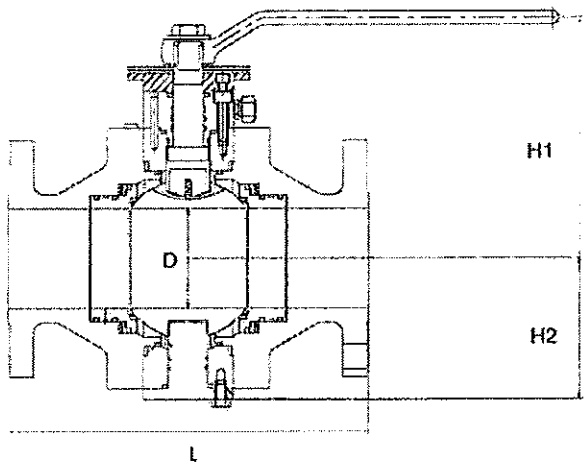


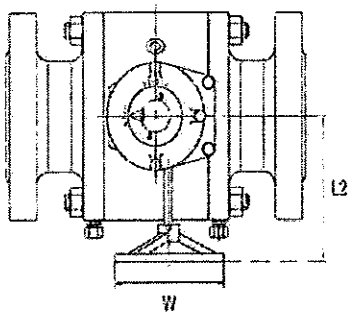
No.	Parts	NACE Service	Low Temp. (-50F) NACE Service	Stainless Steel NACE Service
1	Body	ASTM A105N	ASTM A350-LF2	ASTM A182-F316
2	Adaptor	ASTM A105N	ASTM A350-LF2	ASTM A182-F316
3	Ball	ASTM A105 ENP	ASTM A350-LF2 ENP	ASTM A182-F316
4	Handle	ASTM A216-WCB	ASTM A352-LCB	Stainless Steel
6	Seat Retainer	ASTM A105 ENP	ASTM A350-LF2 ENP	ASTM A182-F316
7	Seat Insert	Glass Filled PTFE-600 Class Nylon-900 & 1500 Class	Glass Filled PTFE-600 Class Nylon-900 & 1500 Class	Glass Filled PTFE-600 Class Nylon-900 & 1500 Class
8	Stem	ASTM A105 ENP	ASTM A350-LF2 ENP	ASTM A182-F316
9	Trunnion	ASTM A105 ENP	ASTM A350-LF2 ENP	ASTM A182-F316
10	Body Gasket	Graphite	Graphite	Graphite
11	Gland Gasket	Graphite	Graphite	Graphite
12	Spacer	PTFE	PTFE	PTFE
13	Stem Packing	Graphite	Graphite	Graphite
14	Seat Retainer Gasket	Graphite	Graphite	Graphite
15	Top Plate	ASTM A105	ASTM A350-LF2	ASTM A182-F316
16	Gland	ASTM A105	ASTM A350-LF2	ASTM A182-F316
17	Stop Plate	Carbon Steel	Carbon Steel	Stainless Steel
18	Thrust Washer	PTFE	PTFE	PTFE
19	Stem Bearing	316+PTFE	316+PTFE	316+PTFE
20	Trunnion Bearing	316+PTFE	316+PTFE	316+PTFE
21	Seat Follower	ASTM A105 ENP	ASTM A350-LF2 ENP	ASTM A182-F316
22	Antistatic Spring	Stainless Steel	Stainless Steel	Stainless Steel
23	Seat Spring	INCONEL X-750	INCONEL X-750	INCONEL X-750
24	Grounding Plunger	ASTM A182-F316	ASTM A182-F316	ASTM A182-F316
25	Seat Retainer O-Ring	Viton	Viton	Viton
26	Body O-Ring	Viton	Viton	Viton
27	Stem O-Ring	Viton	Viton	Viton
28	Gland O-Ring	Viton	Viton	Viton
29	Vent Valve	ASTM A182-F316	ASTM A182-F316	ASTM A182-F316
30	Body Stud	ASTM A193-B7M	ASTM A320-L7M	ASTM A193-B8
31	Body Nut	ASTM A194-2HM	ASTM A194-7M	ASTM A194-8
32	Gland Bolt	ASTM A193-B7M	ASTM A320-L7M	ASTM A193-B8
33	Top Plate Bolt	ASTM A193-B7M	ASTM A320-L7M	ASTM A193-B8
34	Bottom Plate Bolt	ASTM A193-B7M	ASTM A320-L7M	ASTM A193-B8
35	Pin	Carbon Steel	Carbon Steel	Stainless Steel
36	Retainer Clip	Carbon Steel	Carbon Steel	Stainless Steel
37	Washer	Carbon Steel	Carbon Steel	Stainless Steel
38	Bolt	Carbon Steel	Carbon Steel	Stainless Steel
39	Stop Screw	Carbon Steel	Carbon Steel	Stainless Steel
40	Name Plate Rivet	Stainless Steel	Stainless Steel	Stainless Steel
41	Name Plate	Aluminum	Aluminum	Stainless Steel
42	Plug	Stainless Steel	Stainless Steel	Stainless Steel
43	Grease Injection Fitting	ASTM A182-F316	ASTM A182-F316	ASTM A182-F316

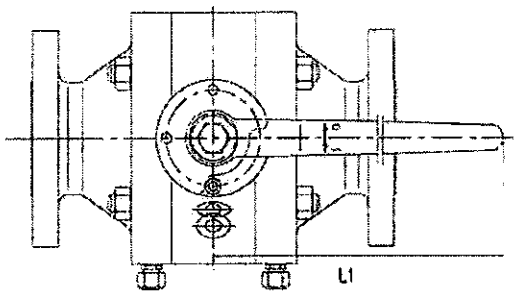
JAG

DIMENSIONS
2" - 6" FP Trunnions

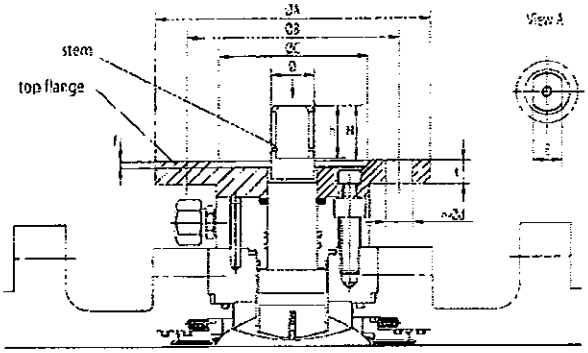




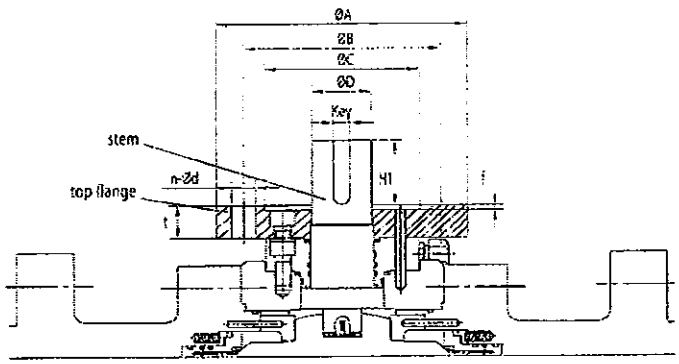




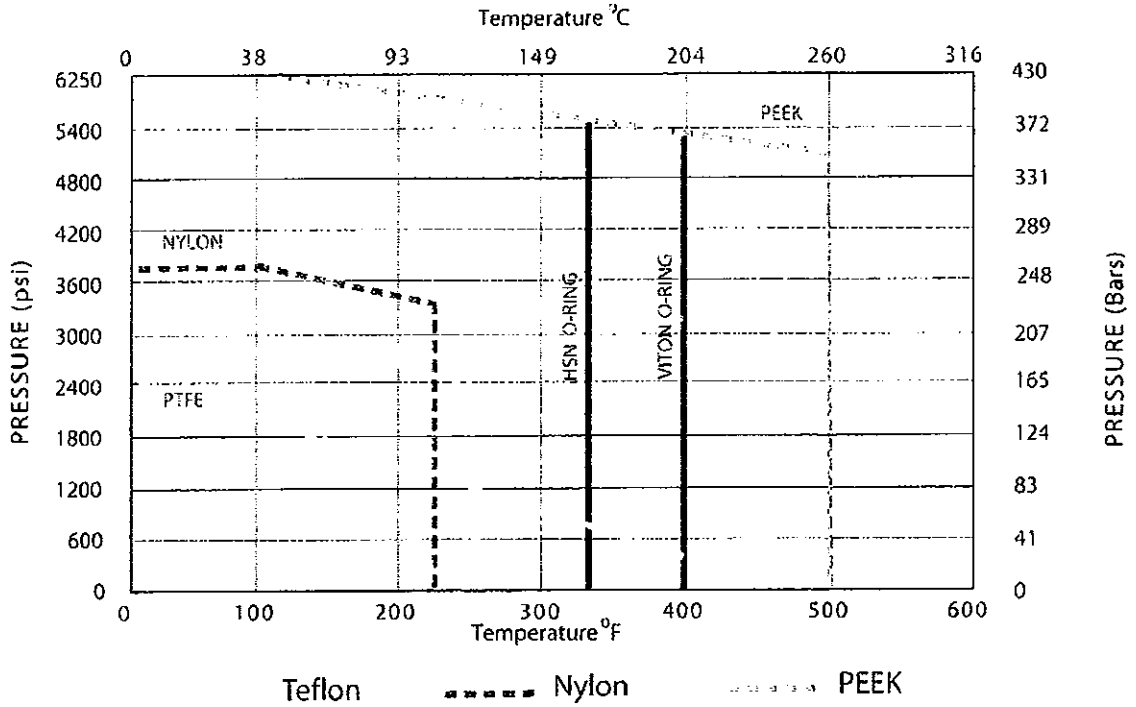
2"	150	2	51	7.00	178	7.50	191	6.8	172	3.4	86	10.4	265	-	-	-	-	66	30
	300	2	51	8.50	216	9.12	232	6.8	172	3.4	86	10.4	265	-	-	-	-	77	35
	600	2	51	11.50	292	11.62	295	6.4	162	-	-	11.2	285	-	-	-	-	95	43
	900/1500	2	51	14.50	368	14.62	371	7.4	188	3.8	97	-	-	9.8	248	11.8	300	220	100
3"	150	3	76	8.00	203	8.50	216	7.1	180	4.1	104	11.2	285	-	-	-	-	132	60
	300	3	76	11.12	283	11.75	299	7.1	180	4.1	104	11.2	285	-	-	-	-	143	65
	600	3	76	14.00	356	14.12	359	7.0	178	-	-	15.7	400	-	-	-	-	165	75
	900	3	76	15.00	381	15.12	384	9.8	250	4.8	118	29.7	755	-	-			187	85
	1500	3	76	18.50	470	18.62	473	10.4	265	5.0	128	-	-	9.8	248	11.8	300	266	130
4"	150	4	102	9.00	229	9.50	241	8.0	203	5.0	127	11.2	285	-	-	-	-	202	92
	300	4	102	12.00	305	12.63	321	7.8	198	5.0	128	15.7	400	-	-	-	-	242	110
	600	4	102	17.00	432	17.10	434	10.3	261	-	-	29.7	755	-	-	-	-	319	145
	900	4	102	18.00	457	18.10	460	10.8	275	5.6	141	44.7	1135	-	-	-	-	330	150
	1500	4	102	21.50	546	21.60	548	10.7	272	5.7	146	-	-	11.0	280	15.7	400	440	200
6"	150	6	152	15.50	394	16.00	406	9.6	244	7.1	180	-	-	9.8	248	11.8	300	418	190
	300	6	152	15.90	403	16.50	419	10.2	258	8.7	220	-	-	9.8	248	11.8	300	440	200
	600	6	152	22.00	559	22.10	561	10.4	265	7.5	190	-	-	9.8	248	11.8	300	539	245
	900	6	152	24.00	610	24.10	612	12.2	310	7.4	187	-	-	13.2	335	19.7	500	836	380
	1500	5.7	146	27.75	705	28.00	711	12.8	324	11.8	300	-	-	13.2	335	23.6	600	1231	560



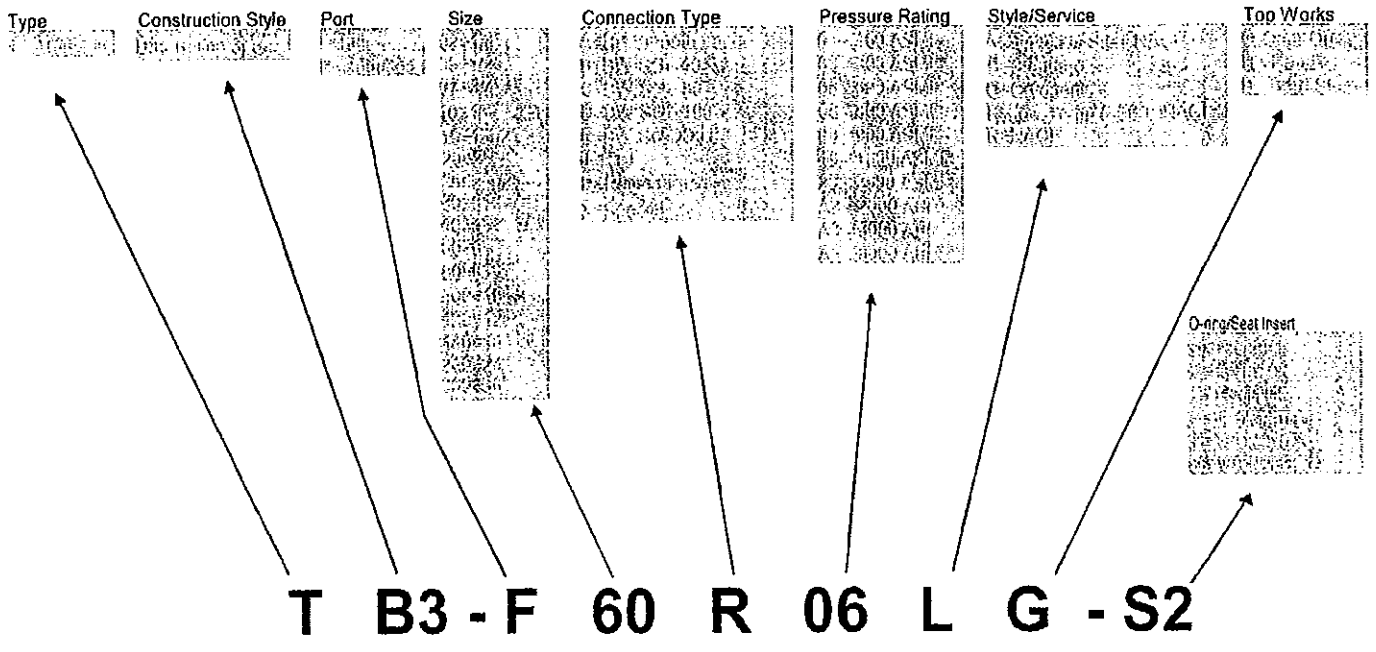
Bore (in)	CLASS											
2"	150	125	102	70	19	14	20	18	4	15	4-12	F10
	600	125	102	70	24	18	25	22.5	4	15	4-12	F10
3"	150	125	102	70	24	18	25	22.5	4	15	4-12	F10
	600	150	125	85	30	22	25	22.5	4	18	4-14	F12
	1500	175	140	100	40	27	53	51	5	15	4-18	F14
4"	150	125	102	70	24	18	25	22.5	4	15	4-12	F10
	600	175	140	100	35	24	50	47	5	20	4-18	F14



Bore (In)	CLASS										
4	1500	210	165	130	50	50	6	35.4	4-22	F16	C14*9*50
6"	150	175	140	100	40	47.5	5	15	4-18	F14	C12*8*50
	600	210	165	130	50	50	6	33.4	4-22	F16	C14*9*50
	1500	300	254	200	70	90	6	47.4	8-18	F25	C20*12*90
8"	150	210	165	130	50	50	6	33.4	4-22	F16	C14*9*50
	600	300	254	200	60	70	6	41.4	8-18	F25	C18*11*70
	1500	300	254	200	80	100	6	47.5	8-18	F25	C22*14*100
10"	150	210	165	130	50	50	6	33.4	4-22	F16	C14*9*50
	600	300	254	200	70	100	6	47.4	8-18	F25	C20*12*100
	1500	300	254	200	100	140	6	47.5	8-18	F25	C28*16*140
12"	150	300	254	200	60	70	6	41.4	8-18	F25	C18*11*70
	600	300	254	200	70	100	6	47.4	8-18	F25	C20*12*100
	1500	350	298	230	120	150	6	47.5	8-22	F30	C32*18*150



Above ratings are for softseal components. Please consult ASMEB16.34 for Body and Closure Pressure/Temperature ratigns



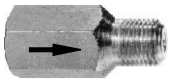
Therefore a TB3-F60R06LG-S2 is a

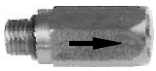
Trunnion Bolted 3 Piece Full Port, 6 inch, RF, 600 Class, Low Temp Nace Trim,HSN O-RING, Nylon seat. Gear Op.

Please Contact Factory for Body,Trim,Connection and Pressure Classes not listed above.

SINGLE BALL STEEL CHECK VALVES

Single Ball Steel Check Valves are designed for use in hydraulic or lubrication systems with pressures up to 5,000 PSI. Available in two models for use as inlet or outlet check valves. An arrow stamped on the body indicates flow direction. The standard type ball and spring principle is used.





Features

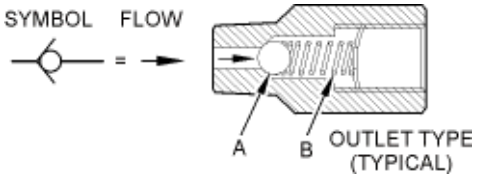
- Positive seal prevents leakage and backflow
- Compact and easy to install

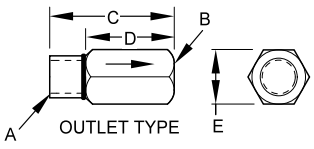
Specifications

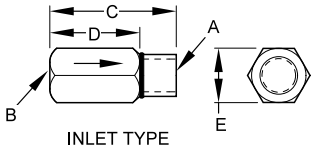
Lubricant (Mineral Based and Synthetic) ..... Oil and Grease
Net Weight (approx.) ..... 1 oz. (28g)
See table below for dimensions specifications and materials.

Operation

The check valve is installed with the arrow on the body facing in the direction of flow. Incoming flow pushes ball (A) from the valve seat, compressing spring (B), permitting lubricant to flow through the check valve to the lube points. When flow stops, spring (B) expands, reseating ball (A) creating a positive seal.







NOTE: STRAIGHT THREAD CHECK VALVES
INCLUDED O-RING AT BASE OF MALE THREADS

Single Ball Check Valve Dimensions and Ordering Information

Pipe Size		C	D	E HEX	Pressure		Material			
Inlet "A"	Outlet "B"				Nom. Cracking PSI (bar)	Max. Operating PSI (bar)	Body	Spring	Ball	Part Number
1/8 NPTF (M)	1/8 NPSF (F)	1.28 (32.5)	0.56 (14.2)	0.56 (14.2)	10 (0.7)	5000 (345)	Steel	Steel	Steel	509-350-010
1/8 NPTF (F)	1/8 NPSF (M)	1.28 (32.5)	0.56 (14.2)	0.56 (14.2)	15 (1)	5000 (345)	Steel	Steel	Steel	509-355-010
1/8 NPTF (M)	1/8 NPSF (F)	1.28 (32.5)	0.56 (14.2)	0.56 (14.2)	35 (2)	5000 (345)	Steel	Steel	Steel	509-350-030
1/8 NPTF (F)	1/8 NPSF (M)	1.28 (32.5)	0.56 (14.2)	0.56 (14.2)	35 (2)	5000 (345)	Steel	Steel	Steel	509-355-030
1/8 NPTF (F)	1/8 NPSF (M)	1.28 (32.5)	0.56 (14.2)	0.56 (14.2)	60 (4)	5000 (345)	Steel	Steel	Steel	509-355-060
1/8 NPTF (M)	1/8 NPSF (F)	1.28 (32.5)	0.56 (14.2)	0.56 (14.2)	100 (7)	5000 (345)	Steel	Steel	Steel	509-350-100
1/8 NPTF (M)	1/8 NPSF (F)	1.28 (32.5)	0.56 (14.2)	0.56 (14.2)	125 (9)	5000 (345)	Steel	Steel	Steel	509-350-120
1/8 NPTF (M)	1/8 NPSF (F)	1.28 (32.5)	0.56 (14.2)	0.56 (14.2)	250 (17)	5000 (345)	Steel	Steel	Steel	509-350-250
1/8 NPTF (F)	1/8 NPSF (M)	1.28 (32.5)	0.56 (14.2)	0.56 (14.2)	250 (17)	5000 (345)	Steel	Steel	Steel	509-355-250
1/8 NPTF (M)	1/8 NPSF (F)	1.28 (32.5)	0.56 (14.2)	0.56 (14.2)	360 (25)	5000 (345)	Steel	Steel	Steel	463-001-582
1/4 NPTF (M)	1/4 NPSF (F)	1.62 (41.2)	0.68 (17.4)	0.68 (17.4)	10 (0.7)	5000 (345)	Steel	Steel	Steel	509-360-010
1/4 NPTF (F)	1/4 NPSF (M)	1.75 (44.5)	0.68 (17.4)	0.68 (17.4)	10 (0.7)	5000 (345)	Steel	Steel	Steel	509-365-010
1/4 NPTF (M)	1/4 NPSF (F)	1.62 (41.2)	0.68 (17.4)	0.68 (17.4)	35 (2)	5000 (345)	Steel	Steel	Steel	509-360-030
1/4 NPTF (F)	1/4 NPSF (M)	1.75 (44.5)	0.68 (17.4)	0.68 (17.4)	35 (2)	5000 (345)	Steel	Steel	Steel	509-365-030
1/4 NPTF (M)	1/4 NPSF (F)	1.62 (41.2)	0.68 (17.4)	0.68 (17.4)	35 (2)	5000 (345)	Steel *	Steel	Steel	509-360-035
1/4 NPTF (M)	1/4 NPSF (F)	1.62 (41.2)	0.68 (17.4)	0.68 (17.4)	100 (7)	5000 (345)	Steel	Steel	Steel	509-360-100
1/4 NPTF (M)	1/4 NPSF (F)	1.62 (41.2)	0.68 (17.4)	0.68 (17.4)	250 (17)	5000 (345)	Steel	Steel	Steel	509-360-250

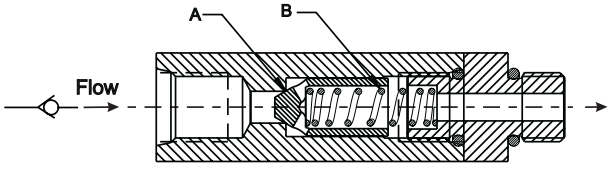
* Nickel Plated

Single Ball Check Valve Dimensions and Ordering Information con'd

Straight Thread Check Valves, SAE										
Tube Size		C	D	E HEX	Pressure		Material			Part Number
Inlet "A"	Outlet "B"				Nom. Cracking PSI (bar)	Max. Operating PSI (bar)	Body	Spring	Ball	
7/16-20 SAE (M)	7/16-20 SAE (F)	1.56 (39.6)	1.20 (30.5)	0.62 (15.7)	35 (2)	3500 (242)	S.S.	Steel	Steel	463-001-589
9/16-18 SAE (M)	9/16-18 SAE (F)	1.68 (42.7)	1.30 (33.0)	0.75 (19.0)	35 (2)	3500 (242)	S.S.	Steel	Steel	463-001-590
9/16-18 SAE (F)	9/16-18 SAE (M)	1.75 (44.5)	1.36 (34.5)	0.81 (20.6)	35 (2)	5000 (345)	S.S.	Steel	Steel	463-001-600
7/16-20 SAE (F)	7/16-20 SAE (M)	1.44 (36.6)	1.08 (27.4)	0.69 (17.4)	60 (4)	5000 (345)	S.S.	Steel	Steel	463-001-601
Straight Thread Check Valves - BSPP, "G"										
1/8 BSPP (M)	1/8 BSPP (F)	1.27 (32.3)	1.03 (26.1)	0.62 (15.9)	35 (2)	5000 (345)	Steel	Steel	Steel	463-001-573
1/4 BSPP (F)	1/4 BSPP (M)	1.79 (45.4)	1.41 (35.7)	0.88 (22.3)	35 (2)	5000 (345)	Steel	Steel	Steel	463-001-621
1/8 BSPP (F)	1/8 BSPP (M)	1.27 (32.1)	1.03 (26.1)	0.62 (15.9)	35 (2)	3000 (207)	Steel	Steel	Steel	463-001-622
Straight Thread Check Valves - Metric (ISO 6149)										
M12x1.5 (F)	M12x1.5 (M)	1.84 (46.8)	1.41 (35.8)	0.78 (20.0)	35 (2)	5000 (345)	Steel	Steel	Steel	463-001-630
M10x1 (M)	M10x1 (F)	1.56 (39.6)	1.22 (31.1)	0.78 (20.0)	35 (2)	5000 (345)	Steel	Steel	Steel	463-001-632

HI SHOCK STEEL CHECK VALVES

Hi Shock Steel Check Valves are a poppet type designed specifically for the harsh operating conditions encountered in the circulating oil systems found on modern high speed metal forming presses.



Features

- Hardened poppet provides long life
- Available with SAE straight, or pipe threads

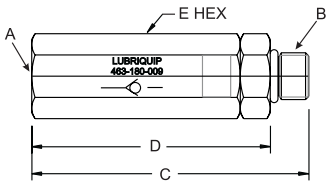
Specifications

Material ..... Steel body, hardened steel poppet
Maximum Operating Pressure ..... 3500 PSI (241 bar)
Maximum Operating Temperature ..... 250°F (121°C)
Cracking Pressure ..... 200 PSI (14 bar)
Lubricant (Mineral base and Synthetic) ..... Oil

Operation

The check valve is installed with the arrow on the body facing in the direction of flow. Incoming flow pushes poppet (A) from the valve seat, compressing spring (B), permitting lubricant to flow through the check valve. When flow stops, spring (B) expands, reseating poppet (A) thus preventing back flow.

High Shock Check Valve Dimensions and Ordering Information

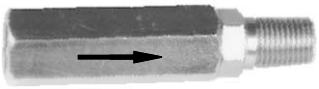


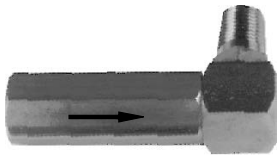
Inlet	Outlet	Thread Size/Type		Dimensions			
		A	B	C	D	E	Part Number
Female	Male	7/16-20 SAE	7/16-20 SAE	2.59 (65.8)	2.23 (56.6)	0.69 (17.5)	463-180-009*
Female	Male	1/4-18 NPSF	1/8-27 NPTF	2.15 (54.6)	1.77 (45.0)	1.00 (25.4)	463-180-010
Male	Female	9/16-18 SAE	9/16-18 SAE	2.39 (60.7)	1.99 (50.5)	0.75 (19.0)	463-180-011

* Supplied less O-ring on male thread

DOUBLE BALL CHECK VALVES

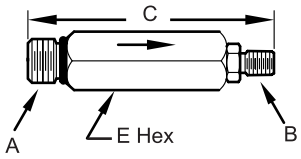
Double Ball Check Valves are designed for high pressure applications where reverse leakage must be kept to a minimum. Typical applications include engine and compressor cylinder lubrication, and hydraulic systems. Check valves can be used to isolate parts of circuits and to prevent fluid drainage due to gravity. A relatively stiff bias spring in these valves serves to increase the reliability of circuits designed to detect a blockage or reduction in lubricant flow. This bias spring also can provide a controlled pressure in hydraulic circuits. The right angle configuration allows convenient installation in a wide variety of plumbing configurations. Application is similar to straight body double ball check valves.

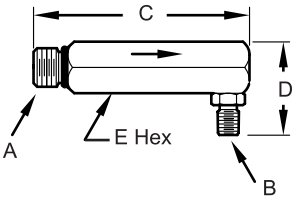




Features

- Various inlet and outlet sizes and configurations
- Positive sealing check valve





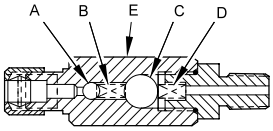
Specifications

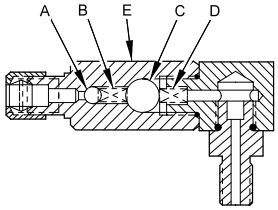
Lubricant (Mineral Based and Synthetic) ..... Oil and Grease
See tale below for dimensions, specifications and materials.

Maximum Operating Temperature ..... 400 °F (204.5 °C)

Operation

Fluid flow entering the check valve creates a pressure on the smaller ball (A). If the pressure created is higher than the opposing force of the bias spring (B), the smaller ball is moved off its seat inside the valve body (E). This allows flow to create a similar pressure and action on the larger ball (C) and spring (D). Flow then continues on to the outlet of the check valve. If flow is reversed in the circuit, flow force and spring (D) cause ball (C) to be reseated. Any leakage around ball (C) is blocked by ball (A) that is firmly seated by bias spring (B).





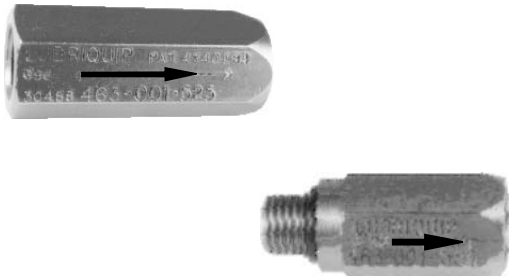
Double Ball Check Valve Dimensions and Ordering Information

Inlet "A"	Outlet "B"	C	D	E HEX	Pressure		Material			Part Number
					Nom. Cracking PSI (bar)	Max. Operating PSI (bar)	Body	Spring	Ball	
Straight										
1/4" OD Tube	1/8-27 NPTF (M)	3.00 (76.2)	N/A	.75 (19.1)	90 (6)	6000 (414)	Carbon Steel	Stainless Steel	Stainless Steel	070200
1/4" OD Tube	1/4-18 NPTF (M)	3.19 (81.0)	N/A	.75 (19.1)	90 (6)	6000 (414)	Carbon Steel	Stainless Steel	Stainless Steel	070201
1/4-18 NPTF (F)	1/4-18 NPTF (M)	3.21 (81.5)	N/A	.75 (19.1)	90 (6)	8000 (552)	Carbon Steel	Stainless Steel	Stainless Steel	070205
1/8-27 NPTF (F)	1/8-27 NPTF (M)	3.19 (81.0)	N/A	.75 (19.1)	90 (6)	8000 (552)	Carbon Steel	Stainless Steel	Stainless Steel	070206
1/8-27 NPTF (F)	1/4-18 NPTF (M)	3.19 (81.0)	N/A	.75 (19.1)	110 (7)	8000 (552)	Carbon Steel	Stainless Steel	Stainless Steel	070207
1/4-18 NPTF (F)	1/4-18 NPTF (M)	3.19 (81.0)	N/A	.75 (19.1)	110 (7)	8000 (552)	Stainless Steel	Stainless Steel	Stainless Steel	070252
1/8-27 NPTF (F)	1/8-27 NPTF (M)	3.19 (81.0)	N/A	.75 (19.1)	110 (7)	8000 (552)	Stainless Steel	Stainless Steel	Stainless Steel	070253
1/8-27 NPTF (F)	1/4-18 NPTF (M)	3.19 (81.0)	N/A	.75 (19.1)	110 (7)	8000 (552)	Stainless Steel	Stainless Steel	Stainless Steel	070254
1/4-18 NPTF (F)	1/8-27 NPTF (M)	2.75 (69.9)	N/A	.75 (19.1)	110 (7)	8000 (552)	Stainless Steel	Stainless Steel	Stainless Steel	070255
Angle										
1/4" OD Tube	1/4-18 NPTF (M)	2.50 (63.5)	1.53 (38.9)	.94 (23.9)	90 (6)	8000 (552)	Carbon Steel	Stainless Steel	Stainless Steel	040233
1/4" OD Tube	1/4 NPTF (M)	3.00 (76.2)	1.60 (40.6)	.75 (19.1)	90 (6)	8000 (552)	Carbon Steel	Stainless Steel	Stainless Steel	070202
1/8-27 NPTF (F)	1/4-18 NPTF (M)	3.00 (76.2)	1.78 (45.2)	.75 (19.1)	110 (7)	8000 (552)	Carbon Steel	Stainless Steel	Stainless Steel	070211
1/8-27 NPTF (F)	1/4-18 NPTF (M)	2.75 (69.9)	1.78 (45.2)	.75 (19.1)	110 (7)	8000 (552)	Stainless Steel	Stainless Steel	Stainless Steel	070274

SOFT SEAT CHECK VALVES

Soft Seat Check Valves are designed for use in hydraulic or lubrication systems with pressures up to 7,500 PSI. A poppet and soft ball check design improves check valve reliability. This check valve is available in single and “double ball” versions. The “double ball” check valve contains a poppet and soft ball check, as well as a conventional steel ball back-up for added protection. An arrow stamped on the body indicates flow direction.

Available in a wide range of pipe thread and tube size inlet/outlet fitting combinations, this unit can be used in a variety of applications.



Features

- Provides optimum sealing against reverse flow
- Tapered at outlet end to help identify flow direction

Specifications

Material
- Poppet (except 463-001-616) ..... Steel
- Ball (Large, soft seat) ..... See Table
- Ball (Small) ..... Steel

See table below for dimensions, pressure ratings and materials

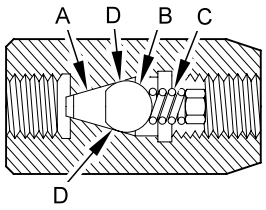
Maximum Operating
- Temperature ..... Viton Ball 400 °F (204.5 °C)
  Buna N Ball 250 °F (121 °C)

Lubricant (Mineral Based and Synthetic) ..... Oil and Grease Compatible with Viton or Buna N Material

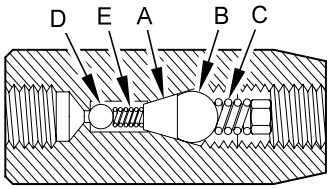
Net Weight ..... Single Ball 4 oz. (113g)
Double Ball 5 oz. (142g)

Operation

Single Ball Soft Seat Check Valve. Lubricant flow entering the check valve moves poppet (A), and Viton ball (B) forward, allowing lubricant to move around the poppet and ball, through the check valve, and out to the lube point. During flow through the check valve, the poppet and Viton ball remain nested together. When flow stops, spring (C) returns poppet (A) and ball (B) to the check position. The poppet functions only as an alignment and anti-extrusion mechanism for the Viton ball. The Viton ball provides the seal when seated against the check valve body at point (D).



Double Ball Soft Seat Check Valve. In the “double ball” version, the function is basically the same. In a flow condition, steel ball (D) moves off its seat compressing spring (E), causing poppet (A) and ball (B) to move forward allowing lube to flow around ball (D), poppet (A), and ball (B), through the check valve and out to the lube point.



Soft Seat Check Valve Dimensions and Ordering Information

Soft Seat Single Ball Check Valve

Inlet "A"	Outlet "B"	Figure	C	D	E HEX	Pressure		Material			Part Number
						Nom. Cracking PSI (bar)	Max. Operating PSI (bar)	Body	Spring	Ball	
1/4-18 NPSF (F)	1/4-18 NPSF (F)	A	1.94 (49.2)	—	0.75 (19.1)	48 (3)	7,500 (518)	Stainless	Steel	Viton	463-001-524
1/4-18 NPSF (F)	1/4-18 NPSF (F)	A	1.94 (49.2)	—	0.75 (19.1)	42 (3)	7,500 (518)	Stainless	Steel	Buna N	463-001-525
1/8-27 NPSF (F)	1/8-27 NPTF (M)	D	1.31 (33.3)	.94 (23.8)	0.58 (14.3)	35 (2)	100 (7)	Steel	Steel	Viton	463-001-535 *
1/8-27 NPTF (M)	1/8-27 NPSF (F)	D	1.28 (32.5)	.79 (20.1)	0.58 (14.3)	35 (2)	100 (7)	Steel	Steel	Viton	463-001-536 *
1/8-27 NPTF (M)	1/4-18 NPSF (F)	D	1.56 (39.7)	1.08 (27.3)	0.69 (17.4)	48 (3)	7,500 (518)	Stainless	Steel	Viton	463-001-580
7/16-20 SAE (F)	7/16-20 SAE (F)	A	1.94 (49.2)	—	0.63 (15.9)	35 (2)	7,500 (518)	Stainless	Steel	Viton	463-001-584
7/16-20 SAE (M)	7/16-20 SAE (F)	B	1.56 (39.7)	1.20 (30.5)	0.63 (15.9)	35 (2)	7,500 (518)	Stainless	Steel	Viton	463-001-585
9/16-18 SAE (M)	9/16-18 SAE (F)	B	1.69 (42.9)	2.42 (61.5)	0.75 (19.1)	48 (3)	7,500 (518)	Stainless	Steel	Viton	463-001-587
7/16-20 SAE (F)	7/16-20 SAE (M)	C	2.78 (70.6)	2.42 (61.5)	0.63 (15.9)	25 (2)	7,500 (518)	Stainless	Steel	Viton	463-001-593
Soft Seat Double Ball Check Valve											
1/4-18 NPSF (F)	1/4-18 NPSF (F)	A	2.41 (61.1)	—	0.75 (19.1)	48 (3)	7,500 (518)	Stainless	Steel	Buna N/Steel	463-024-166
1/4-18 NPSF (F)	1/4-18 NPSF (F)	A	2.41 (61.1)	—	0.75 (19.1)	48 (3)	7,500 (518)	Stainless	Steel	Viton/Steel	463-024-173
1/8-27 NPSF (F)	1/8-27 NPSF (F)	A	2.41 (61.1)	—	0.56 (14.3)	48 (3)	7,500 (518)	Stainless	S.S./Steel	Viton/Steel	463-024-174

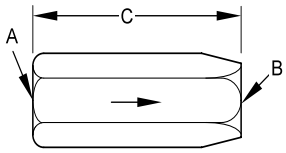
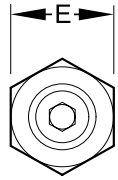


Fig. A



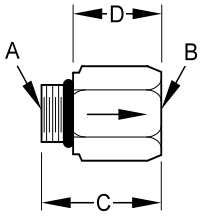


Fig. B

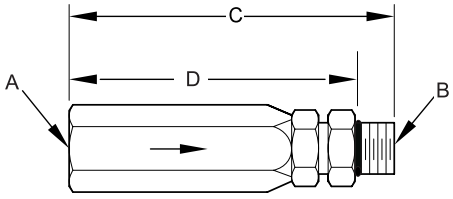


Fig. C

* No Poppet

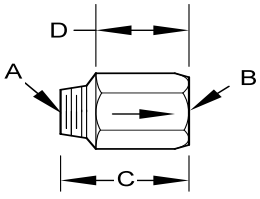
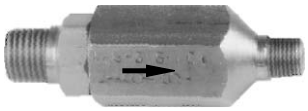


Fig. D

TWIN TANDEM CHECK VALVE

Twin Tandem Check Valves are designed for hydraulic or lubrication systems with pressures up to 10,000 PSI. The Twin Tandem Check Valve incorporates both a garter type check valve and a standard ball and spring type check valve. The garter check valve has a soft seat elastic garter band that permits uninterrupted flow and seals unwanted back flow.



Features

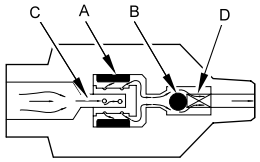
- Positive seal prevents leakage and back flow
- Compact and easy to install

Specifications

Material ..... All Stainless Steel
Viton Elastic Band ..... Suitable for most fluids
Maximum Operating Pressure ..... 10,000 PSI (690 bar)
Maximum Operating Temperature ..... 400 °F (204.5 °C)
Cracking Pressure ..... 45 ±10 PSI (3 ± 0.7 bar)
Lubricant (Mineral Based and Synthetic) ..... Oil and Grease Compatible with Viton
Net Weight (approx.) ..... 5 oz. (142g)

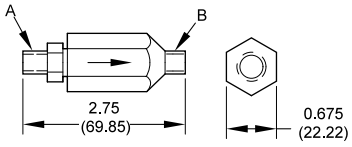
Operation

The Twin Tandem Check Valve is installed in a system with the arrow on the check valve towards the direction of flow. Under normal flow conditions, the soft seat Viton elastic garter band (A) is raised off the valve stem uncovering the flow holes and allowing flow through the valve stem (C). The lubricant flow pushes ball (B) from the valve seat compressing spring (D), and travels into the system. In case of back flow, the ball check (B) is blocking the flow, any leakage compresses the garter band (A) over the flow holes in the valve stem and forms a positive seal.



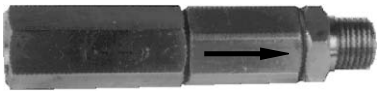
Twin Tandem Check Valve Dimensions and Ordering Information

Pipe Size		Part Number
A Inlet	B Outlet	
1/4 NPTF (M)	1/8 NPTF (M)	509-356-060
1/4 NPTF (M)	1/4 NPTF (M)	509-356-100



BRASS DOUBLE BALL CHECK VALVES

Brass Double Ball Check Valves are for use in hydraulic or lubrication systems with pressures up to 3,000 PSI. These check valves are typically used as inlet check valves. Two of the conventional spring & ball type checks are combined to provide maximum protection against system back flow/ leakage. Flow direction is indicated by an arrow stamped on the check valve body.



Features

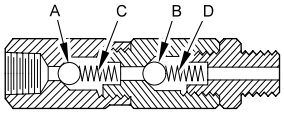
- Positive seal prevents leakage and back flow
- Compact and easy to install

Specifications

Material ..... All Brass with Stainless Steel Spring
Maximum Operating Pressure ..... 3,000 PSI (207 bar)
Maximum Operating Temperature ..... 500 °F (260 °C)
Cracking Pressure ..... 35 ±10 PSI (2 ± 0.7 bar)
Lubricant (Mineral Based and Synthetic) ..... Oil and Grease
Net Weight (approx.) ..... 6 oz. (171g)

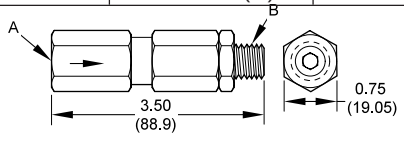
Operation

The check valve is installed with the arrow on the check valve towards the direction of flow. Incoming flow of lubricant moves check balls (A) and then (B), compressing springs (C) & (D). This allows lubricant to flow through the check valve and out to the lube points. When flow ceases, springs (C) & (D) reseat the check balls, preventing back flow to the system.



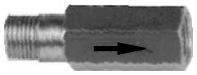
Brass Double Ball Check Valve Dimensions and Ordering Information

A (Inlet)	B (Outlet)	Part Number
1/4 NPT (FM)	1/4 NPT (M)	463-021-571
1/8 NPT (FM)	1/8 NPT (M)	463-021-611
1/4" O.D. Tube	1/4 NPT (M)	463-021-701



BI-FLOW OUTLET CHECK VALVE

The Bi-Flow Outlet Check Valve is a conventional metal ball, hard seat type check valve. It is capable of using a special fitting in the outlet to accept either 3/16" or 1/4" tube.

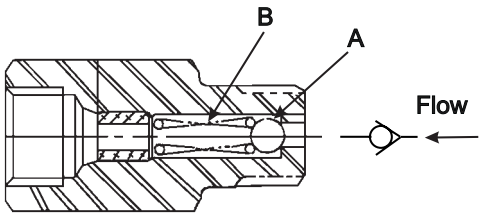


Specifications

Material ..... Steel
Maximum Pressure .....5,000 PSI (345 bar)
Cracking Pressure .....35 ±10 PSI (2 ± 0.7 bar)
Lubricant (Mineral Based and Synthetic) ..... Oil and Grease
Net Weight ..... 4 oz. (113g)

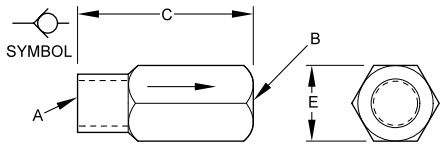
Operation

The check valve is installed with the arrow on the check valve in the direction of flow. Incoming flow pushes ball (A) from the valve seat, compressing spring (B), permitting lubricant to flow through the check valve to the lube points. When flow stops, spring (B) expands, reseating ball (A), creating a positive seal.



Bi-Flow Outlet Check Valve Dimensions and Ordering Information

Pipe Size		C	E	Part Number
Inlet "A"	Outlet "B"			
1/8-27 (M)	1/8-27 (FM)	1.500 (38.1)	0.500 (12.7)	463-001-546
1/4-18 (M)	1/4-18 (FM)	1.593 (40.5)	0.687 (17.4)	463-001-550



CHECK VALVE WITH 90 MICRON FILTER

This check valve is a conventional metal ball, hard seat type with an integral 90 micron filter. It is designed to be used before a "zero-leak" solenoid inlet base. However, it can be used anywhere that a check valve and a filter would be used in series.

Features

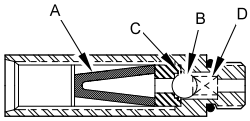
- One check/filter combination valve replaces two separate devices resulting in fewer leak paths.
- Protects downstream components from contamination.
- Compact and easy to install.

Specifications

Body Material ..... Steel
Filter Material ..... (90 Micron) Sintered Bronze
Maximum Pressure .....7,500 PSI (518 bar)
Cracking Pressure .....35 ±10 PSI (2 ± 0.7 bar)
Lubricant (Mineral Based and Synthetic) ..... Oil only
Net Weight (Approx.) ..... 3 oz. (85g)

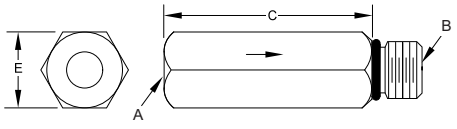
Operation

The check valve is installed with the arrow on the check valve in the direction of flow. The oil first passes through the filter element (A). Then flow pushes the ball (B) from the valve seat (C), compressing the spring (D) and permitting oil to flow through the check valve. When flow stops, the spring (D) expands, reseating the ball (B) and creating a positive seal.



Check Valve with Filter Dimensions and Ordering Information

SAE Thread Size		C	E	Part Number
Inlet "A"	Outlet "B"			
9/16-18 (FM)	9/16-18 (M)	2.50	0.687	463-001-604
7/16-20 (FM)	7/16-20 (M)	1.89	0.562	463-001-605



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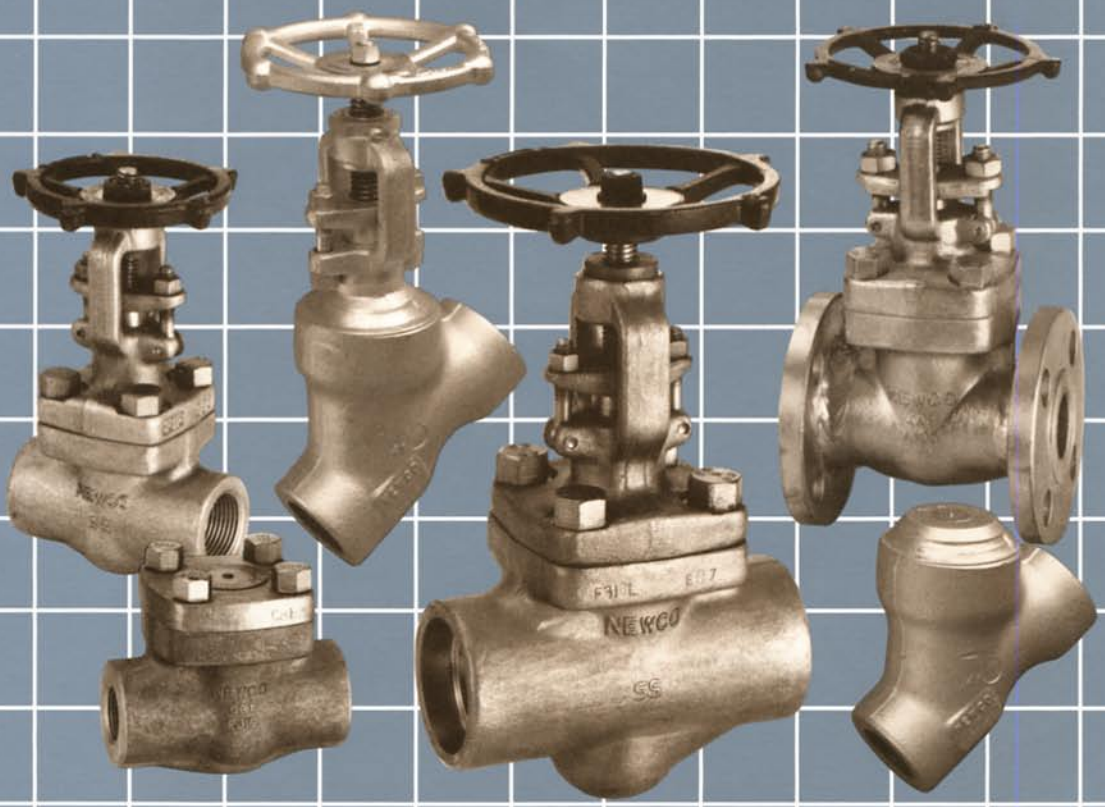
IDEX CORPORATION

Newco
FORGED STEEL VALVES



Newco Valves

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The growth of Newmans for the past six decades has been a prelude of our commitment to the future of the valve industry. The formula for our success has been simple: good people selling quality products from large inventories at competitive prices.

Newco has become a leader in the valve industry due to Newmans' ability to anticipate and supply market needs through international sources and large advance purchases. Our regional warehouses are stocked with well-balanced inventories of Newco industrial valves representing the best value in today's market.

Newmans' primary corporate philosophy is to provide our customers with the highest quality valves obtainable. These efforts involve technical staffs in the United States, Europe, and the Far East who are responsible for basic product design and all quality assurance standards. Uniquely, the Newco product line is fully traceable.

COMMITMENT TO NEWCO QUALITY

- Design and manufacturing systems are reviewed and modified prior to production to conform to Newco quality standards.
- Newco facilities control their own casting and forging facilities to insure both quality and delivery of critical components.
- Newco facilities maintain quality control staffs independent from production and under direct control of Newman's technical staffs.
- Formal, documented ISO 9001 manufacturing quality assurance programs are in place.
- Semi-annual audits of manufacturing processes are conducted by Newmans to insure that any changes are properly evaluated with respect to product quality.
- Individual product tests and inspections to ASME and API Standards are monitored by Newmans' technical staffs.

NEWCO FIGURE NUMBERS

Type	Pressure Class	End Connections	Trim Material
1 = Gate, OS&Y	1 = 150	F = Flanged	1 = CR13
2 = Globe, OS&Y	3 = 300	W = Butt Weld	2 = CR13/HF**
3 = Swing Check	6 = 600	S = Socket Weld	3 = HF/HF**
4 = Lift Check	8 = 800	T = Threaded	4 = 316
7 = Angle, OS&Y	15 = 1500	X = Special (Customer to specify)	4/2 = HF**/316
	25 = 2500		4/3 = 316/HF**
	45 = 4500		5 = NI CU (Monel***)
			5/2 = HF**/Monel***
			5/3 = Monel***/HF**
			9 = Special (Customer to specify)

FIG. 18T-FS2-*

BODY/BONNET MATERIAL

* SUFFIX LETTERS

Y	= Y Pattern
INT	= Integral Flanged
WB	= Welded Bonnet
HP	= Horizontal Piston Check
HB	= Horizontal Ball Check
VB	= Vertical Ball Check
FP	= Full Port
RP	= Regular Port
TF	= Teflon* Insert
VT	= Viton* Insert
N1	= NACE Valve, Class I Bolting
N2	= NACE Valve, Class II Bolting
N3	= NACE Valve, Class III Bolting
MO	= Motor Operator
PO	= Pneumatic Operator
HO	= Hydraulic Operator
CR	= Cryogenic Service
OX	= Oxygen Service
CL	= Chlorine Service
GI	= Grease Injection
BS	= Bellows Seal
ST	= Socket Weld x Threaded
EB	= Extended Body

FS	= ASTM A105	= Forged Carbon Steel
F5	= ASTM A182, F5	= Forged Alloy Steel (5% Chrome, ½% Moly)
LF-2	= ASTM A350, LF2	= Forged Low Temperature Carbon Steel
F9	= ASTM A182, F9	= Forged Alloy Steel (9% Chrome, 1% Moly)
F11	= ASTM A182, F11	= Forged Alloy Steel (1¼% Chrome, ½% Moly) (Class 2)
F22	= ASTM A182, F22	= Forged Alloy Steel (2¼% Chrome, 1% Moly) (Class 3)
F91	= ASTM A182, F91	= Forged Alloy Steel (9% Chrome, 1 Moly, Vanadium)
SPL	= Special (Customer to Specify)	

Note: Trim Materials Defined on Page 4.

* = Viton and Teflon are registered trademarks of DuPont Company.

** HF = Hardfaced - AWS 5.13 Class C_OC_RA.

*** = Monel is a registered trademark of International Nickel Company.

Please order by size, figure number (which specifies type), pressure class, end connections, materials and special features, as shown above.

For End Connections, Body Materials and Trims not listed, please specify

Newco Valves

MATERIALS SPECIFICATIONS

MATERIALS

Standard stocked material in A105 with NEWCO No. 2 Trim. (API Trim No. 8)
Bellow Seal and Extended Body Valves are available upon request.

The charts below list materials available.
F8C, F9, F347, & F347H are available upon request and factory ordered.

MATERIALS (BODY / BONNET)

NEWCO Material Designation	Common Designation	ASTM Specification	Standard NEWCO Trim	Optional Available Trim
FS	Carbon Steel	A105	2	3, 4, 4/3, 5
LF2	Low Temp Carbon Steel	A350 Grade LF-2	4/3	4
F11	1¼ Chrome ½ Moly	A182 Grade F-11	2	4, 5
F22	2¼ Chrome 1 Moly	A182 Grade F-22	3	4, 5
F5	5 Chrome ½ Moly	A182 Grade F-5	2	4, 5
F91	F91	A182 Grade F91	3	—

TRIM MATERIALS

NEWCO Trim No.	Seat Ring Facing	Wedge or Disc Facing	Stem	Other Trim Parts	API 602 Trim No.
1	CR13	CR13	F6a	F6a	1
2	Hardfaced	CR13	F6a	F6a	8
3	Hardfaced	Hardfaced	F6a	F6a	5
4	316	316	316	316	10
4/2	Hardfaced	316	316	316	12
4/3	Hardfaced	Hardfaced	316	316	16
5	NICU	NICU	NICU	NICU	9
5/2	Hardfaced	NICU	NICU	NICU	11
5/3	Hardfaced	Hardfaced	NICU	NICU	—
9	SPL	SPL	SPL	SPL	—

SPECIFICATIONS

NEWCO forged steel valves comply with the following applicable specifications:

ASME	API	MSS
B16.34	598	SP-84
B16.11	602	
B1.20.1		

Note: Bolted bonnet valves are also available in welded bonnet configuration.
Full Penetrant Welded Flanged Ends available in Class 600.

SOCKET WELD DIMENSIONS

Tolerances
Column A Dimensions + 010-000

Valve Size	Socket Dia. A	Min. ANSI B16.11 Socket Depth B
¼	.555	.38
⅜	.690	.38
½	.855	.38
¾	1.065	.50
1	1.330	.50
1¼	1.675	.50
1½	1.915	.50
2	2.406	.62

All catalog dimensions are subject to change.

GATE VALVES

BOLTED BONNET CLASS 150-300-600-800-1500

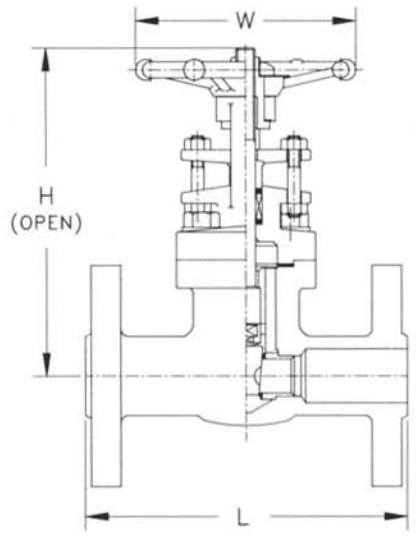


Fig. 11F-FS2-INT Class 150 (Flanged)
Fig. 13F-FS2-INT Class 300 (Flanged)
Fig. 16F-FS2-INT Class 600 (Flanged)

FEATURES

- Spiral wound gasket of stainless steel and flexible graphite with controlled compression.
- Flexible graphite packing with braided carbon end rings.

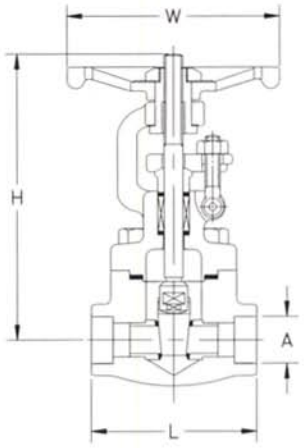


Fig. 18S-FS2 Class 800 (Socket Weld)
Fig. 18T-FS2 Class 800 (Threaded)

Fig. 115S-FS2 Class 1500 (Socket Weld)
Fig. 115T-FS2 Class 1500 (Threaded)

Also available in Class 2500

CLASS 150-300-600 DIMENSIONS

NPS		½"	¾"	1"	1¼"	1½"	2"
L - 150 Face to Face	IN	4.25	4.62	5.0	5.5	6.5	7.0
	MM	108	117	127	140	165	178
L - 300 Face to Face	IN	5.5	6.0	6.5	7.0	7.5	8.5
	MM	140	152	165	178	190	216
L - 600 Face to Face	IN	6.5	7.5	8.5	9.0	9.5	11.5
	MM	165	190	216	229	241	292
W - Handwheel Dia.	IN	3.5	3.8	4.3	5.5	5.5	6.7
	MM	89	97	109	140	140	170
H - Height (150)	IN	7.1	7.3	8.2	8.9	9.8	11.6
	MM	179	184	207	227	248	295
H - Height (300)	IN	5.9	6.3	7.3	8.9	9.8	11.2
	MM	150	159	185	227	248	285
H - Height (600)	IN	7.8	8.1	9.3	9.7	11.5	12.8
	MM	197	205	235	247	291	325
WT - CLASS 150	LB	6.8	8.6	12.2	18.0	23.3	32.0
	KG	3.1	3.9	5.5	8.2	10.6	14.5
WT - CLASS 300	LB	7.3	10.8	14.8	21.2	29.5	36.3
	KG	3.3	4.9	6.7	9.6	13.4	16.5
WT - CLASS 600	LB	7.7	11.7	16.0	23.0	31.0	40.9
	KG	3.5	5.3	7.1	10.4	14.0	18.6

For materials and applicable specifications see page 4.

CLASS 800 DIMENSIONS

NPS		¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"
H - Height (open)	IN	4.7	4.7	5.2	5.8	7.2	8.9	9.2	10.5
	MM	119	119	132	147	183	226	234	267
W - Handwheel Dia.	IN	3.2	3.2	3.2	3.7	4.3	5.5	5.5	6.7
	MM	81	81	81	94	109	140	140	170
L - End to End	IN	2.56	2.56	3.15	3.55	4.33	5.0	5.0	5.28
	MM	65	65	80	90	110	127	127	134
WT	LB	2.0	2.0	4.0	4.6	8.4	11.3	15.5	22.9
	KG	0.9	0.9	1.8	2.1	3.8	5.1	7.0	10.4

CLASS 1500 DIMENSIONS

NPS		½"	¾"	1"	1¼"	1½"	2"
H - Height (open)	IN	7.3	7.5	8.5	9.4	11.0	12.6
	MM	185	190	216	239	279	320
W - Handwheel Dia.	IN	4.3	4.7	5.5	5.5	6.8	7.9
	MM	109	119	140	140	173	200
L - End to End	IN	4.37	4.37	4.72	5.12	5.51	6.38
	MM	111	111	120	130	140	162
WT	LB	8.8	11.9	16.3	21.2	33.3	37.9
	KG	4.0	5.4	7.4	9.6	15.1	17.2

Newco Valves

GLOBE VALVES

BOLTED BONNET CLASS 150-300-600-800-1500

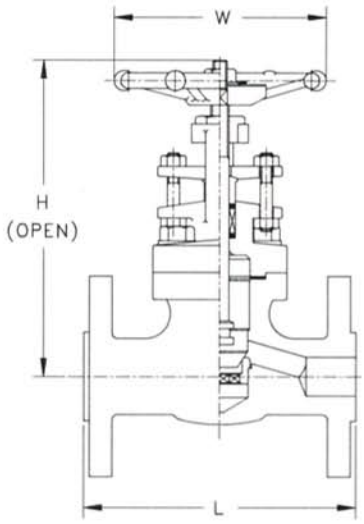


Fig. 21F-FS2-INT Class 150 (Flanged)
Fig. 23F-FS2-INT Class 300 (Flanged)
Fig. 26F-FS2-INT Class 600 (Flanged)

FEATURES

- Spiral wound gasket of stainless steel and flexible graphite with controlled compression.
- Flexible graphite packing with braided end rings.

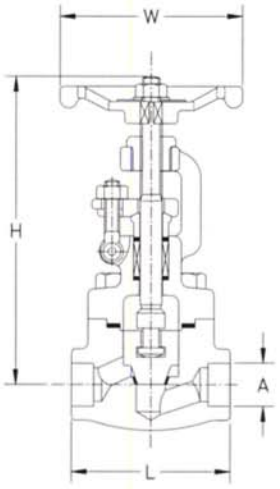


Fig. 28S-FS2 Class 800 (Socket Weld)
Fig. 28T-FS2 Class 800 (Threaded)

Fig. 215S-FS2 Class 1500 (Socket Weld)
Fig. 215T-FS2 Class 1500 (Threaded)

Also available in Class 2500

CLASS 150-300-600 DIMENSIONS

NPS		½"	¾"	1"	1¼"	1½"	2"
L - 150 Face to Face	IN	4.25	4.62	5.0	5.5	6.5	8.0
	MM	108	117	127	140	165	203
L - 300 Face to Face	IN	6.0	7.0	8.0	8.5	9.0	10.5
	MM	152	178	203	216	229	267
L - 600 Face to Face	IN	6.5	7.5	8.5	9.0	9.5	11.5
	MM	165	190	216	229	241	292
W - Handwheel Dia.	IN	5.2	5.8	7.2	9.0	9.2	10.5
	MM	132	147	183	229	234	267
H - Height (150)	IN	7.32	7.4	8.1	9.5	11.4	12.1
	MM	186	188	205	240	290	308
H - Height (300)	IN	6.1	6.1	7.3	9.4	11.4	12.1
	MM	155	155	185	240	290	308
H - Height (600)	IN	6.1	6.1	7.3	9.4	11.4	12.1
	MM	155	155	185	240	290	308
WT - CLASS 150	LB	6.8	7.5	17.2	24.3	25.1	35.3
	KG	3.1	3.4	7.8	11.0	11.4	16.0
WT - CLASS 300	LB	7.3	8.0	22.5	30.4	31.3	39.2
	KG	3.3	3.6	10.2	13.8	14.2	17.8
WT - CLASS 600	LB	7.7	8.4	24.3	34.0	32.6	44.1
	KG	3.5	3.8	11.0	15.4	14.8	20.0

For materials and applicable specifications see page 4.

CLASS 800 DIMENSIONS

NPS		¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"
H - Height (open)	IN	4.9	4.9	5.8	6.1	7.3	8.6	9.5	10.3
	MM	124	124	147	155	185	218	241	262
W - Handwheel Dia.	IN	3.2	3.2	5.2	5.8	7.2	8.9	9.2	10.5
	MM	80	80	132	147	183	226	234	267
L - End to End	IN	2.56	2.56	3.15	3.55	4.33	5.12	6.10	6.77
	MM	65	65	80	90	110	130	155	172
WT	LB	2.2	2.2	4.2	4.6	8.4	12.3	17.2	24.9
	KG	1.0	1.0	1.9	2.1	3.8	5.6	7.8	11.3

CLASS 1500 DIMENSIONS

NPS		½"	¾"	1"	1¼"	1½"	2"
H - Height (open)	IN	7.0	8.2	9.4	10.0	12.0	12.8
	MM	180	210	240	255	306	325
W - Handwheel Dia.	IN	5.0	5.0	6.3	6.3	7.0	9.0
	MM	125	125	160	160	180	230
L - End to End	IN	4.33	4.72	5.12	6.69	8.26	8.26
	MM	110	120	130	170	210	210
WT	LB	7.3	12.0	18.3	24.5	45.0	55.4
	KG	3.3	5.5	8.2	10.9	20.0	25.0

All catalog dimensions are subject to change.

GLOBE VALVES

Y PATTERN — WELDED BONNET — CLASS 800-1500-2500

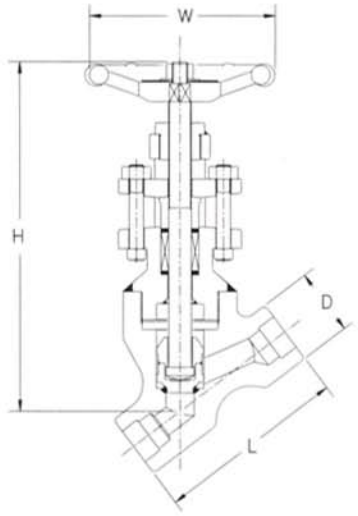


Fig. 28S-FS3 - WB - Y Class 800 (Socket Weld)
Fig. 28T-FS3 - WB - Y Class 800 (Threaded)

Fig. 215S-FS3 - WB - Y Class 1500 (Socket Weld)
Fig. 215T-FS3 - WB - Y Class 1500 (Threaded)
Fig. 215W-FS3 - WB - Y Class 1500 (Buttwelding)

Fig. 225S-FS3 - WB - Y Class 2500 (Socket Weld)
Fig. 225T-FS3 - WB - Y Class 2500 (Threaded)
Fig. 225W-FS3 - WB - Y Class 2500 (Buttwelding)

FEATURES

- Seal welded bonnet eliminates potential leak path.
- Stainless packing gland and stem nut reduce wear and improve corrosion resistance.
- Hardfaced backseat reduces wear.
- Hardfaced disc guides provide protection against side loading.
- Integral hardfaced body seat eliminates potential leak path while providing capability for reseating.
- Tapered hardfaced disc fits into seat for positive shutoff.
- Flexible graphite packing minimizes emissions at all service temperatures.
- In-line inlet port prevents fluid entrapment.

CLASS 800 DIMENSIONS

NPS		½"	¾"	1"	1¼"	1½"	2"
H - Height (open)	IN	5.9	7.1	8.5	12.0	10.8	12.4
	MM	150	180	215	305	275	315
W - Handwheel Dia.	IN	3.2	3.9	4.7	6.8	6.8	6.8
	MM	80	100	120	172	172	172
L - End to End	IN	3.2	3.9	4.3	6.0	6.3	7.5
	MM	80	100	110	150	160	190
D	IN	1.4	1.6	1.9	2.9	2.9	3.4
	MM	36	41	48	74	74	86
WT	LB	5.3	6.6	8.8	23.2	23.2	35.4
	KG	2.4	3.0	4.0	10.5	10.5	16.0

For material and applicable specifications see page 4.

CLASS 1500 DIMENSIONS

NPS		½"	¾"	1"	1¼"	1½"	2"
H - Height (open)	IN	7.1	8.5	8.9	10.8	12.0	14.4
	MM	180	216	226	274	305	366
W - Handwheel Dia.	IN	3.9	5.5	5.5	6.8	6.8	9.0
	MM	99	140	140	173	173	229
L - End to End	IN	3.9	4.3	4.9	5.9	6.3	7.5
	MM	99	109	124	150	160	190
D	IN	1.6	1.9	2.2	2.7	2.7	3.3
	MM	40	49	56	69	69	85
WT	LB	7	12	14	27	29	44
	KG	3.2	5.5	6.2	12.3	13	20

CLASS 2500 DIMENSIONS

NPS		½"	¾"	1"	1¼"	1½"	2"
H - Height (open)	IN	8.7	8.9	10.8	10.8	12.4	14.6
	MM	220	225	275	275	315	370
W - Handwheel Dia.	IN	4.7	5.5	6.8	6.8	6.8	9.1
	MM	120	140	172	172	172	230
L - End to End	IN	4.3	4.9	6.3	6.3	7.5	8.3
	MM	110	125	160	160	190	210
D	IN	1.9	2.2	2.7	2.8	3.3	3.9
	MM	49	56	69	72	83	99
WT	LB	8	13	16	29	32	46
	KG	3.5	6	7.3	13	14.5	21

All catalog dimensions are subject to change.

Newco Valves

GLOBE VALVES

HIGH TEMPERATURE — Y-PATTERN WELDED BONNET — CLASS 1500-2500-4500

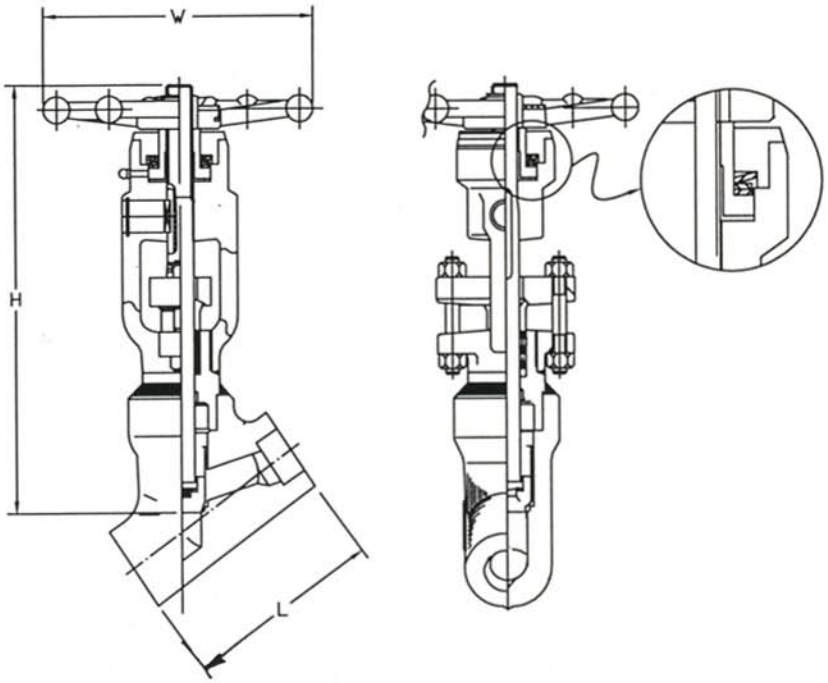


Fig. 215S-F913-WB-Y Class 1500 (Socket Weld)
Fig. 225S-F913-WB-Y Class 2500 (Socket Weld)
Fig. 245S-F913-WB-Y Class 4500 (Socket Weld)

CLASS 1500 DIMENSIONS

NPS		1"	1 1/2"	2"
H - Height (open)	IN	11.9	13.8	16.3
	MM	302	350	414
W - Handwheel Dia.	IN	5.5	7.9	10.2
	MM	140	200	260
L - End to End	IN	4.9	6.3	7.5
	MM	125	160	190
WT	LB	14	29	44
	KG	6.2	13	20

CLASS 4500 DIMENSIONS

NPS		1"	1 1/2"	2"
H - Height (open)	IN	14.5	15.1	17.0
	MM	369	383	433
W - Handwheel Dia.	IN	6.7	7.9	10.2
	MM	170	200	260
L - End to End	IN	7.5	7.5	8.3
	MM	190	190	210
WT	LB	32	46	52
	KG	14.5	21	23.6

CLASS 2500 DIMENSIONS

NPS		1"	1 1/2"	2"
H - Height (open)	IN	13.5	14.7	16.9
	MM	342	374	430
W - Handwheel Dia.	IN	6.7	7.9	10.2
	MM	168	198	255
L - End to End	IN	6.3	7.5	8.3
	MM	158	188	208
WT	LB	16	32	46
	KG	7.3	14.5	21

FEATURES

- High-Temperature design allows the valve to be used at full differential pressure,and at temperatures above 800°F.
- Seal welded bonnet eliminates potential leak path.
- Stainless packing gland and stem nut reduce wear and improve corrosion resistance.
- Hardfaced backseat reduces wear.
- Hardfaced disc guides provide protection against side loading.
- Integral hardfaced body seat eliminates potential leak path while providing capability for reseating.
- Tapered hardfaced disc fits into seat for positive shutoff.
- Flexible graphite packing minimizes emissions at all service temperatures.
- In-line port prevents fluid entrapment.

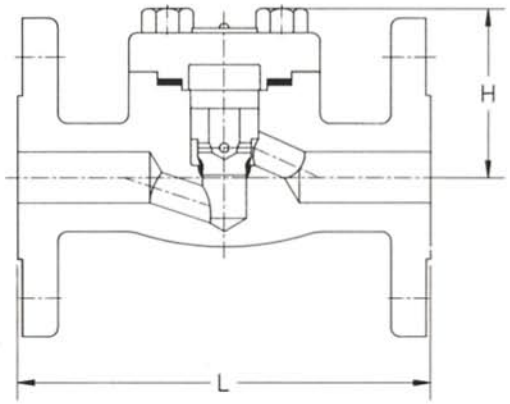
All catalog dimensions are subject to change.

CHECK VALVES

BOLTED CAP CLASS 150-300-600-800-1500

FEATURES

- Spiral wound gasket of stainless steel and flexible graphite with controlled compression.
- Fully guided disc in lift checks hardfaced seats
- No sidewall plug on swing checks.
- Lift checks with springs can be purchased upon special request.

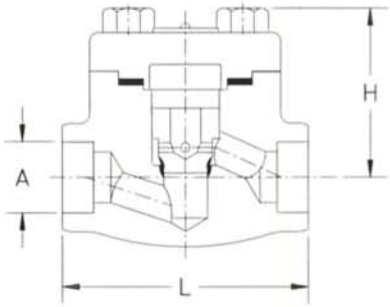


Lift Check Fig. Numbers:
Fig. 41F-FS2-INT Class 150 (Flanged)
Fig. 43F-FS2-INT Class 300 (Flanged)
Fig. 46F-FS2 Class 600 (Flanged)

CLASS 150-300-600 DIMENSIONS

NPS		½"	¾"	1"	1½"	2"
L-150 Face to Face	IN	6.00	7.00	8.00	9.00	10.50
	MM	152	178	203	229	267
L-300 Face to Face	IN	6.00	7.00	8.00	9.00	10.50
	MM	152	178	203	229	267
L-600 Face to Face	IN	6.50	7.50	8.50	9.50	11.50
	MM	165	190	216	241	292
H - Height	IN	1.73	2.05	2.60	3.23	3.82
	MM	44	52	66	82	92
WT - 150	LB	5.3	6.6	10.6	18.3	28.7
	KG	2.4	3.0	4.8	8.3	13.0
WT - 300	LB	6.0	8.8	12.3	22.7	31.5
	KG	2.7	4.0	5.6	10.3	14.3
WT - 600	LB	6.4	11.0	13.4	28.6	40.3
	KG	2.9	5.0	6.1	13.0	18.3

For materials and applicable specifications see page 4.



Lift Check Fig. Numbers:
Fig. 48S-FS2 Class 800 (Socket Weld)
Fig. 48T-FS2 Class 800 (Threaded)

Fig. 415S-FS2 Class 1500 (Socket Weld)
Fig. 415T-FS2 Class 1500 (Threaded)

CLASS 800 DIMENSIONS

NPS		¼"	⅜"	½"	¾"	1"	1¼"	1½"	2"
H - Height	IN	1.7	1.7	1.7	2.0	2.6	2.9	3.2	3.8
	MM	44	44	44	52	66	74	82	97
L - End to End	IN	2.91	2.91	2.91	3.38	4.17	5.12	5.98	6.77
	MM	74	74	74	86	106	130	152	172
WT	LB	2.9	2.9	2.9	2.9	5.1	8.2	10.4	16.3
	KG	1.3	1.3	1.3	1.3	2.3	3.7	4.7	7.4

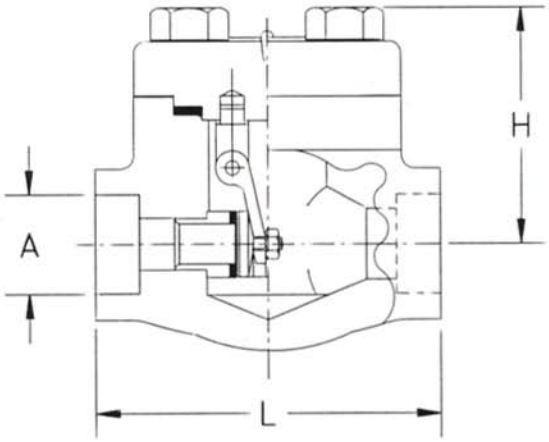
CLASS 1500 DIMENSIONS

NPS		½"	¾"	1"	1¼"	1½"	2"
H - Height	IN	2.8	2.8	3.4	4.1	4.6	5.4
	MM	72	72	85	103	116	135
L - End to End	IN	4.37	4.37	5.12	5.98	6.77	8.66
	MM	111	111	130	152	172	220
WT	LB	6.2	6.2	9.0	12.8	20.1	28.7
	KG	2.8	2.8	4.1	5.8	9.1	13.0

Newco Valves

CHECK VALVES

BOLTED CAP CLASS 800



Swing Check Fig. Numbers:
Fig. 38S-FS2 Class 800 (Socket Weld)
Fig. 38T-FS2 Class 800 (Threaded)

Y PATTERN — WELDED BONNET CLASS 1500-2500

FEATURES

- Seal welded cap eliminates potential leak path
- Integral hardfaced seats
- Spring loaded piston for positive shut-off
- In-line inlet port prevents fluid entrapment

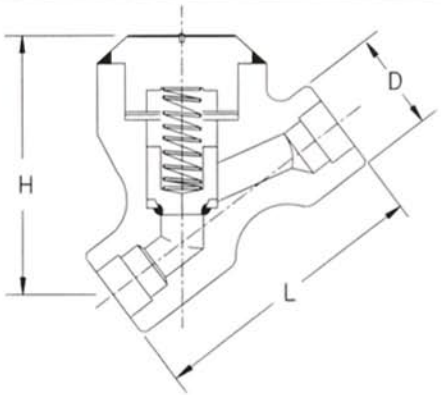


Fig. 415S-FS3 - WB - Y Class 1500 (Socket Weld)
Fig. 415T-FS3 - WB - Y Class 1500 (Threaded)
Fig. 415W-FS3 - WB - Y Class 1500 (Buttwelding)

Fig. 425S-FS3 - WB - Y Class 2500 (Socket Weld)
Fig. 425T-FS3 - WB - Y Class 2500 (Threaded)
Fig. 425W-FS3 - WB - Y Class 2500 (Buttwelding)

CLASS 800 DIMENSIONS

NPS		½″	¾″	1″	1¼″	1½″	2″
H - Height	IN	1.9	2.2	2.7	2.9	3.9	4.1
	MM	49	56	67	73	95	105
L - End to End	IN	3.15	3.54	4.33	5.00	6.10	6.70
	MM	80	90	110	127	155	170
WT	LB	2.4	4.0	5.1	7.9	13.2	19.6
	KG	1.1	1.8	2.3	3.6	6.0	8.9

For materials and applicable specifications see page 4.

CLASS 1500 DIMENSIONS

NPS		½″	¾″	1″	1¼″	1½″	2″
H - Height	IN	3.0	3.1	3.4	4.5	4.5	5.5
	MM	75	80	85	115	115	140
D	IN	1.6	1.9	2.2	2.7	2.7	3.3
	MM	40	49	56	69	69	85
L - End to End	IN	3.9	4.3	4.9	5.9	6.3	7.5
	MM	100	110	125	150	160	190
WT	LB	5.5	6.6	10.0	13.3	13.3	20.0
	KG	2.5	3.0	4.5	6.0	6.0	9.0

CLASS 2500 DIMENSIONS

NPS		½″	¾″	1″	1¼″	1½″	2″
H - Height	IN	3.2	3.3	4.5	5.5	5.5	5.9
	MM	80	85	115	140	140	150
D	IN	1.9	2.2	2.7	2.8	3.3	3.9
	MM	49	56	69	72	83	99
L - End to End	IN	4.3	4.9	6.3	6.3	7.5	8.3
	MM	110	125	160	160	190	210
WT	LB	6.6	10.0	13.3	13.3	20.0	26.6
	KG	3.0	4.5	6.0	6.0	9.0	12.0

All catalog dimensions are subject to change.

PRESSURE / TEMPERATURE RATINGS

A105*/LF2****

Temperature °F	Class 150	Class 300	Class 600	Class 800	Class 1500	Class 2500
-20 to 100	285	740	1480	1975	3705	6170
200	260	675	1350	1800	3375	5625
300	230	655	1315	1750	3280	5470
400	200	635	1270	1690	3170	5280
500	170	600	1200	1595	2995	4990
600	140	550	1095	1460	2735	4560
650	125	535	1075	1430	2685	4475
700	110	535	1065	1420	2665	4440
750	95	505	1010	1345	2520	4200
800	80	410	825	1100	2060	3430
850	65	270	535	715	1340	2230
900	50	170	345	460	860	1430
950	35	105	205	275	515	860
1000	20	50	105	140	260	430
1050	—	—	—	—	—	—
1100	—	—	—	—	—	—
1150	—	—	—	—	—	—
1200	—	—	—	—	—	—

F22**

Temperature °F	Class 150	Class 300	Class 600	Class 800	Class 1500	Class 2500
-20 to 100	290	750	1500	2000	3750	6250
200	260	750	1500	1910	3750	6250
300	230	730	1455	1805	3640	6070
400	200	705	1410	1730	3530	5880
500	170	665	1330	1705	3325	5540
600	140	605	1210	1615	3025	5040
650	125	590	1175	1570	2940	4905
700	110	570	1135	1515	2840	4730
750	95	530	1065	1420	2660	4430
800	80	510	1015	1355	2540	4230
850	65	485	975	1300	2435	4060
900	50	450	900	1200	2245	3745
950	35	375	755	1005	1885	3145
1000	20	260	520	715	1305	2170
1050	20	175	350	530	875	1455
1100	—	110	220	300	550	915
1150	—	—	—	—	—	—
1200	—	—	—	—	—	—

F11**

Temperature °F	Class 150	Class 300	Class 600	Class 800	Class 1500	Class 2500
-20 to 100	290	750	1500	2000	3750	6250
200	260	750	1500	1900	3750	6250
300	230	720	1445	1795	3610	6015
400	200	695	1385	1755	3465	5775
500	170	665	1330	1710	3325	5540
600	140	605	1210	1615	3025	5040
650	125	590	1175	1570	2940	4905
700	110	570	1135	1515	2840	4730
750	95	530	1065	1420	2660	4430
800	80	510	1015	1355	2540	4230
850	65	485	975	1300	2435	4060
900	50	450	900	1200	2245	3745
950	35	320	640	1005	1595	2655
1000	20	215	430	595	1080	1800
1050	20	145	290	365	720	1200
1100	20	95	190	255	480	800
1150	—	60	125	140	310	515
1200	—	40	75	95	190	315

F91

Temperature °F	Class 150	Class 300	Class 600	Class 800	Class 1500	Class 2500	Class 4500
-20 to 100	290	750	1500	2750	3750	6250	11250
200	260	750	1500	2750	3750	6250	11250
300	230	730	1455	2670	3640	6070	10925
400	200	705	1410	2585	3530	5880	10585
500	170	665	1330	2435	3325	5540	9965
600	140	605	1210	2215	3025	5040	9070
650	125	590	1175	2155	2940	4905	8825
700	110	570	1135	2080	2840	4730	8515
750	95	530	1065	1950	2660	4430	7970
800	80	510	1015	1860	2540	4230	7610
850	65	485	975	1785	2435	4060	7305
900	50	450	900	1650	2245	3745	6740
950	35	385	775	1415	1930	3220	5795
1000	20	365	725	1330	1820	3030	5450
1050	20	360	720	1320	1800	3000	5400
1100	20	300	605	1105	1510	2515	4525
1150	20	225	445	815	1115	1855	3345
1200	20	145	290	525	720	1200	2160

F5

Temperature °F	Class 150	Class 300	Class 600	Class 800	Class 1500	Class 2500
-20 to 100	290	750	1500	2000	3750	6250
200	260	745	1490	2000	3725	6205
300	230	715	1430	1940	3580	5965
400	200	705	1410	1880	3530	5880
500	170	665	1330	1775	3325	5540
600	140	605	1210	1615	3025	5040
650	125	590	1175	1570	2940	4905
700	110	570	1135	1515	2840	4730
750	95	530	1055	1420	2640	4400
800	80	510	1015	1325	2540	4230
850	65	485	965	1170	2415	4030
900	50	370	740	940	1850	3085
950	35	275	550	695	1370	2285
1000	20	200	400	510	995	1655
1050	20	145	290	375	720	1200
1100	20	100	200	275	495	830
1150	20	60	125	185	310	515
1200	15	35	70	120	170	285

Notes:
*Permissible, but not recommended for prolonged usage above 800°F.
**Permissible, but not recommended for prolonged usage above 100°F.
****Not to be used over 650°F.

Newco Valves

CORROSION DATA

CORROSIVE MEDIA	Carbon Steel	Stainless Steel 304	Stainless Steel 316	Iconel	Monel
Acetate Solvents, Crude	D	A	A	A	B
Acetate Solvents, Pure	C	A	A	A	A
Acetic Acid, 95%	D	B	A	A	A
Acetic Anhydride, Boiling	D	B	A	A	A
Acetone	B	A	A	A	A
Alcohols	B	A	A	A	A
Amines	B	A	A	A	A
Ammonia, Anhydrous	B	A	A	A	A
Ammonium Hydroxide, Hot	B	A	A	A	D
Ammonium Nitrate	B	A	A	A	C
Aniline Hydrochloride	D	D	C	B	B
Antimony Trichloride	D	D	C	B	B
Asphalt	B	A	A	A	A
Barium Chloride, 5%	C	A	A	A	A
Barium Hydroxide	C	A	A	A	A
Barium Nitrate	C	A	A	B	C
Benzene, Hot	B	A	A	A	A
Benzoic Acid	B	A	A	A	A
Blood	D	A	A	A	A
Bromine, Dry Gas	D	A	A	B	A
Bromine, Moist Gas	D	D	D	D	C
Buttermilk	D	A	A	A	A
Calcium Bisulfite, Hot	D	C	B	D	D
Calcium Chloride, Dilute	C	B	A	A	A
Calcium Hydroxide, 20%, Boiling	D	A	A	A	A
Calcium Hypochloride, <2%	C	C	B	B	C
Carbolic Acid, 90%	C	A	A	A	B
Carbon Dioxide, Dry	C	A	A	A	A
Carbon Disulphide	B	A	A	A	B
Chloroacetic Acid	D	D	C	B	B
Chloric Acid	D	D	C	C	C
Chlorinated Water, Sal.	D	D	C	C	C
Chlorine, Dry Gas	B	B	B	A	A
Chlorine, Moist Gas	D	D	C	D	C
Citric Acid, Dilute	D	A	A	A	A
Citric Acid, Hot, Conc.	D	C	B	B	B
Creosote, Hot	B	A	A	A	A
Cupric Chloride, 5%	D	D	C	D	D
Ethyl Chloride	A	A	A	A	A
Ethylene Glycol	A	A	A	A	A
Ferric Chloride <1%	D	C	B	B	C
Ferric Nitrate, 5%	D	B	A	C	D
Ferric Sulfate, 5%	D	B	A	B	C
Ferrous Sulfate, 10%	C	A	A	B	A
Flourine, Dry Gas	C	C	B	A	A
Flourine, Moist Gas	D	D	D	B	A
Freon, Wet	C	C	C	B	A
Fuel Oil, 140°F	A	A	A	A	B

CORROSIVE MEDIA	Carbon Steel	Stainless Steel 304	Stainless Steel 316	Iconel	Monel
Furfural	B	B	B	B	B
Gasoline Sour	B	A	A	C	C
Gasoline Refined	A	A	A	B	A
Gelatine	D	B	A	A	A
Glucose	B	A	A	A	A
Glycerine	B	A	A	A	A
Hydrofluoric Acid, Boiling	D	D	D	D	B
Hydrofluosilicic Acid	D	D	C	B	A
Hydrogen Chloride, Dry	B	D	C	A	A
Hydrogen Chloride, Moist	D	D	D	D	C
Hydrogen Fluoride, Dry	C	D	C	A	A
Hydrogen Peroxide, Boiling	D	C	B	B	B
Hydrogen Sulfide, Dry	B	A	A	A	A
Hydrogen Sulfide, Moist	C	B	A	A	B
Iodine, Dry	D	D	B	A	A
Kerosene	A	A	A	A	A
Lactic Acid, 5%	D	B	A	A	B
Lactic Acid, 10%	D	B	A	A	B
Lactic Acid, Boiling, 5%	D	C	B	B	C
Lactic Acid, Boiling, 10%	D	D	B	B	C
Lead Acetate, Hot	D	A	A	B	B
Magnesium Chloride, Hot, 5%	D	C	B	A	A
Magnesium Hydroxide	B	A	A	A	A
Magnesium Sulfate	B	A	A	B	A
Magnesium Sulfate, Boiling	C	A	A	C	A
Mercury	B	A	A	A	B
Mercuric Chloride, <2%	D	D	D	D	D
Merouric Cyanide	D	B	B	B	D
Methyl Chloride, Dry	D	B	B	A	A
Milk	D	A	A	A	B
Molasses	B	A	A	A	A
Naptha	B	A	A	A	A
Nickel Chloride	D	C	B	B	B
Nickel Sulfate, Boiling	D	C	C	B	A
Nitric Acid, 20%	D	A	A	B	D
Nitric Acid, Boiling, Conc.	D	D	D	D	D
Nitrous Acid	D	B	B	B	C
Nitrobenzene	D	B	A	B	B
Oils - Miner.	B	A	A	C	B
Oxalic Acid, Boiling, 10%	C	A	A	A	A
Oxalic Acid, Boiling, 50%	D	D	C	B	B
Oxygen	B	A	A	A	A
Picric Acid	C	A	A	D	D
Potassium Bromide	D	C	B	A	A
Potassium Carbonate	B	A	A	A	A
Potassium Chlorate	B	A	A	A	B
Potassium Chloride	D	A	A	A	A
Potassium Chloride, Hot	D	C	B	B	A

CORROSIVE MEDIA	Carbon Steel	Stainless Steel 304	Stainless Steel 316	Iconel	Monel
Potassium Cyanide	B	B	B	B	B
Potassium Sulfate, Dil.	B	A	A	A	A
Propane, Liquid & Gas	B	A	A	A	A
Pyrogallic Acid	B	A	A	B	A
Rosin, Molten	D	A	A	A	A
Salicylic Acid	D	B	B	B	B
Silver Bromide	D	B	A	C	B
Silver Chloride	D	D	D	C	B
Silver Nitrate	D	A	A	A	C
Sodium Acetate	C	A	A	A	A
Sodium Bisulfate	D	B	B	B	A
Sodium Bromide, Dil.	D	B	B	B	A
Sodium Cyanide	B	B	B	B	A
Sodium Fluoride, 5%	D	B	A	B	A
Sodium Hydroxide, 50%	B	A	A	A	A
Sodium Hyposullite	D	B	A	B	A
Sodium Nitrate	B	B	A	A	B
Sodium Perborate	C	A	A	A	B
Sodium Peroxide	C	A	A	A	B
Sodium Phosphate, Tribasic	C	A	A	A	A
Sodium Sillcate	B	A	A	A	B
Sodium Thiosulfate	D	B	A	B	B
Stannous Chloride, Sat.	D	D	B	B	B
Steam, 212°F	A	A	A	A	A
Steam, 600°F	C	A	A	A	A
Sulfite Liquors	D	C	B	D	D
Sulfur Chloride	D	C	D	B	B
Sulfur Dioxide, Moist	D	B	A	D	D
Sulfuric Acid, Conc.	B	B	B	B	D
Sulfurous Acid, Sat.	D	B	B	D	D
Tannic Acid, 10%	D	A	A	B	A
Tar, Hot	B	A	A	A	B
Tartaric Acid, 120°F	D	B	A	A	A
Toluene	A	A	A	A	A
Trichlorethylene	B	A	A	A	A
Turpentine	B	A	A	A	A
Varnish, Hot	C	A	A	A	A
Vegetable Oils	B	A	A	A	B
Vinegar	D	A	A	A	A
Water, Acid Mine	D	A	A	A	C
Water, Boiler Feed	B	A	A	A	A
Water, Distilled	D	A	A	A	A
Water, Salt Sea	D	C	B	B	A
Whiskey, Boiling	D	A	A	A	C
Wine	D	A	A	A	C
Xylene, Boiling	D	A	A	A	A
Zinc Chloride, 5%	D	C	B	B	B
Zinc Sulfate, Boiling	D	A	A	B	A

A = Substantial resistance - Preferred material of construction.
B = Moderate resistance - Satisfactory for use under most conditions.
C = Questionable resistance - Use with caution.
D = Inadequate resistance - Not recommended.

Newman's doesn't assume any responsibility from the use of a.m. data which is purely theoretical. The user must verify the best conditions of use.

FLOW COEFFICIENT CHART

Flow Coefficient C_V

The flow characteristic of a valve is identified by means of the Cv symbol. The Cv Flow Coefficient is the quantity expressed in U.S. gallons per minute of water at a standard temperature (60°F=15.6°C) which will flow through the valve at the differential pressure of 1 p.s.i.

Valve Description			Size					
Type	**Rating**	**Bore**	**1/2**	**3/4**	**1**	**1 1/4**	**1 1/2**	**2**
Gate	800	Full	12.3	23.2	43	57	98	200
Gate	800	Reduced	6	10	26	44	65	103
Gate	1500	Full	12.5	23.7	44	59	100	200
Gate	1500	Reduced	6.2	10.5	26.5	45	65.5	99
Gate	2500	Full	5	12.1	23	42.5	56	97
Globe	800	Full	3.2	5.8	11.5	15.2	20.9	38.3
Globe	800	Reduced	1.5	3.7	6.4	10.4	17.8	21.5
Globe	1500	Full	2.8	6	12	-	20	24
Globe	1500	Reduced	1.7	2.9	5.8	-	15.5	19.8
Y-Pattern Globe	800		4.8	11.1	13.9	-	37	68
Y-Pattern Globe	1500		5.2	11.2	14.8	-	35	68
Y-Pattern Globe	2500		2.9	5.8	12.1	-	27	36
Swing Check	800	Full	5.4	12.2	16.8	25.5	54.3	101
Swing Check	800	Reduced	3.8	6.2	13.3	18.1	27.8	54.5
Lift Check	800	Full	2.8	5.2	11.1	-	17.8	32
Lift Check	800	Reduced	1.2	3.4	6.3	-	15.1	18.2
Lift Check	1500	Full	2.6	5.8	11	-	19	22
Lift Check	1500	Reduced	1.6	2.7	5.3	-	11	19.2

FLOW-RATE

$$Q = Cv \sqrt{\frac{\Delta p}{S}}$$

PRESSURE DROP

$$\Delta p = S \left(\frac{Q}{Cv}\right)^2$$

For liquids other than water

Δp = Pressure drop LB./IN^2 (psig)
Q = Liquid flow in gallons per minute (GPM).
S = Specific gravity of liquid relative to water (60°F).
C_V = Valve flow coefficient

INSTALLATION & MAINTENANCE

STORAGE ON SITE

- Do not remove end protectors until ready to install.
- Store valves indoors in a well-protected, dry area. Do not store in contact with the floor. Store on pallets or shelves.

INSTALLATION

- Remove end protectors when ready to install.
- Check nameplate to make sure of type and class of valve.
- Check internal port area of valve by visual inspection to locate and remove any debris which may be in the valve. (If necessary, use compressed air to blow out debris).
- Install the valve according to the flow indicator on valve body. (Flow arrows will be present on globes and checks. Gates may be installed in any direction unless specially marked with flow arrows due to consideration of end connections).

MAINTENANCE

- Inspect periodically all critical parts for wear.
  - stem threads
  - packing and packing glands
  - body-bonnet joint and bolting
  - seats
  - end connections

- If leakage on the stem seal occurs, tighten the gland nuts and the packing gland being careful to maintain perpendicular alignment between stem and gland flange. When tightening the gland nuts, alternate tightening with no more than 1/4 turn on each nut until the leak stops.
- When tightening the gland is not enough to stop the leak, it will be necessary to replace the packing.
- Repacking may be done while the valve is in line; however, strict caution is advised to:
  - Remove all line pressure, upstream and downstream
  - The valve must be fully and tightly back-seated prior to any attempt to re-pack.
  - Disassemble with caution in the event all pressures have not been fully relieved.
- For any other repair operation, it is advisable to remove the valve from the line.
- Use trained personnel and proper tools.
- If valve is removed from the line for any repair, pressure test the valve prior to re-installation.

MANUAL

- On customer's request, the complete ***Newman's*** "Newco Forged Valve Operation & Maintenance Manual" will be supplied.

TERMS & CONDITIONS

QUOTATIONS
Goods quoted FOB our warehouses are subject to prior sale. Prices quoted are valid only for the duration indicated in the quotation. Quoted prices supercede all previous prices, quotations or contracts and are subject to change without notice.

TAXES
Any sales or use tax which may be imposed or any excise or occupational tax measured or required, whether or not the law imposing such tax is now in effect, shall be in addition to the quoted price and shall be paid by the Buyer. If any tax is required to be paid by Newman's, the Buyer shall reimburse Newman's upon presentation of invoice.

ORDERS
Orders for standard valves should state the exact size and figure number desired. Orders for special items or modifications of standard items must be confirmed in writing and accompanied with detailed prints and/or specifications.

INSPECTION
When orders are accepted subject to the Buyer's inspection, the goods must be inspected and accepted prior to shipment.

DESIGN CHANGES
We reserve the right to institute changes in materials, design and specifications without notice.

DELIVERY
Delivery of material to a common carrier shall be considered delivery thereof to the Buyer, and shall be at the Buyer's risk thereafter. Claims for loss or any damage to material in transit shall be filed by the Buyer direct with the carrier. All claims for shortages, corrections or deductions must be made within 10 days after receipt of goods.

CANCELLATIONS & RETURNS
Orders placed with us cannot be cancelled without our prior consent. Requests to return merchandise must be submitted to us in writing and have our written approval before any returned goods will be accepted. A cancellation charge will be applicable unless otherwise agreed upon. Special items or modification of standard items are not returnable. We assume no responsibility for goods returned without prior agreement.

FORCE MAJEURE
We are not responsible for delays in delivery or defaults in completing a contract due to strikes, work stoppages, fires, floods, accident, inability to obtain materials, fuel, transportation or other causes beyond our control.

SPARE PARTS
Spare parts are available for all Newco valves. When ordering, please state size and figure number of valves and name or identification number of part desired.

LIMITED WARRANTY
Newman's warrants to the original purchaser, for a period of one year from and after the date of delivery to the original customer, that its products will be free from defects in workmanship and materials, not caused or resulting from improper usage or application, improper installation, improper maintenance, repair modification or alterations.

In the event the original purchaser shall determine that a product purchased from Newman's shall be defective in workmanship or materials, the customer shall notify the Newman's Warranty Representative by telephone 713-675-8631 within 24 hours from such determination, followed by written notice to such effect within 7 days therefrom, addressed to:

Newman's
1300 Gazin St.
Houston, TX 77020

In the event Newman's shall determine that the product is defective based upon such examination of the product which Newman's may deem appropriate, Newman's shall thereupon, at its sole option, (a) cause the defective product to be repaired, (b) replaced with a substantially identical product, or (c) accept the return of a defective product and refund the purchasing price to the original purchaser. Newman's shall bear all normal surface transportation costs to the original purchaser but shall in no event bear any installation, reinstallation, engineering or other costs incurred in connection with repair or replacement.

Unless Newman's shall have provided engineering and/or suitability of application or installation services for a purchaser, for which a separate charge shall have been specifically identified and made, the selection, suitability, installation and fitness of all products sold by Newman's shall be deemed to have been determined exclusively by and within the sole discretion of the purchaser. Accordingly, Newman's disclaims any obligation, warranty or guarantee in any manner relating to or resulting from the selection, application, suitability, fitness or installation of its products.

The foregoing constitutes the sole obligation of Newman's with respect to defective products purchased from it and in no manner shall Newman's assume or be liable for any other expenses, incidental or consequential damages, losses, lost profits, downtime or otherwise, whether directly or indirectly suffered, or in any other manner relating to or as the result of any defect or failure of any product that it may sell.

Except as otherwise provided herein, NEWMAN'S MAKES NO WARRANTIES OR REPRESENTATIONS, WHETHER EXPRESS OR IMPLIED, OF ANY KIND WHATSOEVER WITH RESPECT TO GOODS AND PRODUCTS SOLD BY IT, INCLUDING WITHOUT LIMITATION, ANY WARRANTIES WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO PERSON IS AUTHORIZED TO GRANT OR EXTEND ANY WARRANTY OR REPRESENTATION ON BEHALF OF NEWMAN'S OTHER THAN AS SET FORTH HEREIN.

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FORGED STEEL VALVES

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Houston, Texas 77020
Phone: (713) 675-8631
Wats: 1-800-231-3505
Fax: 1-713-671-0839

New Jersey
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East Brunswick, New Jersey 08816
Phone: (732) 257-0300
Wats: 1-800-526-2421
Fax: 1-732-238-0132

Newmans Valve Ltd. — Canada

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P.O. Box 881/92 Davidson Street
Barrie, Ontario, Canada L4M 3S3
Phone: (705) 737-4216
Wats: 1-800-461-4430 (Canada)
Fax: 1-705-737-5156

Edmonton
8400 - 18th Street
Edmonton, Alberta, Canada T6P 1K5
Phone: (780) 464-3500
Wats: 1-800-661-7326 (Canada)
Fax: 1-780-467-0376

Newmans — Europe

PVF International S.R.L.
Via San Nicolo' 23
34121 - Trieste, Italy
Phone: 011-39-040-367610
Fax: 011-39-040-370154

Please visit our web site www.NewcoValves.com or www.OICValve.com

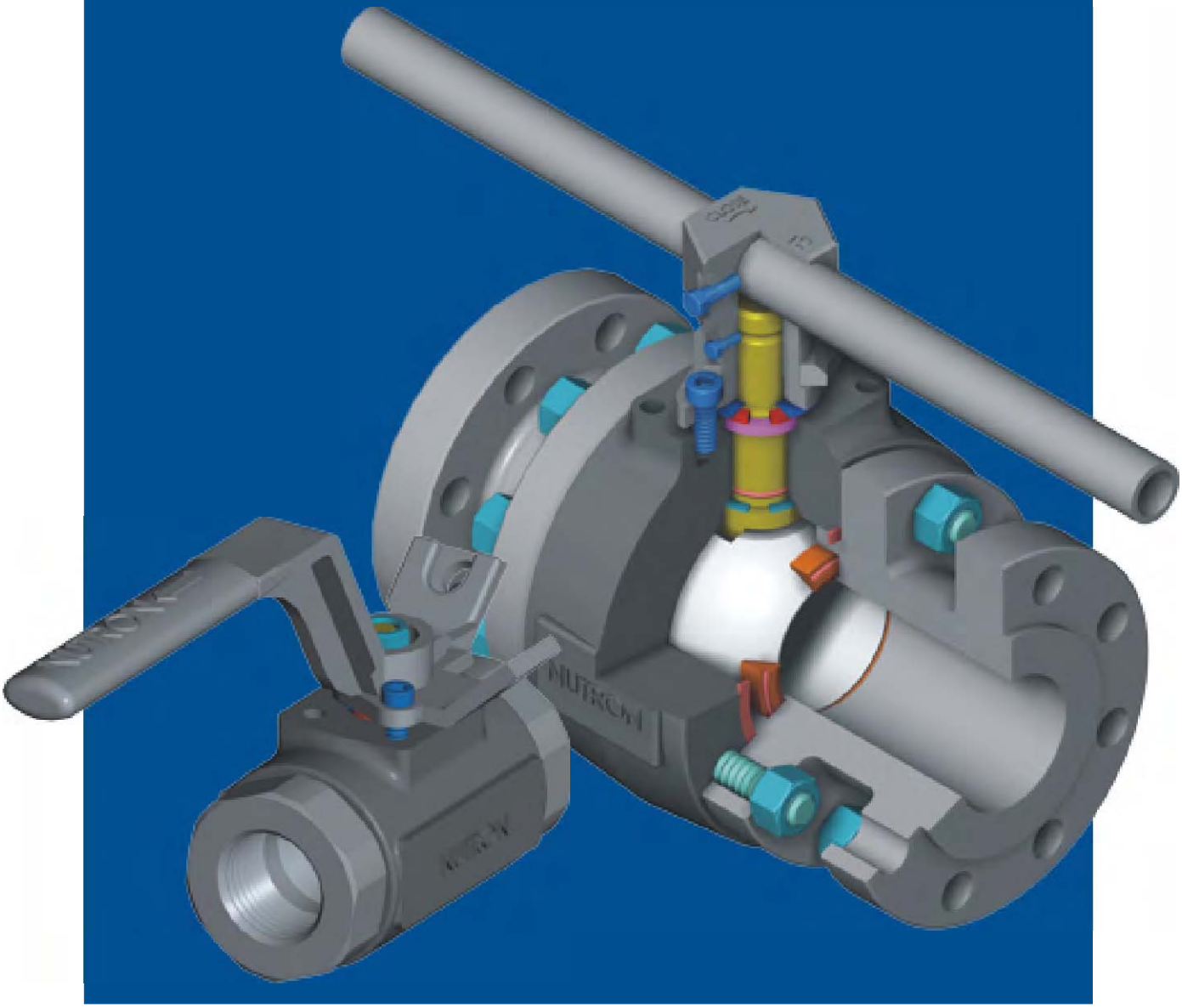
Newco Valves

Newmans®

CAT #FS301 - 7/2000

NUTRON

FORGED STEEL
FLOATING BALL VALVES
MODEL T3 & B3



COOPER CAMERON VALVES

TABLE OF CONTENTS

FLOATING BALL VALVES

MODEL T3 3 PIECE THREADED FLOATING BALL VALVES

- Full Port sizes 1/2 in. through 3 in. (15 mm through 80 mm)
- Reduced Port sizes 3/4 in. through 4 in. (20 mm through 100 mm)
- ASME Class 150 through 2500 (PN 20 through 420) (see page 3)
- WOG 1000 through 6000 psi (see page 3)
- End Connections: Threaded, Flanged, Socket Weld, Buttweld

MODEL B3 3 PIECE BOLTED FLOATING BALL VALVES

- Full Port sizes 1 1/2 in. through 4 in. (40 mm through 100 mm)
- Reduced Port sizes 2 in. and 6 in. (50 mm and 150 mm)
- ASME Class 150 through 1500 (PN 20 through 250) (see page 17)
- WOG 2000 and 4000 psi (see page 17)
- End Connections: Flanged, Threaded, Buttweld

MATERIALS AND ACTUATION

- Materials: Carbon Steel, Stainless Steel, Special Alloys
- Operator: Manual Lever Handle
- Actuation: Consult Cooper Cameron Valves - NUTRON Sales Department for information on various types of actuators including; Gear Operators (B3), Pneumatic, Hydro-Pneumatic, Electric, Electro-Pneumatic and Hydraulic

COMPLIANCE TO STANDARDS AND SPECIFICATIONS:

- ISO 9001-2000: Registered Quality System
- ASME B16.34
- API 598 and API 607 4th Edition (Fire Safe)
- CE Mark Number 0879
- ASME Section VIII Division 1 Boiler and Pressure Vessel Code
- CSA Z245.15 Steel Valves
- NACE MR0175 (Rev. 2002)
- Canadian Registration Number (CRN)

STANDARD FEATURES

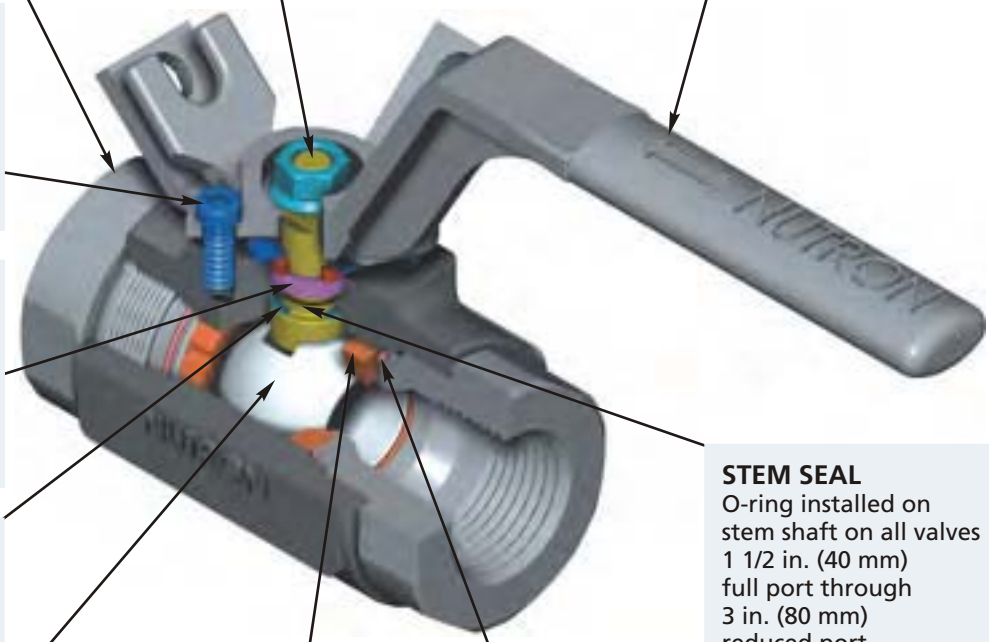
MODEL T3

BODY CONSTRUCTION
Forged steel three piece threaded construction. A machined pad area is drilled and tapped for actuation as a standard. Threaded construction allows for combinations of end connections.

STEM
Blowout proof stem is back-seated through the valve body.

HANDLE
Rugged cast handle.
Handle position indicates flow position.
When the handle is positioned in line with the pipe, the valve is open.
When the handle is positioned perpendicular to the pipe, the valve is closed.
Locking handle is standard for all 2 in. (50 mm) reduced port and smaller valves with either socket weld or FNPT end connections.

CAP SCREWS
Dual purpose;
allows for easy stem packing adjustment without handle removal while providing a stop for the handle.



PACKING
Self adjusting by means of a Belleville washer. Allows for long service life before manual packing adjustment is necessary.

STEM SEAL
O-ring installed on stem shaft on all valves 1 1/2 in. (40 mm) full port through 3 in. (80 mm) reduced port.

THRUST WASHER
Acts as a bearing between the body and stem.

BALL
The floating ball design allows for positive shut off in either flow direction.
Includes pressure equalization hole to prevent trapping of pressure in the body cavity.

SEATS
Materials available are Teflon, Delrin, PEEK and Devlon.

BODY SEALS
Body seal O-rings are placed ahead of the body cap threads to protect the threads from the flow media.

MODEL T3 SIZES AVAILABLE

ASME CLASS (PN)		150 (20)	300 (50)	600 (100)	900 (150)	1500 (250)	2500 (420)
Full Port	in. (mm)	1/2 thru 3 (15 thru 80)	1/2 thru 3 (15 thru 80)	1/2 thru 2 (15 thru 50)	1/2 thru 2 (15 thru 50)	1/2 thru 2 (15 thru 50)	1/2 thru 2 (15 thru 50)
Reduced Port		3/4 thru 4 (20 thru 100)	3/4 thru 4 (20 thru 100)	3/4 thru 3 (20 thru 100)	3/4 thru 3 (20 thru 80)	3/4 thru 3 (20 thru 80)	3/4 thru 3 (20 thru 80)
WOG (psi)			**1000**	**2000**	**3000**	**4000**	**6000**
Full Port, Threaded	in. (mm)		3 (80)	1/4 thru 3 (8 thru 80)	1/4 thru 2 (8 thru 50)	1/4 thru 2 (8 thru 50)	1/4 thru 2 (8 thru 50)
Reduced Port, Threaded			4 (100)	3/4 thru 3 (20 thru 80)	3/4 thru 3 (20 thru 80)	3/4 thru 3 (20 thru 80)	3/4 thru 3 (20 thru 80)
Full Port, Socket Weld				1/2 thru 2 (15 thru 50)	1/2 thru 2 (15 thru 50)	1/2 thru 2 (15 thru 50)	1/2 thru 2 (15 thru 50)
Reduced Port, Socket Weld				3/4 thru 3 (20 thru 80)	3/4 thru 3 (20 thru 80)	3/4 thru 3 (20 thru 80)	3/4 thru 3 (20 thru 80)

ORDERING INFORMATION

How to develop figure numbers:

MODEL
T3 - 3 PIECE THREADED

BORE
F - FULL PORT
R - REDUCED PORT

SIZE in. (mm)

02 - 1/4 (8)	15 - 1 1/2 (40)
03 - 3/8 (10)	20 - 2 (50)
05 - 1/2 (15)	25 - 2 1/2 (65)
07 - 3/4 (20)	30 - 3 (80)
10 - 1 (25)	40 - 4 (100)
12 - 1 1/4 (32)	

STYLE*

A - STAINLESS STEEL -50°F (-46°C)	J - HIGH TEMP/ STAINLESS STEEL
B - STANDARD	L - SOUR LOW TEMP -50°F (-46°C)
D - FULL STAINLESS STEEL -150°F (-100°C)	N - MONEL STEEL
E - STEAM HIGH TEMP/ STAINLESS STEEL	Q - DUPLEX STEEL
F - HIGH TEMP/SOUR LOW TEMP	S - SOUR -20°F (-29°C)
G - STEAM HIGH TEMP/SOUR	
H - HIGH TEMP/SOUR	

T3 - F 07 S 20 S Z

END CONNECTION

A - RF SMOOTH FACE	H - FNPT X RTJ
B - BW SCH 40	J - RTJ
C - BW SCH 80	M - MALE NPT
D - BW SCH 160	R - RAISED FACE
E - BW SCH XXH	S - FEMALE NPT
F - FNPT X MNPT	TS - FNPT X SOCKET WELD
G - FNPT X RF	WS - SOCKET WELD

PRESSURE

10 - 1000 WOG	01 - 150 ASME
20 - 2000 WOG	03 - 300 ASME
30 - 3000 WOG	06 - 600 ASME
40 - 4000 WOG	09 - 900 ASME
60 - 6000 WOG	15 -1500 ASME
	25 -2500 ASME

OPTIONS
ANTI-STATIC SPRING
BLEEDER HOLE
BLEEDER VALVE
CARR. SEAL CLOSE
CARR. SEAL OPEN
DELRIN SEATS
DEVLON SEATS
ELECTROLESS NICKEL PLATING (ENP)
EXTENDED STEM
GRAPHITE PACKING
HSN O-RINGS
IMPREGLON COATING
LOCKING HANDLE
NITRILE O-RINGS
PEEK SEATS
SEAL WELDED
SEAL INJECTION
SPRING RETURN HANDLE
TAC WELD CAP
TEFLON O-RINGS
VITON O-RINGS

FIRE SAFE

Examples:

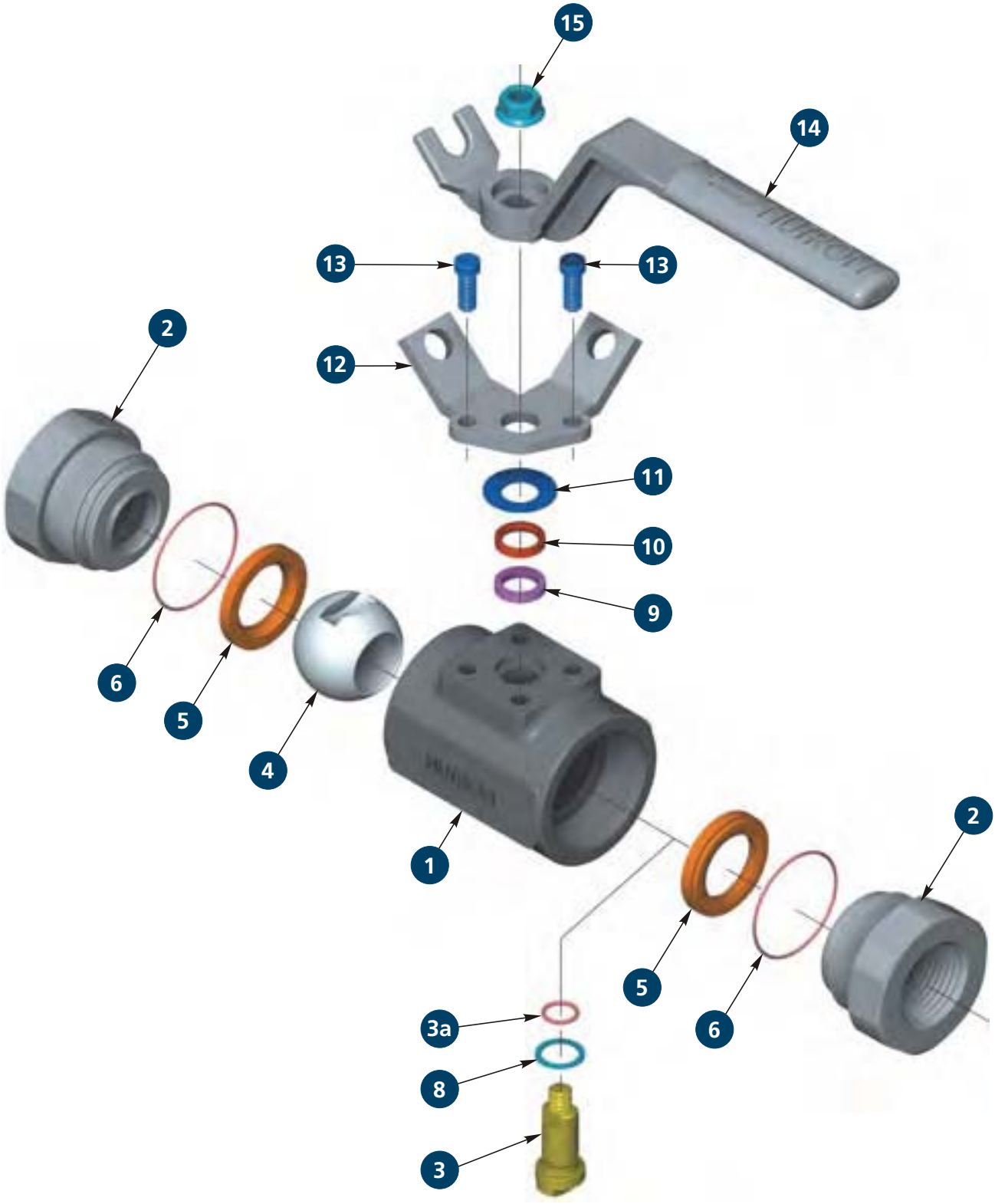
T3-F07S20SZ = Model T3, Full Port, 3/4 in. (20 mm), Female NPT, 2000 WOG, Sour Valve, Fire Safe.

T3-R10TS30B = Model T3, Reduced Port, 1 in. (25 mm), Female NPT x Socket Weld, 3000 WOG, Standard Valve.

* Consult Cooper Cameron Valves - NUTRON Sales Department for detailed valve style descriptions, full range of options, materials, actuation packages or for a particular special valve service application.

Cooper Cameron Valves reserves the right to substitute materials listed on the following pages with alternate materials for the designated service.

THREADED END CONNECTIONS



MATERIALS LIST - THREADED END CONNECTIONS

ITEM	PART	WORKING PRESSURE	STANDARD -20°F (-29°C)	SOUR -20°F (-29°C)
1	Body	All	ASTM A105	ASTM A105
2	End Caps	All	ASTM A105	ASTM A105
■ 3	Stem	2000 & 3000 4000 & 6000	ASTM A108, Plated ASTM A564 17-4PH	ASTM A564 17-4PH ASTM A564 17-4PH
■● 3a*	Stem O-Ring	All	Nitrile	Viton
■ 4	Ball	2000, 3000 & 4000 6000	Carbon Steel, Chrome Plated ASTM A564 17-4PH	ASTM A351 Gr. CF8M ASTM A564 17-4PH
■● 5	Seats	2000 3000 & 4000 6000	Teflon Delrin PEEK	Teflon Delrin PEEK
■● 6	Body O-Rings	All	Nitrile	Viton
■● 8	Thrust Washer	2000 3000 & 4000 6000	Teflon Delrin PEEK	Teflon Delrin PEEK
■● 9	Packing	All	Teflon	Teflon (Graphite 6000 psi)
10	Packing Follower	All	Carbon Steel, Plated	Stainless Steel
11	Belleville Washer	All	Carbon Steel	Stainless Steel
12	Gland Flange **	All	Carbon Steel, Plated	Carbon Steel, Plated
13	Cap Screws	All	Carbon Steel	Stainless Steel
14	Handle	All	Carbon Steel	Carbon Steel
15	Handle Nut	All	Carbon Steel, Plated	Carbon Steel, Plated

ITEM	PART	WORKING PRESSURE	SOUR & LOW TEMP -50°F (-46°C)	STAINLESS STEEL -50°F (-46°C)
1	Body	All	ASTM A350 LF2	ASTM A479 TYPE 316
2	End Caps	All	ASTM A350 LF2	ASTM A479 TYPE 316
■ 3	Stem	All	ASTM A564 17-4PH	ASTM A564 17-4PH with Nitriding
■● 3a*	Stem O-Ring	All	Viton	HSN
■ 4	Ball	2000 3000 & 4000 6000	ASTM A351 Gr. CF8M ASTM A351 Gr. CF8M ASTM A564 17-4PH	ASTM A351 Gr. CF8M ASTM A564 17-4PH ASTM A564 17-4PH
■● 5	Seats	2000 3000 & 4000 6000	Teflon Delrin PEEK	Teflon PEEK PEEK
■● 6	Body O-Rings	All	Viton	Teflon
■● 8	Thrust Washer	2000 3000 & 4000 6000	Teflon Delrin PEEK	Teflon PEEK PEEK
■● 9	Packing	All	Teflon (Graphite 6000 psi)	Teflon (Graphite 6000 psi)
10	Packing Follower	All	Stainless Steel	Stainless Steel
11	Belleville Washer	All	Stainless Steel	Stainless Steel
12	Gland Flange **	All	Carbon Steel, Plated	Carbon Steel, Plated
13	Cap Screws	All	Stainless Steel	Stainless Steel
14	Handle	All	Carbon Steel	Carbon Steel
15	Handle Nut	All	Carbon Steel, Plated	Carbon Steel, Plated

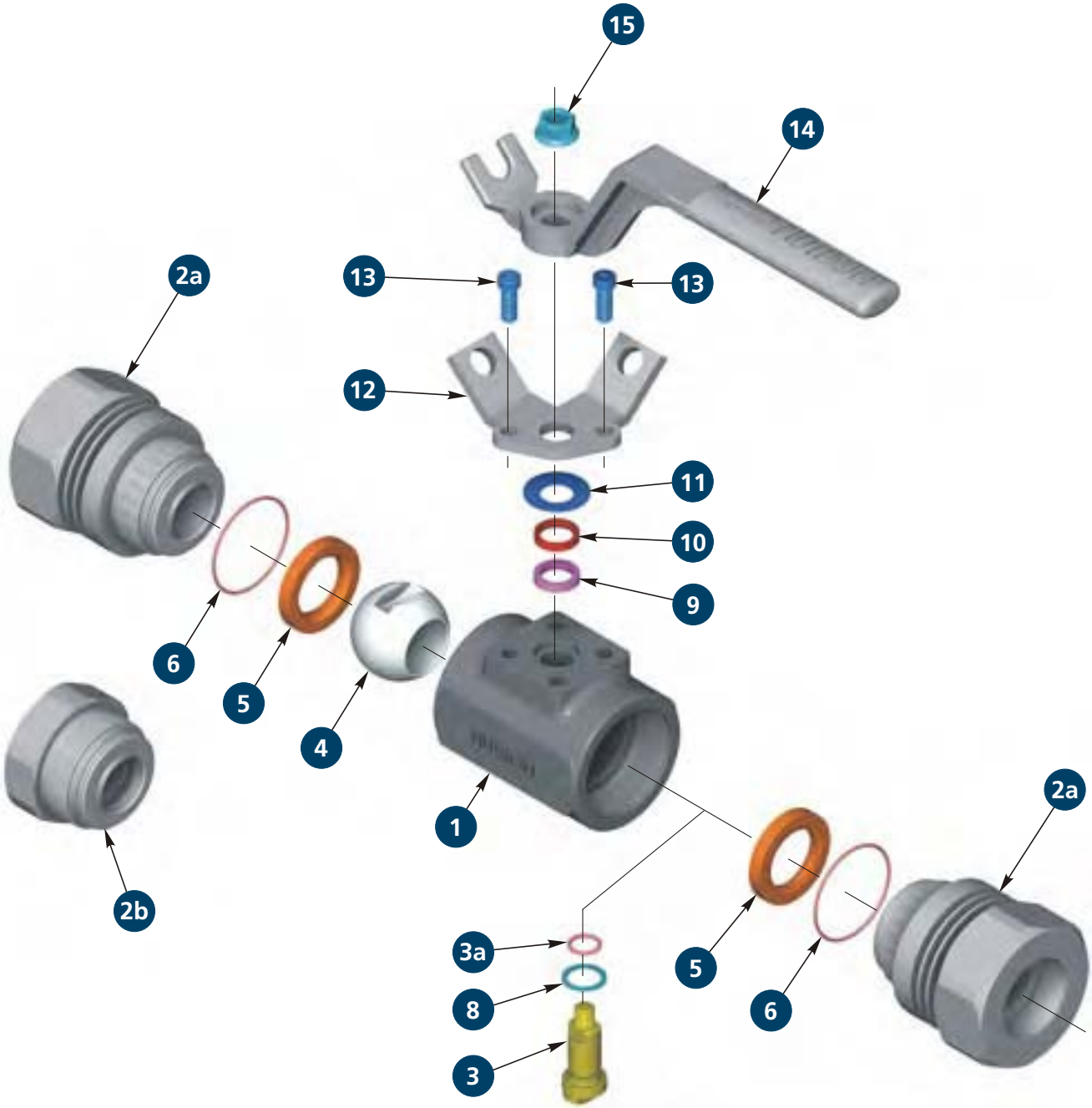
■ Major repair kit.
• Minor repair kit.

* Item 3a is only available on sizes 1 1/2 in. full port through 3 in. reduced port (40 mm through 80 mm) valves.

** Locking device is standard on 1/4 in. full port through 2 in. reduced port (8 mm through 50 mm) valves.

Note: Fire safe trim offered as standard whenever possible.
Consult Cooper Cameron Valves - NUTRON Sales Department for fire safe trim.

SOCKET WELD and
THREADED x SOCKET WELD END CONNECTIONS



MATERIALS LIST

SOCKET WELD and THREADED x SOCKET WELD END CONNECTIONS

ITEM	PART	WORKING PRESSURE	STANDARD -20°F (-29°C)	SOUR -20°F (-29°C)
1	Body	All	ASTM A105	ASTM A105
2a	End Caps - SW	All	ASTM A350 Gr. LF2	ASTM A350 Gr. LF2
2b	End Cap - NPT	All	ASTM A105	ASTM A105
■ 3	Stem	2000 & 3000 4000 & 6000	ASTM A108, Plated ASTM A564 17-4PH	ASTM A564 17-4PH ASTM A564 17-4PH
■● 3a*	Stem O-Ring	All	HSN	Viton
■ 4	Ball	2000 3000, 4000 & 6000	ASTM A351 Gr. CF8M ASTM A564 17-4PH	ASTM A351 Gr. CF8M ASTM A564 17-4PH
■● 5	Seats	2000 3000, 4000 & 6000	Teflon PEEK	Teflon PEEK
■● 6	Body O-Rings	All	Viton	Viton
■● 8	Thrust Washer	2000 3000, 4000 & 6000	Teflon PEEK	Teflon PEEK
■● 9	Packing	All	Teflon	Teflon (Graphite - 3000 thru 6000)
10	Packing Follower	All	Carbon Steel, Plated	Stainless Steel
11	Belleville Washer	All	Carbon Steel	Stainless Steel
12	Gland Flange **	All	Carbon Steel, Plated	Carbon Steel, Plated
13	Cap Screws	All	Carbon Steel	Stainless Steel
14	Handle	All	Carbon Steel	Carbon Steel
15	Handle Nut	All	Carbon Steel, Plated	Carbon Steel, Plated

ITEM	PART	WORKING PRESSURE	SOUR & LOW TEMP -50°F (-46°C)	STAINLESS STEEL -50°F (-46°C)
1	Body	All	ASTM A350 LF2	ASTM A479 TYPE 316
2a	End Caps - SW	All	ASTM A350 LF2	ASTM A479 TYPE 316 L
2b	End Cap - NPT	All	ASTM A350 LF2	ASTM A479 TYPE 316
■ 3	Stem	All	ASTM A564 17-4PH	ASTM A564 17-4PH with Nitriding
■● 3a*	Stem O-Ring	All	Viton	HSN
■ 4	Ball	2000 3000, 4000 & 6000	ASTM A351 Gr. CF8M ASTM A564 17-4PH	ASTM A351 Gr. CF8M ASTM A564 17-4PH
■● 5	Seats	2000 3000, 4000 & 6000	Teflon PEEK	Teflon PEEK
■● 6	Body O-Rings	All	Viton	Teflon
■● 8	Thrust Washer	2000 3000, 4000 & 6000	Teflon PEEK	Teflon PEEK
■● 9	Packing	All	Teflon (Graphite - 3000 thru 6000)	Teflon (Graphite - 3000 thru 6000)
10	Packing Follower	All	Stainless Steel	Stainless Steel
11	Belleville Washer	All	Stainless Steel	Stainless Steel
12	Gland Flange **	All	Carbon Steel, Plated	Carbon Steel, Plated
13	Cap Screws	All	Stainless Steel	Stainless Steel
14	Handle	All	Carbon Steel	Carbon Steel
15	Handle Nut	All	Carbon Steel, Plated	Carbon Steel, Plated

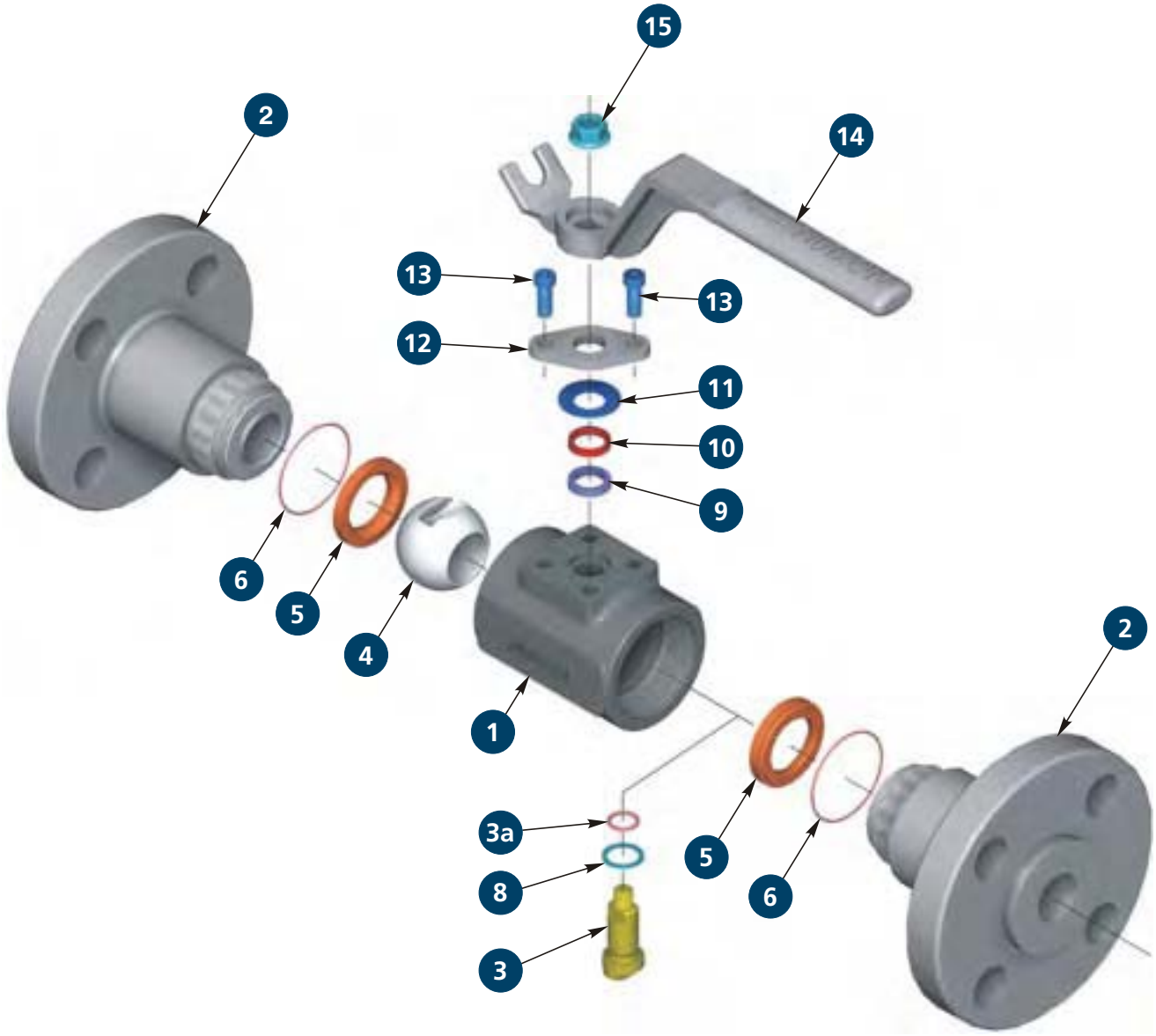
■ Major repair kit.
● Minor repair kit.

* Item 3a is only available on sizes 1 1/2 in. full port through 3 in. reduced port (40 mm through 80 mm) valves.

** Locking device is standard on 1/4 in. full port through 2 in. reduced port (8 mm through 50 mm) valves.

Note: Fire safe trim offered as standard whenever possible.
Consult Cooper Cameron Valves - NUTRON Sales Department for fire safe trim.

THREADED END CONNECTIONS



MATERIALS LIST - FLANGED END CONNECTIONS

ASME CLASS 150 THROUGH 2500 (PN 20 THROUGH 420)

ITEM	PART	ASME CLASS	STANDARD -20°F (-29°F)	SOUR -20°F (-29°C)
1	Body	All	ASTM A105	ASTM A105
2	End Caps	All	ASTM A105	ASTM A105
■ 3	Stem	150, 300, 600 & 900 1500 & 2500	ASTM A108, Plated ASTM A564 17-4PH	ASTM A564 17-4PH ASTM A564 17-4PH
■• 3a*	Stem O-Ring	All	Nitrile	Viton
■ 4	Ball	150 thru 1500 2500	Carbon Steel, Chrome Plated ASTM A564 17-4PH	ASTM A351 Gr. CF8M ASTM A564 17-4PH
■• 5	Seats 1/4 in. (8 mm) thru 1 1/4 in. (32 mm)	150 thru 1500 2500 150 thru 600	Delrin PEEK Teflon	Delrin PEEK Teflon
■• 6	Body O-Rings	All	Nitrile	Viton
■• 8	Thrust Washer 1/4 in. (8 mm) thru 1 1/4 in. (32 mm)	150 thru 1500 2500 150 thru 600	Delrin PEEK Teflon	Delrin PEEK Teflon
■• 9	Packing	All	Teflon	Teflon
10	Packing Follower	All	Carbon Steel, Plated	Stainless Steel
11	Belleville Washer	All	Carbon Steel	Stainless Steel
12	Gland Flange	All	Carbon Steel, Plated	Carbon Steel, Plated
13	Cap Screws	All	Carbon Steel	Stainless Steel
14	Handle	All	Carbon Steel	Carbon Steel
15	Handle Nut	All	Carbon Steel, Plated	Carbon Steel, Plated

ITEM	PART	ASME CLASS	SOUR & LOW TEMP -50°F (-46°C)	STAINLESS STEEL -50°F (-46°C)
1	Body	All	ASTM A350 LF2	ASTM A479 TYPE 316
2	End Caps	All	ASTM A350 LF2	ASTM A479 TYPE 316
■ 3	Stem	All	ASTM A564 17-4PH	ASTM A564 17-4PH with Nitriding
■• 3a*	Stem O-Ring	All	Viton	HSN
■ 4	Ball	150, 300 & 600 900 & 1500 2500	ASTM A351 Gr. CF8M ASTM A351 Gr. CF8M ASTM A564 17-4PH	ASTM A351 Gr. CF8M ASTM A564 17-4PH ASTM A564 17-4PH
■• 5	Seats 1/4 in. (8 mm) thru 1 1/4 in. (32 mm)	150, 300 & 600 900 & 1500 2500 150 thru 600	Delrin Delrin PEEK Teflon	Teflon PEEK PEEK N/A
■• 6	Body O-Rings	All	Viton	Teflon
■• 8	Thrust Washer	150, 300 & 600 900 & 1500 2500	Delrin Delrin PEEK	Teflon PEEK PEEK
■• 9	Packing	All	Teflon (Graphite - 2500 psi)	Teflon (Graphite - 1500 & 2500 psi)
10	Packing Follower	All	Stainless Steel	Stainless Steel
11	Belleville Washer	All	Stainless Steel	Stainless Steel
12	Gland Flange	All	Carbon Steel, Plated	Carbon Steel, Plated
13	Cap Screws	All	Stainless Steel	Stainless Steel
14	Handle	All	Carbon Steel	Carbon Steel
15	Handle Nut	All	Carbon Steel, Plated	Carbon Steel, Plated

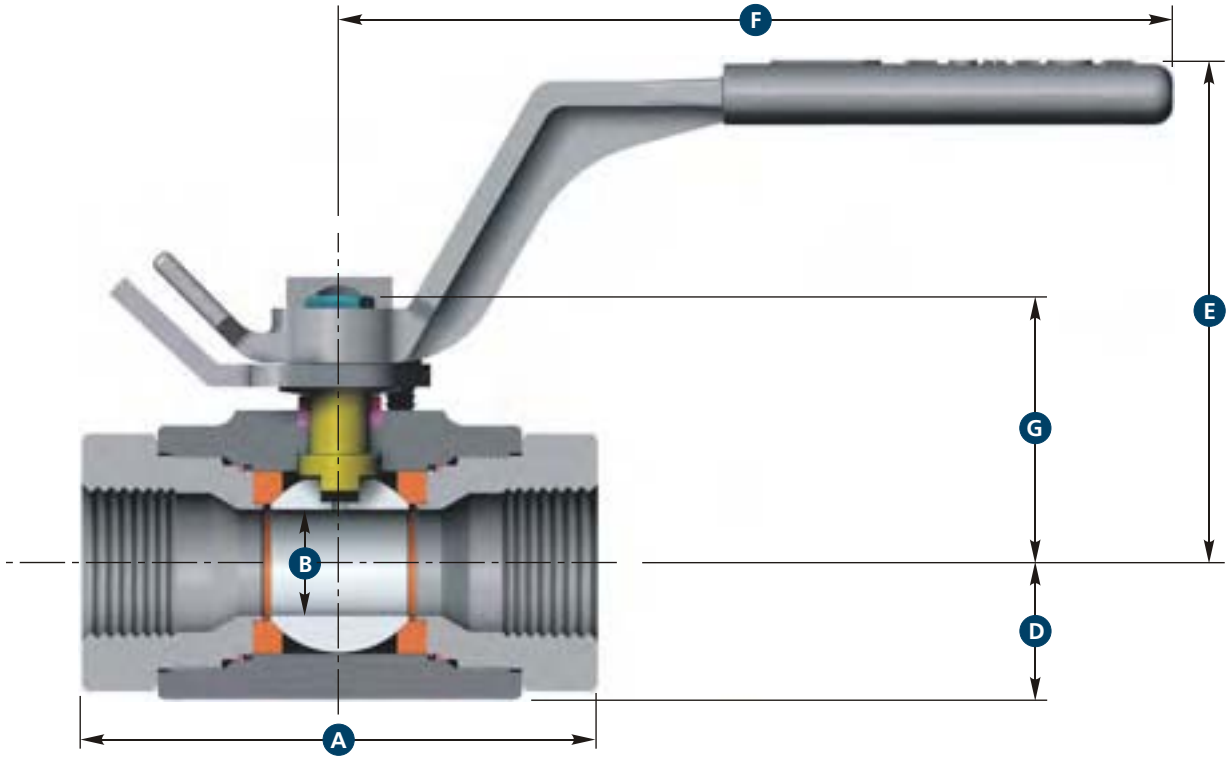
■ Major repair kit.
• Minor repair kit.

* Item 3a is only available on sizes 1 1/2 in. full port through 3 in. reduced port (40 mm through 80 mm) valves.

Note: Fire safe trim offered as standard whenever possible.
Consult Cooper Cameron Valves - NUTRON Sales Department for fire safe trim.

FLOATING BALL VALVES

FULL PORT - THREADED



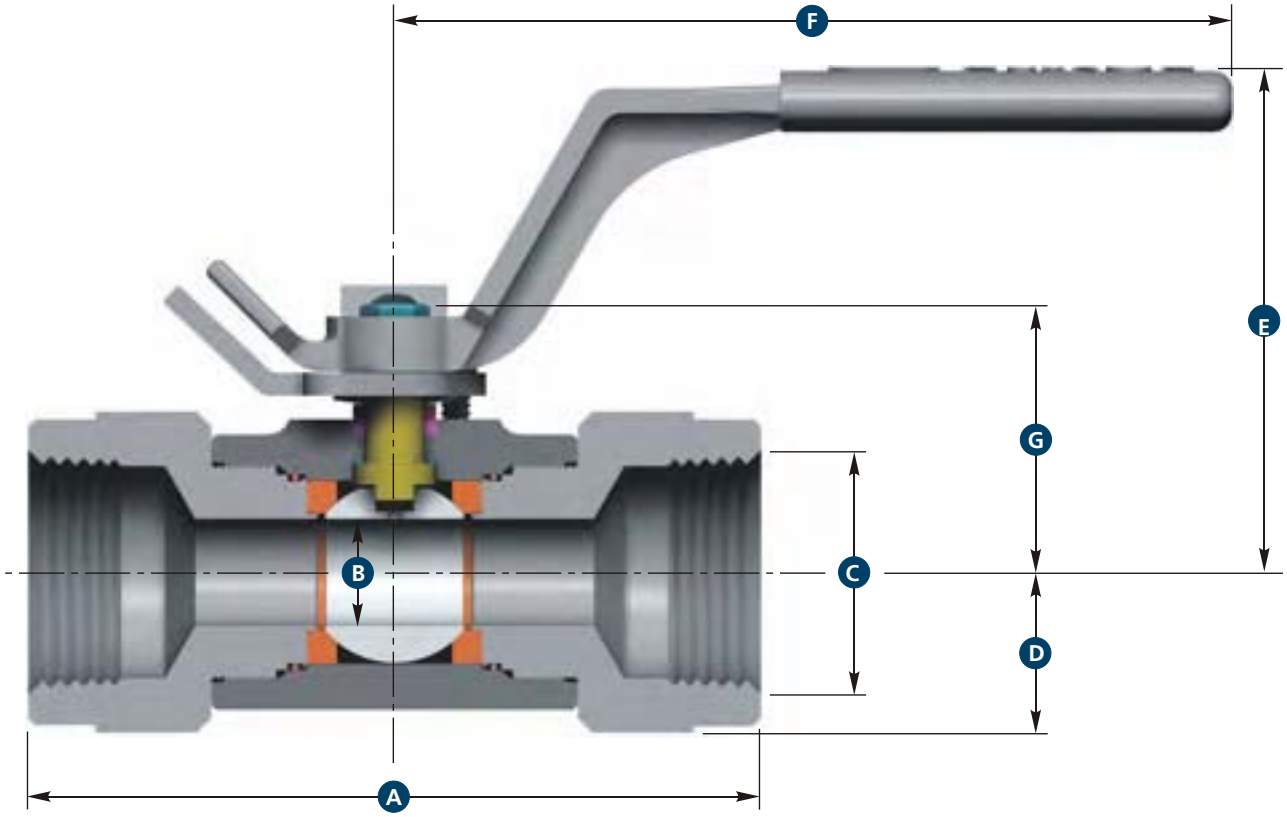
DIMENSIONS

SIZE in. (mm)	WOG	A	B	D	E	F	G	C_v	WEIGHT lb. (kg)
1/4 (8)	2000	3.88 (98)	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	9	2.5 (1.1)
	3000	3.88 (98)	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	9	2.5 (1.1)
	4000	3.88 (98)	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	9	2.5 (1.1)
	6000	3.88 (98)	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	9	2.5 (1.1)
3/8 (10)	2000	3.88 (98)	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	9	2.4 (1.0)
	3000	3.88 (98)	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	9	2.4 (1.0)
	4000	3.88 (98)	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	9	2.4 (1.0)
	6000	3.88 (98)	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	9	2.4 (1.0)
1/2 (15)	2000	3.88 (98)*	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	26	2.2 (0.9)
	3000	3.88 (98)*	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	26	2.2 (0.9)
	4000	3.88 (98)*	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	26	2.2 (0.9)
	6000	4.38 (111)	0.50 (13)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	26	2.2 (0.9)
3/4 (20)	2000	4.25 (108)	0.88 (22)	1.12 (29)	4.40 (112)	6.75 (172)	2.16 (55)	50	4.8 (2.1)
	3000	4.25 (108)	0.88 (22)	1.12 (29)	4.40 (112)	6.75 (172)	2.16 (55)	50	4.8 (2.1)
	4000	4.25 (108)	0.88 (22)	1.12 (29)	4.40 (112)	6.75 (172)	2.16 (55)	50	4.8 (2.1)
	6000	4.25 (108)	0.88 (22)	1.50 (38)	4.40 (112)	6.75 (172)	2.16 (55)	50	6.5 (2.9)
1 1/2 (40)	2000	6.25 (159)	1.50 (38)	1.98 (50)	5.62 (143)	11.00 (279)	3.52 (89)	260	18.0 (8.1)
	3000	6.25 (159)	1.50 (38)	1.98 (50)	5.62 (143)	11.00 (279)	3.52 (89)	260	18.0 (8.1)
	4000	6.25 (159)	1.50 (38)	1.98 (50)	5.62 (143)	11.00 (279)	3.52 (89)	260	18.0 (8.1)
	6000	6.25 (159)	1.50 (38)	1.98 (50)	5.62 (143)	11.00 (279)	3.52 (89)	260	18.0 (8.1)
2 (50)	2000	6.25 (159)	2.00 (51)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	480	30.0 (13.6)
	3000	6.25 (159)	2.00 (51)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	480	30.0 (13.6)
	4000	6.25 (159)	2.00 (51)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	480	30.0 (13.6)
	6000	6.25 (159)	2.00 (51)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	480	30.0 (13.6)
3 (80)	1000	9.70 (246)	3.00 (76)	3.50 (89)	8.26 (210)	23.88 (607)	5.37 (137)	1300	67.0 (30.4)
	2000	9.70 (246)	3.00 (76)	3.50 (89)	8.26 (210)	23.88 (607)	5.37 (137)	1300	67.0 (30.4)

* 4.38 in. (111 mm) for Stainless Steel valves.

NOTE: " A " dimension to be within ± 0.062 in. (1.5 mm).

REDUCED PORT - THREADED

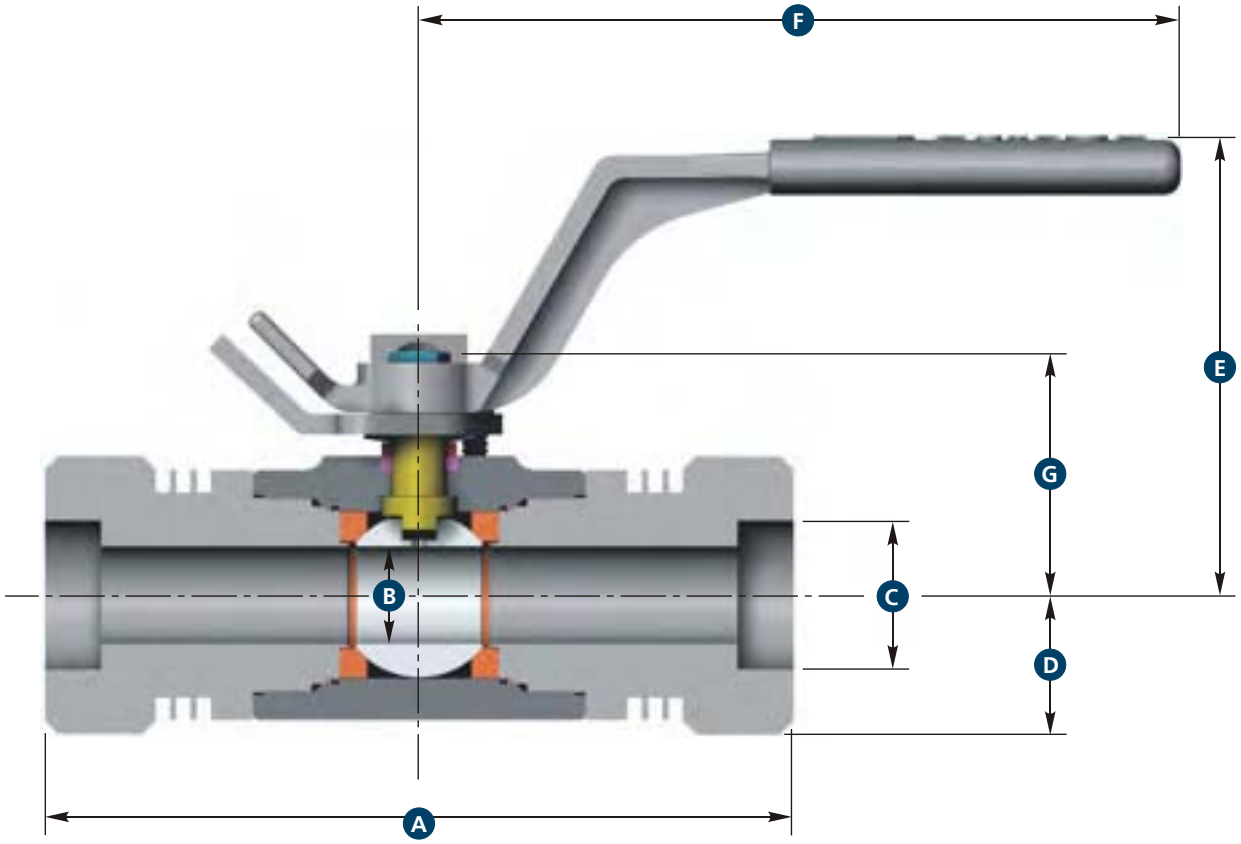


DIMENSIONS

SIZE in. (mm)	WOG	A	B	C	D	E	F	G	C_v	WEIGHT lb. (kg)
3/4 (20)	2000	4.38 (111)	0.50 (13)	0.75 (19)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	14	2.5 (1.1)
	3000	4.38 (111)	0.50 (13)	0.75 (19)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	14	2.5 (1.1)
	4000	4.38 (111)	0.50 (13)	0.75 (19)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	14	2.5 (1.1)
	6000	4.38 (111)	0.50 (13)	0.75 (19)	0.82 (21)	3.29 (83)	4.82 (122)	1.73 (44)	14	2.5 (1.1)
1 (25)	2000	4.25 (108)	0.88 (22)	1.00 (25)	1.12 (28)	4.40 (112)	6.75 (172)	2.16 (55)	35	4.5 (2.0)
	3000	4.25 (108)	0.88 (22)	1.00 (25)	1.12 (28)	4.40 (112)	6.75 (172)	2.16 (55)	35	4.5 (2.0)
	4000	4.25 (108)	0.88 (22)	1.00 (25)	1.12 (28)	4.40 (112)	6.75 (172)	2.16 (55)	35	4.5 (2.0)
	6000	5.25 (133)	0.88 (22)	1.00 (25)	1.50 (38)	4.40 (112)	6.75 (172)	2.16 (55)	35	7.5 (3.4)
1 1/4 (32)	2000	6.00 (152)	0.88 (22)	1.25 (32)	1.30 (33)	4.40 (112)	6.75 (172)	2.16 (55)	35	8.0 (3.6)
	3000	6.00 (152)	0.88 (22)	1.25 (32)	1.30 (33)	4.40 (112)	6.75 (172)	2.16 (55)	35	8.0 (3.6)
2 (50)	2000	6.25 (159)	1.50 (38)	2.00 (51)	1.98 (50)	5.62 (143)	11.00 (279)	3.52 (89)	100	17.5 (7.9)
	3000	6.25 (159)	1.50 (38)	2.00 (51)	1.98 (50)	5.62 (143)	11.00 (279)	3.52 (89)	100	17.5 (7.9)
	4000	6.25 (159)	1.50 (38)	2.00 (51)	1.98 (50)	5.62 (143)	11.00 (279)	3.52 (89)	100	17.5 (7.9)
	6000	7.25 (184)	1.50 (38)	2.00 (51)	1.98 (50)	5.62 (143)	11.00 (279)	3.52 (89)	100	21.0 (9.5)
3 (80)	2000	10.0 (254)	2.00 (51)	3.00 (76)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	420	39.0 (17.6)
	3000	10.0 (254)	2.00 (51)	3.00 (76)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	420	39.0 (17.6)
	4000	10.0 (254)	2.00 (51)	3.00 (76)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	420	39.0 (17.6)
	6000	10.0 (254)	2.00 (51)	3.00 (76)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	420	48.0 (21.8)
4 (100)	1000	9.5 (241)	3.00 (76)	4.00 (102)	3.50 (89)	8.26 (210)	23.88 (607)	5.37 (137)	770	80.0 (36.3)

NOTE: " A " dimension to be within ± 0.062 in. (1.5 mm).

FULL PORT - SOCKET WELD and THREADED x SOCKET WELD



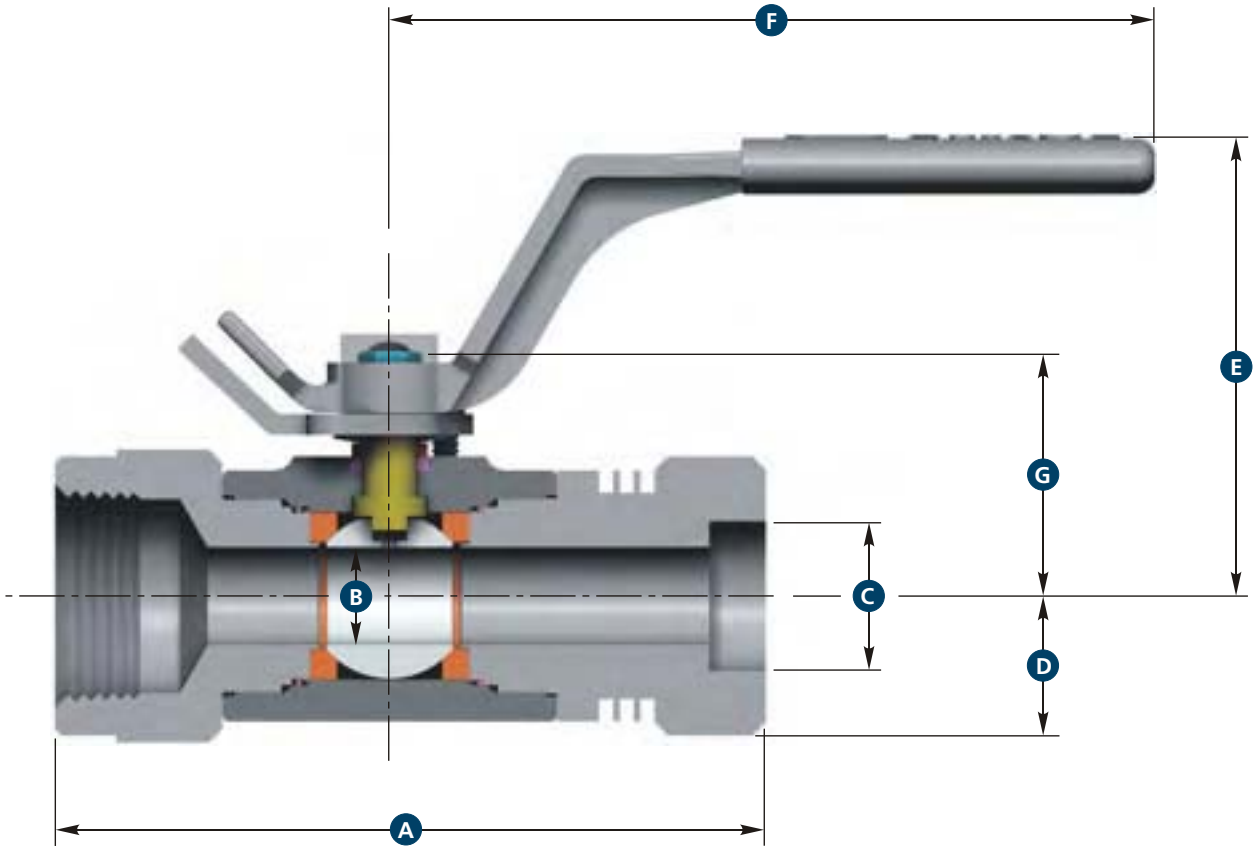
DIMENSIONS

SIZE in. (mm)	WOG	A FNPT x SW	A SW	B	C FNPT x SW	C SW	D	E	F	G	C_v	WEIGHT lb. (kg) FNPT x SW	WEIGHT lb. (kg) SW
1/2 (15)	2000	4.44 (113)*	5.00 (127)	0.50 (13)	0.50 (13)	0.86 (22)	0.94 (24)	3.29 (83)	4.82 (122)	1.73 (44)	26	3.5 (1.5)	4.8 (2.1)
	3000	4.44 (113)*	5.00 (127)	0.50 (13)	0.50 (13)	0.86 (22)	0.94 (24)	3.29 (83)	4.82 (122)	1.73 (44)	26	3.5 (1.5)	4.8 (2.1)
	4000	4.44 (113)*	5.00 (127)	0.50 (13)	0.50 (13)	0.86 (22)	0.94 (24)	3.29 (83)	4.82 (122)	1.73 (44)	26	3.5 (1.5)	4.8 (2.1)
	6000	4.69 (119)	5.00 (127)	0.50 (13)	0.50 (13)	0.86 (22)	0.94 (24)	3.29 (83)	4.82 (122)	1.73 (44)	26	3.5 (1.5)	4.8 (2.1)
3/4 (20)	2000	5.50 (140)	6.75 (172)	0.88 (22)	0.75 (19)	1.07 (27)	1.25 (32)	4.40 (112)	6.75 (172)	2.16 (55)	50	5.7 (2.5)	6.4 (2.9)
	3000	5.50 (140)	6.75 (172)	0.88 (22)	0.75 (19)	1.07 (27)	1.25 (32)	4.40 (112)	6.75 (172)	2.16 (55)	50	5.7 (2.5)	6.4 (2.9)
	4000	5.50 (140)	6.75 (172)	0.88 (22)	0.75 (19)	1.07 (27)	1.25 (32)	4.40 (112)	6.75 (172)	2.16 (55)	50	5.7 (2.5)	6.4 (2.9)
	6000	5.50 (140)	6.75 (172)	0.88 (22)	0.75 (19)	1.07 (27)	1.50 (38)	4.40 (112)	6.75 (172)	2.16 (55)	50	8.6 (3.9)	9.2 (4.1)
1 1/2 (40)	2000	7.40 (188)	8.54 (217)	1.50 (38)	1.50 (38)	1.92 (49)	2.50 (64)	5.62 (143)	11.00 (279)	3.52 (89)	260	21.9 (9.9)	25.7 (11.6)
	3000	7.40 (188)	8.54 (217)	1.50 (38)	1.50 (38)	1.92 (49)	2.50 (64)	5.62 (143)	11.00 (279)	3.52 (89)	260	21.9 (9.9)	25.7 (11.6)
	4000	7.40 (188)	8.54 (217)	1.50 (38)	1.50 (38)	1.92 (49)	2.50 (64)	5.62 (143)	11.00 (279)	3.52 (89)	260	21.9 (9.9)	25.7 (11.6)
	6000	7.40 (188)	8.54 (217)	1.50 (38)	1.50 (38)	1.92 (49)	2.50 (64)	5.62 (143)	11.00 (279)	3.52 (89)	260	21.9 (9.9)	25.7 (11.6)
2 (50)	2000	9.50 (241)	12.75 (324)	2.00 (51)	2.00 (51)	2.41 (61)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	480	38.3 (17)	46.5 (21.0)
	3000	9.50 (241)	12.75 (324)	2.00 (51)	2.00 (51)	2.41 (61)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	480	38.3 (17)	46.5 (21.0)
	4000	9.50 (241)	12.75 (324)	2.00 (51)	2.00 (51)	2.41 (61)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	480	38.3 (17)	46.5 (21.0)
	6000	9.50 (241)	12.75 (324)	2.00 (51)	2.00 (51)	2.41 (61)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	480	38.3 (17)	46.5 (21.0)

* 4.69 in. (119.1 mm) for Stainless Steel valves.

NOTE: " A " dimension to be within ± 0.062 in. (1.5 mm).

REDUCED PORT - SOCKET WELD and THREADED x SOCKET WELD

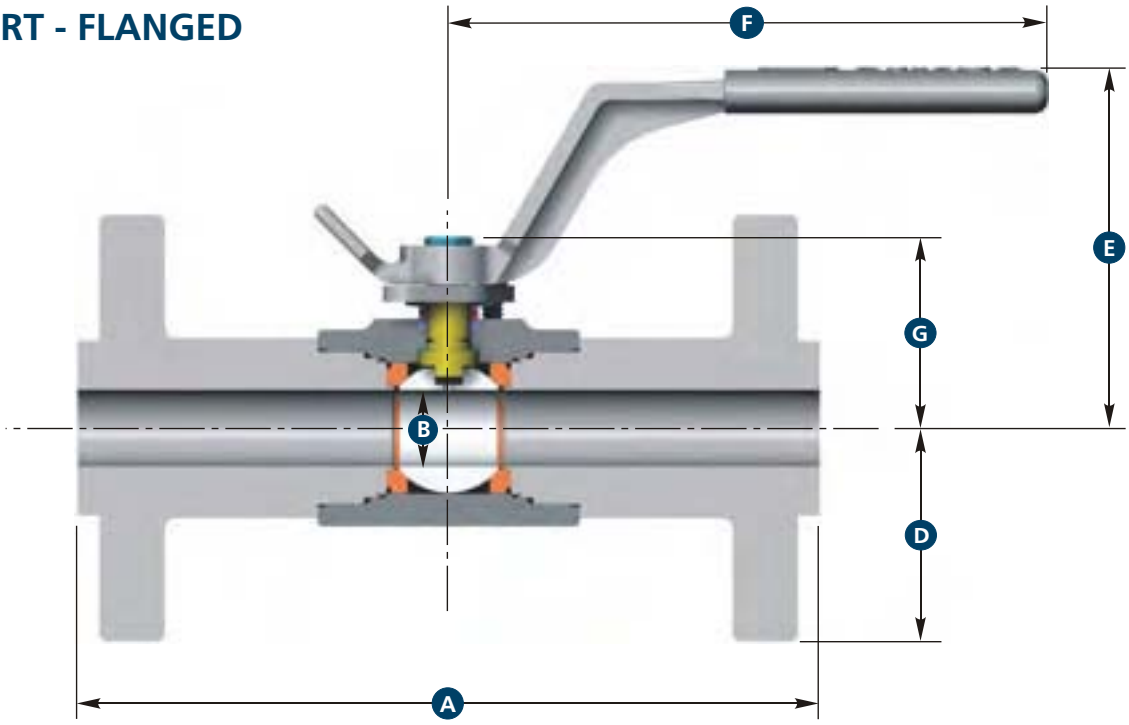


DIMENSIONS

SIZE in. (mm)	WOG	A FNPT x SW	A SW	B	C FNPT x SW	C SW	D	E	F	G	C_v	WEIGHT lb. (kg) FNPT x SW	WEIGHT lb. (kg) SW
3/4 (20)	2000	5.56 (141	6.75 (172)	0.50 (13)	0.75 (19)	1.07 (27)	1.19 (30)	3.29 (83)	4.82 (122)	1.73 (44)	14	3.5 (1.5)	4.4 (1.9)
	3000	5.56 (141)	6.75 (172)	0.50 (13)	0.75 (19)	1.07 (27)	1.19 (30)	3.29 (83)	4.82 (122)	1.73 (44)	14	3.5 (1.5)	4.4 (1.9)
	4000	5.56 (141)	6.75 (172)	0.50 (13)	0.75 (19)	1.07 (27)	1.19 (30)	3.29 (83)	4.82 (122)	1.73 (44)	14	3.5 (1.5)	4.4 (1.9)
	6000	5.56 (141)	6.75 (172)	0.50 (13)	0.75 (19)	1.07 (27)	1.19 (30)	3.29 (83)	4.82 (122)	1.73 (44)	14	3.5 (1.5)	4.4 (1.9)
1 (25)	2000	5.50 (140)*	6.75 (172)	0.88 (22)	1.00 (25)	1.34 (34)	1.25 (32)	4.40 (112)	6.75 (172)	2.16 (55)	35	5.4 (2.4)	6.2 (2.8)
	3000	5.50 (140)*	6.75 (172)	0.88 (22)	1.00 (25)	1.34 (34)	1.25 (32)	4.40 (112)	6.75 (172)	2.16 (55)	35	5.4 (2.4)	6.2 (2.8)
	4000	5.50 (140)*	6.75 (172)	0.88 (22)	1.00 (25)	1.34 (34)	1.25 (32)	4.40 (112)	6.75 (172)	2.16 (55)	35	5.4 (2.4)	6.2 (2.8)
	6000	6.00 (152)	6.75 (172)	0.88 (22)	1.00 (25)	1.34 (34)	1.50 (38)	4.40 (112)	6.75 (172)	2.16 (55)	35	8.3 (3.7)	9.0 (4.0)
2 (50)	2000	7.40 (188)	8.55 (217)	1.50 (38)	2.00 (51)	2.42 (62)	2.50 (64)	5.62 (143)	11.00 (280)	3.52 (90)	100	22.5 (10.2)	26.0 (11.7)
	3000	7.40 (188)	8.55 (217)	1.50 (38)	2.00 (51)	2.42 (62)	2.50 (64)	5.62 (143)	11.00 (280)	3.52 (90)	100	22.5 (10.2)	26.0 (11.7)
	4000	7.40 (188)	8.55 (217)	1.50 (38)	2.00 (51)	2.42 (62)	2.50 (64)	5.62 (143)	11.00 (280)	3.52 (90)	100	22.5 (10.2)	26.0 (11.7)
	6000	7.90 (201)	8.55 (217)	1.50 (38)	2.00 (51)	2.42 (62)	2.50 (64)	5.62 (143)	11.00 (280)	3.52 (90)	100	22.5 (10.2)	26.0 (11.7)
3 (80)	2000	11.38 (289)	12.75 (324)	2.00 (51)	3.00 (76)	3.55 (90)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	420	49.0 (22.2)	60.0 (27.2)
	3000	11.38 (289)	12.75 (324)	2.00 (51)	3.00 (76)	3.55 (90)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	420	49.0 (22.2)	60.0 (27.2)
	4000	11.38 (289)	12.75 (324)	2.00 (51)	3.00 (76)	3.55 (90)	2.53 (64)	6.96 (177)	11.88 (302)	4.83 (123)	420	49.0 (22.2)	60.0 (27.2)

* 6.00 in. (152 mm) for Stainless Steel valves. NOTE: " A " dimension to be within ± 0.062 in. (1.5 mm).

FULL PORT - FLANGED



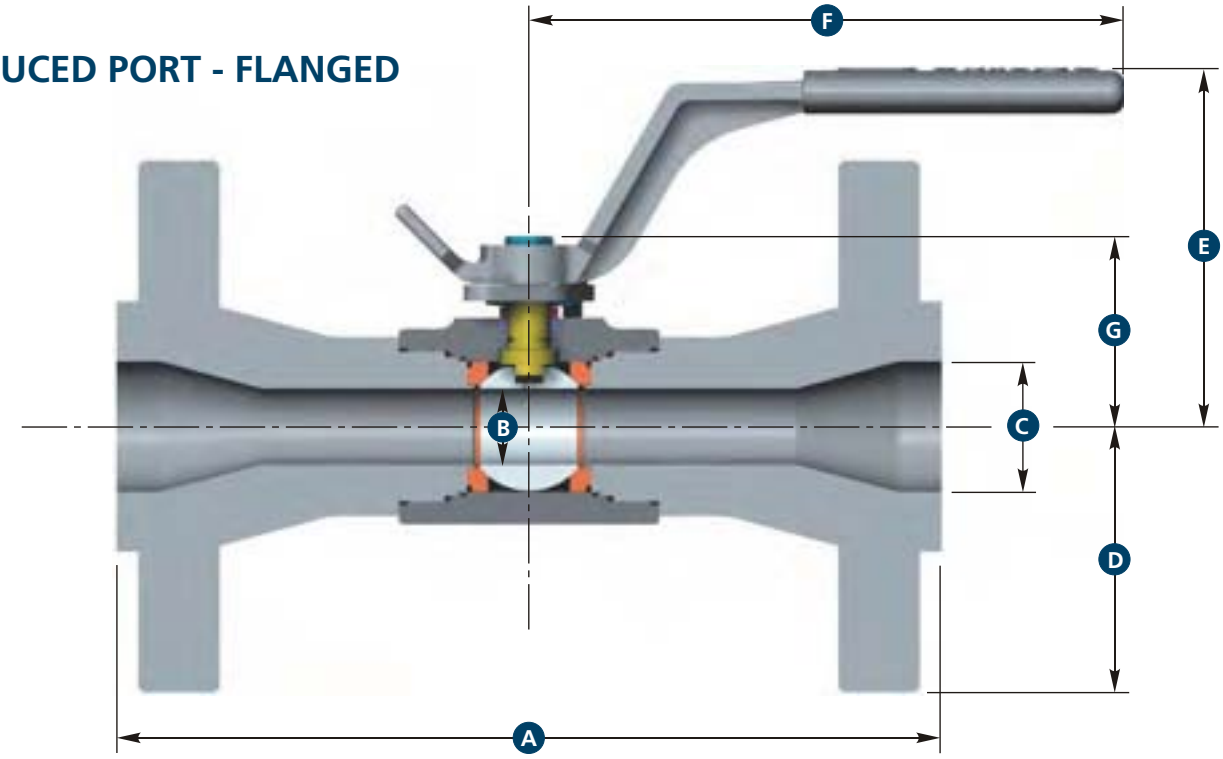
DIMENSIONS

SIZE in. (mm)	ASME CLASS	(PN)	A RF	A RTJ	B	D	E	F	G	C_v	WEIGHT lb. (kg)
1/2 (15)	150	(20)	4.25 (108)	-	0.50 (13)	1.75 (45)	3.29 (83)	4.82 (122)	1.73 (44)	26	4.0 (1.8)
	300	(50)	5.50 (140)	5.94 (151)	0.50 (13)	1.87 (48)	3.29 (83)	4.82 (122)	1.73 (44)	26	4.4 (1.9)
	600	(100)	6.50 (165)	6.50 (165)	0.50 (13)	1.87 (48)	3.29 (83)	4.82 (122)	1.73 (44)	26	5.5 (2.4)
	900/1500	(150/250)	8.50 (216)	8.50 (216)	0.50 (13)	2.37 (60)	5.73 (146)	8.00 (203)	1.73 (44)	26	11.0 (4.9)
	2500	(420)	10.37 (264)	10.37 (264)	0.50 (13)	2.63 (67)	5.73 (146)	8.00 (203)	1.73 (44)	26	17.5 (7.9)
3/4 (20)	150	(20)	4.62 (117)	-	0.88 (22)	1.94 (49)	4.40 (112)	6.75 (172)	2.16 (55)	50	10.3 (4.6)
	300	(50)	6.00 (152)	6.50 (165)	0.88 (22)	2.31 (59)	4.40 (112)	6.75 (172)	2.16 (55)	50	10.3 (4.6)
	600	(100)	7.50 (191)	7.50 (191)	0.88 (22)	2.31 (59)	4.40 (112)	6.75 (172)	2.16 (55)	50	13.3 (6.0)
	900/1500	(150/250)	9.00 (229)	9.00 (229)	0.88 (22)	2.56 (65)	4.40 (112)	6.75 (172)	2.16 (55)	50	16.3 (7.3)
	2500	(420)	10.75 (273)	10.75 (273)	0.88 (22)	2.75 (70)	6.20 (158)	8.12 (206)	2.16 (55)	50	22.8 (10.3)
1 1/2 (40)	150	(20)	6.50 (165)	7.00 (178)	1.50 (38)	2.50 (64)	5.62 (143)	11.00 (279)	3.52 (89)	260	21.0 (9.5)
	300	(50)	7.50 (191)	8.00 (203)	1.50 (38)	3.06 (78)	5.62 (143)	11.00 (279)	3.52 (89)	260	29.0 (13.1)
	600	(100)	9.50 (241)	9.50 (241)	1.50 (38)	3.06 (78)	5.62 (143)	11.00 (279)	3.52 (89)	260	32.5 (14.7)
	900/1500	(150/250)	12.00 (305)	12.00 (305)	1.50 (38)	3.50 (89)	5.62 (143)	11.00 (279)	3.52 (89)	260	46.0 (20.8)
	2500	(420)	15.12 (384)	15.25 (387)	1.50 (38)	4.00 (102)	5.62 (143)	11.00 (279)	3.52 (89)	260	74.0 (33.5)
2 (50)	150	(20)	7.00 (178)	7.50 (191)	2.00 (51)	3.00 (76)	6.96 (177)	11.88 (302)	4.83 (123)	480	36.2 (16.4)
	300	(50)	8.50 (216)	9.12 (232)	2.00 (51)	3.25 (83)	6.96 (177)	11.88 (302)	4.83 (123)	480	43.3 (19.6)
	600	(100)	11.50 (292)	11.62 (295)	2.00 (51)	3.25 (83)	6.96 (177)	11.88 (302)	4.83 (123)	480	51.5 (23.3)
	900/1500	(150/250)	14.50 (368)	14.62 (371)	2.00 (51)	4.25 (108)	6.96 (177)	11.88 (302)	4.83 (123)	480	81.0 (36.7)
	2500	(420)	17.75 (451)	17.87 (454)	2.00 (51)	4.62 (118)	6.96 (177)	11.88 (302)	4.83 (123)	480	121.0 (54.8)
3 (80)	150	(20)	8.00 (203)	8.50 (216)	3.00 (76)	3.75 (95)	8.26 (210)	23.89 (607)	5.37 (137)	1300	58.0 (26.3)
	300	(50)	11.12 (282)	11.75 (299)	3.00 (76)	4.12 (105)	8.26 (210)	23.89 (607)	5.37 (137)	1300	77.5 (35.1)

NOTE: " A " dimension to be within ± 0.062 in. (1.5 mm).

FLOATING BALL VALVE

REDUCED PORT - FLANGED



DIMENSIONS

SIZE in. (mm)	ASME CLASS	(PN)	A RF	A RTJ	B	C	D	E	F	G	C_v	WEIGHT lb. (kg)
3/4 (20)	150	(20)	4.63 (118)	-	0.50 (13)	0.75 (19)	1.94 (49)	3.29 (83)	4.82 (122)	1.73 (44)	14	5.0 (2.2)
	300	(50)	6.00 (152)	6.50 (165)	0.50 (13)	0.75 (19)	2.31 (59)	3.29 (83)	4.82 (122)	1.73 (44)	14	7.0 (3.1)
	600	(100)	7.50 (191)	7.50 (191)	0.50 (13)	0.75 (19)	2.31 (59)	3.29 (83)	4.82 (122)	1.73 (44)	14	9.0 (4.0)
	900/1500	(150/250)	9.00 (229)	9.00 (229)	0.50 (13)	0.75 (19)	2.56 (65)	5.73 (146)	8.00 (203)	1.73 (44)	14	14.0 (6.3)
	2500	(420)	10.75 (273)	10.75 (273)	0.50 (13)	0.75 (19)	2.75 (70)	5.73 (146)	8.00 (203)	1.73 (44)	14	20.5 (9.2)
1 (25)	150	(20)	5.00 (127)	5.50 (140)	0.88 (22)	1.00 (25)	2.12 (54)	4.40 (112)	6.75 (172)	2.16 (55)	35	8.0 (3.6)
	300	(50)	6.50 (165)	7.00 (178)	0.88 (22)	1.00 (25)	2.44 (62)	4.40 (112)	6.75 (172)	2.16 (55)	35	11.5 (5.2)
	600	(100)	8.50 (216)	8.50 (216)	0.88 (22)	1.00 (25)	2.44 (62)	4.40 (112)	6.75 (172)	2.16 (55)	35	13.8 (6.2)
	900/1500	(150/250)	10.00 (254)	10.00 (254)	0.88 (22)	1.00 (25)	2.94 (75)	4.40 (112)	6.75 (172)	2.16 (55)	35	23.0 (10.4)
	2500	(420)	12.12 (308)	12.12 (308)	0.88 (22)	1.00 (25)	3.13 (79)	6.20 (158)	8.12 (206)	2.16 (55)	35	32.0 (14.5)
2 (50)	150	(20)	7.00 (178)	7.50 (191)	1.50 (38)	2.00 (51)	3.00 (76)	5.62 (143)	11.00 (279)	3.52 (89)	100	27.0 (12.2)
	300	(50)	8.50 (216)	9.12 (232)	1.50 (38)	2.00 (51)	3.25 (83)	5.62 (143)	11.00 (279)	3.52 (89)	100	32.0 (14.5)
	600	(100)	11.50 (292)	11.62 (295)	1.50 (38)	2.00 (51)	3.25 (83)	5.62 (143)	11.00 (279)	3.52 (89)	100	38.0 (17.2)
	900/1500	(150/250)	14.50 (368)	14.62 (371)	1.50 (38)	2.00 (51)	4.25 (108)	5.62 (143)	11.00 (279)	3.52 (89)	100	72.0 (32.6)
	2500	(420)	17.75 (451)	17.87 (454)	1.50 (38)	2.00 (51)	4.62 (118)	5.62 (143)	11.00 (279)	3.52 (89)	100	107.5 (48.7)
3 (80)	150	(20)	8.00 (203)	8.50 (216)	2.00 (51)	3.00 (76)	3.75 (95)	6.96 (177)	11.88 (302)	4.83 (123)	420	50.0 (22.6)
	300	(50)	11.12 (282)	11.75 (299)	2.00 (51)	3.00 (76)	4.12 (105)	6.96 (177)	11.88 (302)	4.83 (123)	420	63.2 (28.6)
	600	(100)	14.00 (356)	14.12 (359)	2.00 (51)	3.00 (76)	4.12 (105)	6.96 (177)	11.88 (302)	4.83 (123)	420	76.0 (34.4)
	900	(150)	15.00 (381)	15.12 (384)	2.00 (51)	3.00 (76)	4.75 (121)	6.96 (177)	11.88 (302)	4.83 (123)	420	97.0 (43.9)
	1500	(250)	18.50 (470)	18.62 (473)	2.00 (51)	3.00 (76)	5.25 (133)	6.96 (177)	11.88 (302)	4.83 (123)	420	134.0 (60.7)
	2500	(420)	22.75 (578)	23.00 (584)	2.00 (51)	3.00 (76)	6.00 (152)	7.77 (197)	23.89 (607)	4.83 (123)	420	223.0 (101.1)
4 (100)	150	(20)	9.00 (229)	9.50 (241)	3.00 (76)	4.00 (102)	4.50 (114)	8.26 (210)	23.89 (607)	5.37 (137)	770	72.5 (32.8)
	300	(50)	12.00 (305)	12.63 (321)	3.00 (76)	4.00 (102)	5.00 (127)	8.26 (210)	23.89 (607)	5.37 (137)	770	99.0 (44.9)

NOTE: " A " dimension to be within ± 0.062 in. (1.5 mm).

STANDARD FEATURES

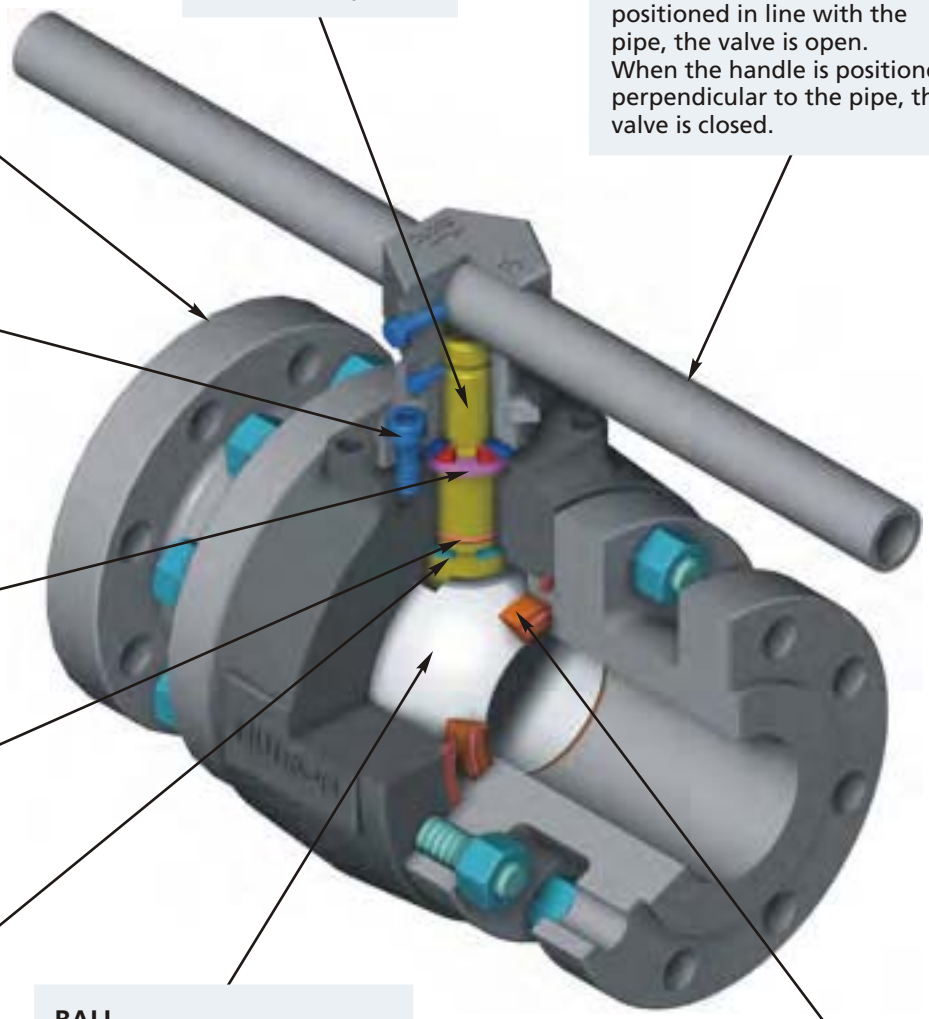
MODEL B3

BODY CONSTRUCTION
Forged steel bolted construction.
A machined pad area is drilled and tapped for actuation as a standard.
Bolted construction allows for combinations of end connections.

STEM
Blowout proof stem is back-seated through the valve body.

HANDLE
Rugged adjustable pipe handle. Handle position indicates flow position. When the handle is positioned in line with the pipe, the valve is open.
When the handle is positioned perpendicular to the pipe, the valve is closed.

CAP SCREWS
Dual purpose;
allows for easy stem packing adjustment without handle removal while providing a stop for the handle.



PACKING
Self adjusting by means of a Belleville washer.
Allows for long service life before manual packing adjustment is necessary.

STEM SEAL
O-Ring installed on stem shaft.

THRUST WASHER
Acts as a bearing between the body and stem.

BALL
The floating ball design allows for positive shut off in either flow direction.
Includes pressure equalization hole to prevent trapping of pressure in the body cavity.

SEATS
Materials available are Teflon, Delrin, PEEK and Devlon.

MODEL B3 SIZES AVAILABLE

ASME CLASS (PN)		150 (20)	300 (50)	600 (100)	900 (150)	1500 (250)
Full Port	in. (mm)	2 thru 4 (50 thru 100)	2 thru 4 (50 thru 100)	1 1/2 thru 3 (40 thru 80)	1 1/2 thru 3 (40 thru 80)	1 1/2 thru 3 (40 thru 80)
Reduced Port		3 thru 6 (80 thru 150)	3 thru 6 (80 thru 150)	2 thru 4 (50 thru 100)	2 thru 4 (50 thru 100)	2 thru 4 (50 thru 100)
WOG (psi)				**2000**		**4000**
Full Port	in. (mm)			3 (80)		3 (80)
Reduced Port				4 (100)		

ORDERING INFORMATION

How to develop figure numbers:

MODEL
B3 - 3 PIECE BOLTED

BORE
F - FULL PORT
R - REDUCED PORT

SIZE in. (mm)
15 - 1 1/2 (40)
20 - 2 (50)
30 - 3 (80)
40 - 4 (100)
60 - 6 (150)

STYLE*
A - STAINLESS STEEL -50°F (-46°C)
B - STANDARD
D - FULL STAINLESS STEEL -150°F (-100°C)
E - STEAM HIGH TEMP/ STAINLESS STEEL
F - HIGH TEMP/SOUR LOW TEMP
G - STEAM HIGH TEMP/SOUR
H - HIGH TEMP/SOUR
J - HIGH TEMP/ STAINLESS STEEL
L - SOUR LOW TEMP -50°F (-46°C)
N - MONEL STEEL
Q - DUPLEX STEEL
S - SOUR - 20°F (-29°C)

FIRE SAFE

B3 - R 40 R 06 L Z

END CONNECTION
A - RF SMOOTH FACE
B - BW SCH 40
C - BW SCH 80
D - BW SCH 160
E - BW SCH XXH
J -RTJ
R - RAISED FACE
S - FEMALE NPT
W - SOCKET WELD

PRESSURE
20 - 2000 WOG
40 - 4000 WOG
01 - 150 ASME (PN 20)
03 - 300 ASME (PN 50)
06 - 600 ASME (PN 100)
09 - 900 ASME (PN 150)
15 -1500 ASME (PN 250)

OPTIONS
ANTI-STATIC SPRING
BLEEDER HOLE
BLEEDER VALVE
CARR. SEAL CLOSE
CARR. SEAL OPEN
DELRIN SEATS
DEVLON SEATS
ELECTROLESS NICKEL PLATING (ENP)
EXTENDED STEM
GEAR OPERATOR
GRAPHITE PACKING
HSN O-RINGS
IMPREGLON COATING
LOCKING HANDLE
NITRILE O-RINGS
PEEK SEATS
SEAL INJECTION
TEFLON O-RINGS
VITON O-RINGS

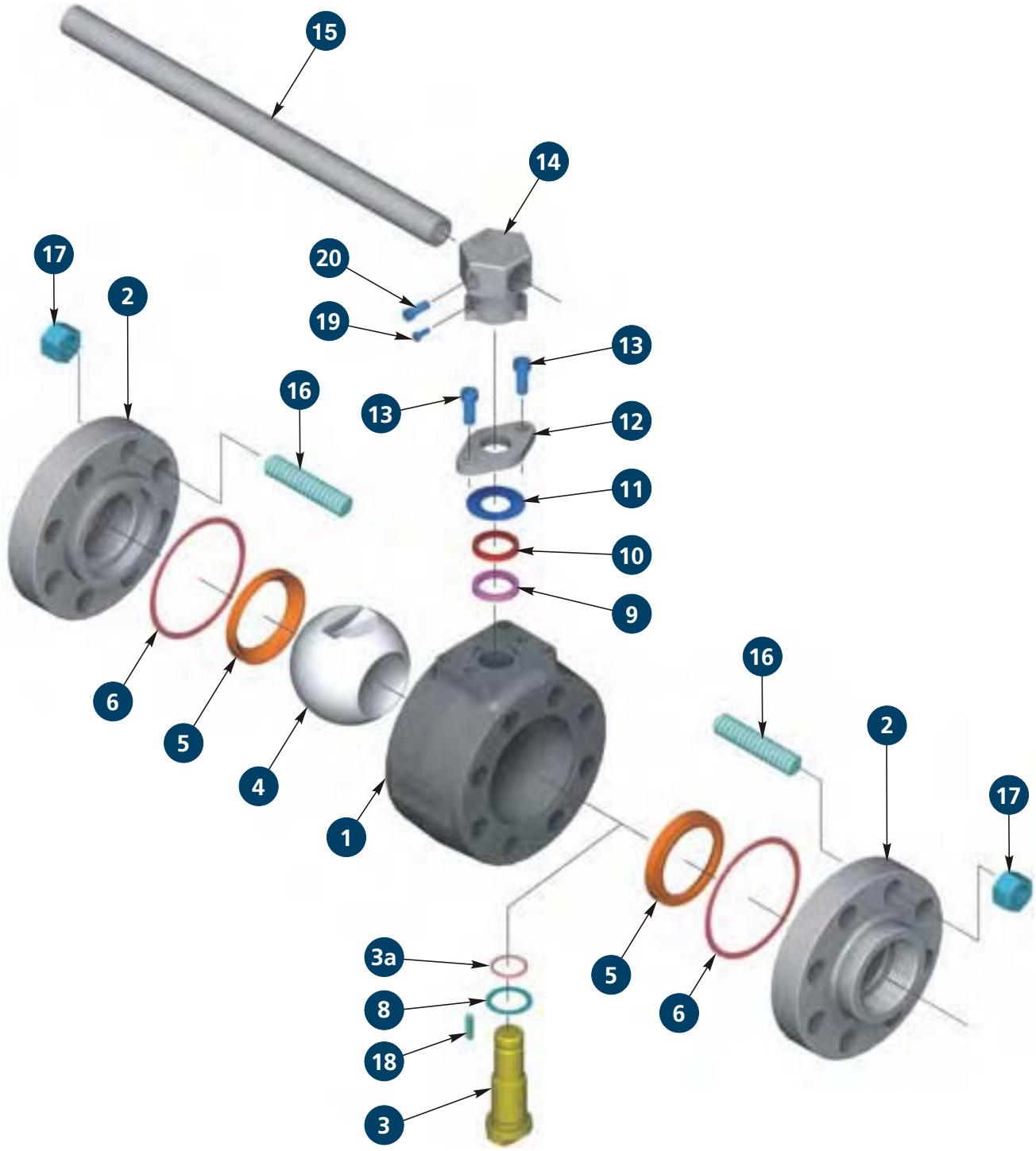
Examples:

B3-R40R06LZ = Model B3, Reduced Port, 4 in. (100 mm), Raised Face Flanges, 600 ASME (PN 100), Sour Low Temp Valve, Fire Safe.

* Consult Cooper Cameron Valves - NUTRON Sales Department for detailed valve style descriptions, full range of options, materials, actuation packages or for a particular special valve service application.

Cooper Cameron Valves reserves the right to substitute materials listed on the following pages with alternate materials for the designated service.

THREADED END CONNECTIONS



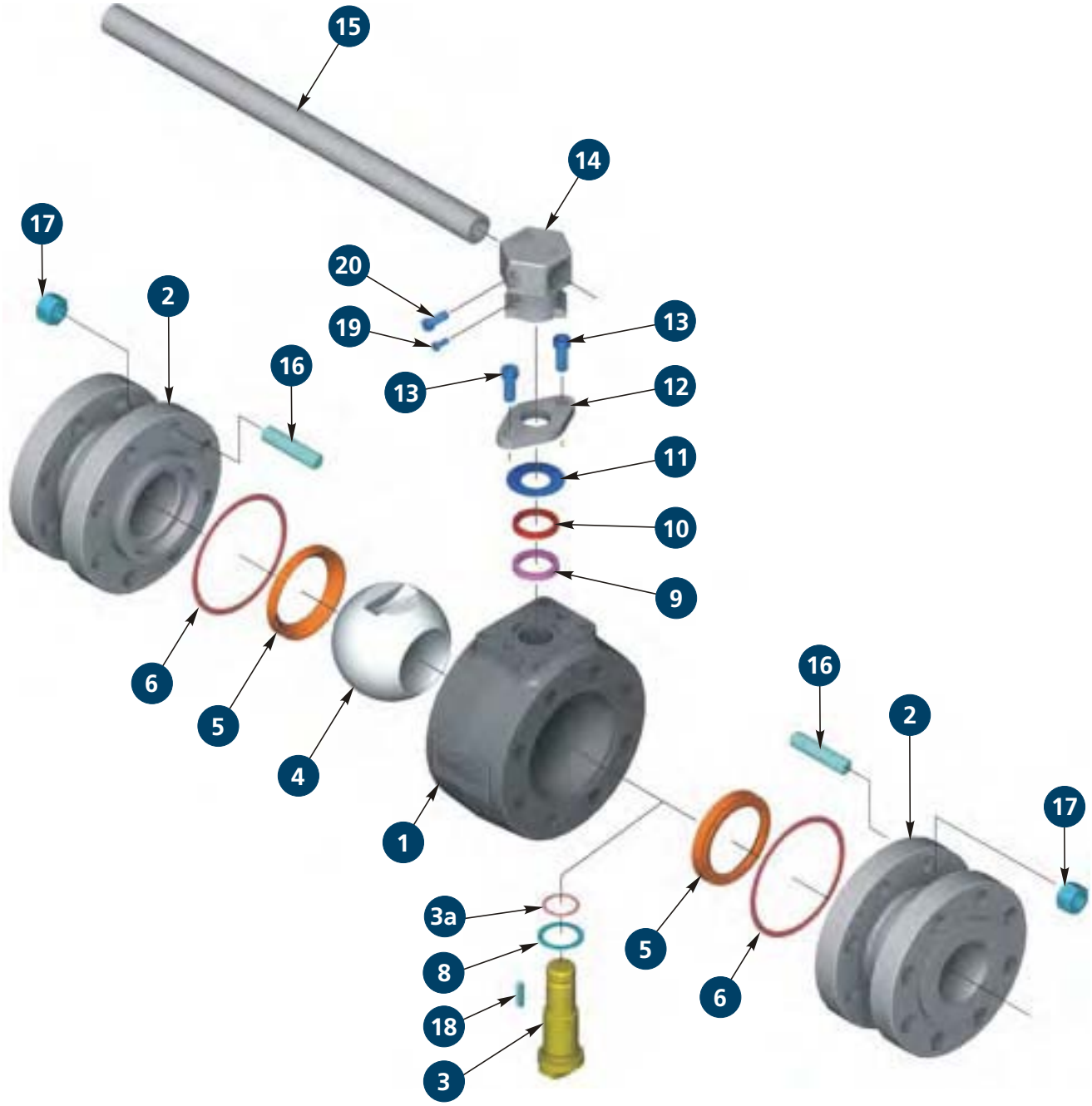
MATERIALS LIST - THREADED END CONNECTIONS

ITEM	PART	WORKING PRESSURE	STANDARD -20°F (-29°C)	SOUR -20°F (-29°C)
1	Body	All	ASTM A105 ASTM A105	
2	End Caps	All	ASTM A350 LF2	ASTM A350 LF2
■ 3	Stem	All	ASTM A322 Gr. 4130, Plated	ASTM A564 17-4PH
■• 3a	Stem 0-Ring	All	HSN	HSN
■ 4	Ball	All	Carbon Steel, Chrome Plated	ASTM A351 Gr. CF8M
■• 5	Seats	2000 4000	Teflon Delrin	Teflon Delrin
■• 6	Body Seals	All	Spiral Wound Gasket	Spiral Wound Gasket
■• 8	Thrust Washer	2000 4000	Teflon Delrin	Teflon Delrin
■• 9	Packing	2000/4000	Graphite/Teflon	Graphite/Teflon
10	Packing Follower	All	Carbon Steel, Plated	Stainless Steel
11	Belleville Washer	All	Carbon Steel Stainless Steel	
12	Gland Flange	All	Carbon Steel, Plated	Carbon Steel, Plated
13	Cap Screws	All	Carbon Steel Stainless Steel	
14	Handle Nut	All	Carbon Steel Carbon Steel	
15	Pipe	All	Carbon Steel Carbon Steel	
16	Studs	All	ASTM A193 B7	ASTM A193 B7M
17	Nuts	All	ASTM A194 2H	ASTM A194 2HM
18	Key	All	Carbon Steel Carbon Steel	
19	Screw	All	Carbon Steel, Plated	Carbon Steel, Plated
20	Screw	All	Carbon Steel, Plated	Carbon Steel, Plated

ITEM	PART	WORKING PRESSURE	SOUR & LOW TEMP -50°F (-46°C)	STAINLESS STEEL -50°F (-46°C)
1	Body	All	ASTM A350 LF2	ASTM A479 TYPE 316
2	End Caps	All	ASTM A350 LF2	ASTM A479 TYPE 316
■ 3	Stem	All	ASTM A564 17-4PH	ASTM A564 17-4PH with Nitriding
■• 3a	Stem O-Ring	All	HSN	HSN
■ 4	Ball	All	ASTM A351 Gr. CF8M	ASTM A351 Gr. CF8M
■• 5	Seats	2000 4000	Teflon Delrin	Teflon PEEK
■• 6	Body Seals	All	Spiral Wound Gasket	Spiral Wound Gasket
■• 8	Thrust Washer	2000 4000	Teflon Delrin	Teflon PEEK
■• 9	Packing	2000/4000	Graphite/Teflon	Graphite/Teflon
10	Packing Follower	All	Stainless Steel	Stainless Steel
11	Belleville Washer	All	Stainless Steel	Stainless Steel
12	Gland Flange	All	Carbon Steel, Plated	Carbon Steel, Plated
13	Cap Screws	All	Stainless Steel	Stainless Steel
14	Handle Nut	All	Carbon Steel	Carbon Steel
15	Pipe	All	Carbon Steel	Carbon Steel
16	Studs	All	ASTM A320 L7M	ASTM A320 L7M, Coated
17	Nuts	All	ASTM A194 L7M	ASTM A194 L7M, Coated
18	Key	All	Carbon Steel	Carbon Steel
19	Screw	All	Carbon Steel, Plated	Carbon Steel, Plated
20	Screw	All	Carbon Steel, Plated	Carbon Steel, Plated

■ Major repair kit.
• Minor repair kit.

FLANGED END CONNECTIONS
3 in. (80 mm) FULL PORT & 4 in. (100 mm) REDUCED PORT
ASME CLASS 600, 900 & 1500 (PN 100, 150 & 250)



MATERIALS LIST - FLANGED END CONNECTIONS

3 in. (80 mm) FULL PORT & 4 in. (100 mm) REDUCED PORT
ASME CLASS 600, 900 & 1500 (PN 100, 150 & 250)

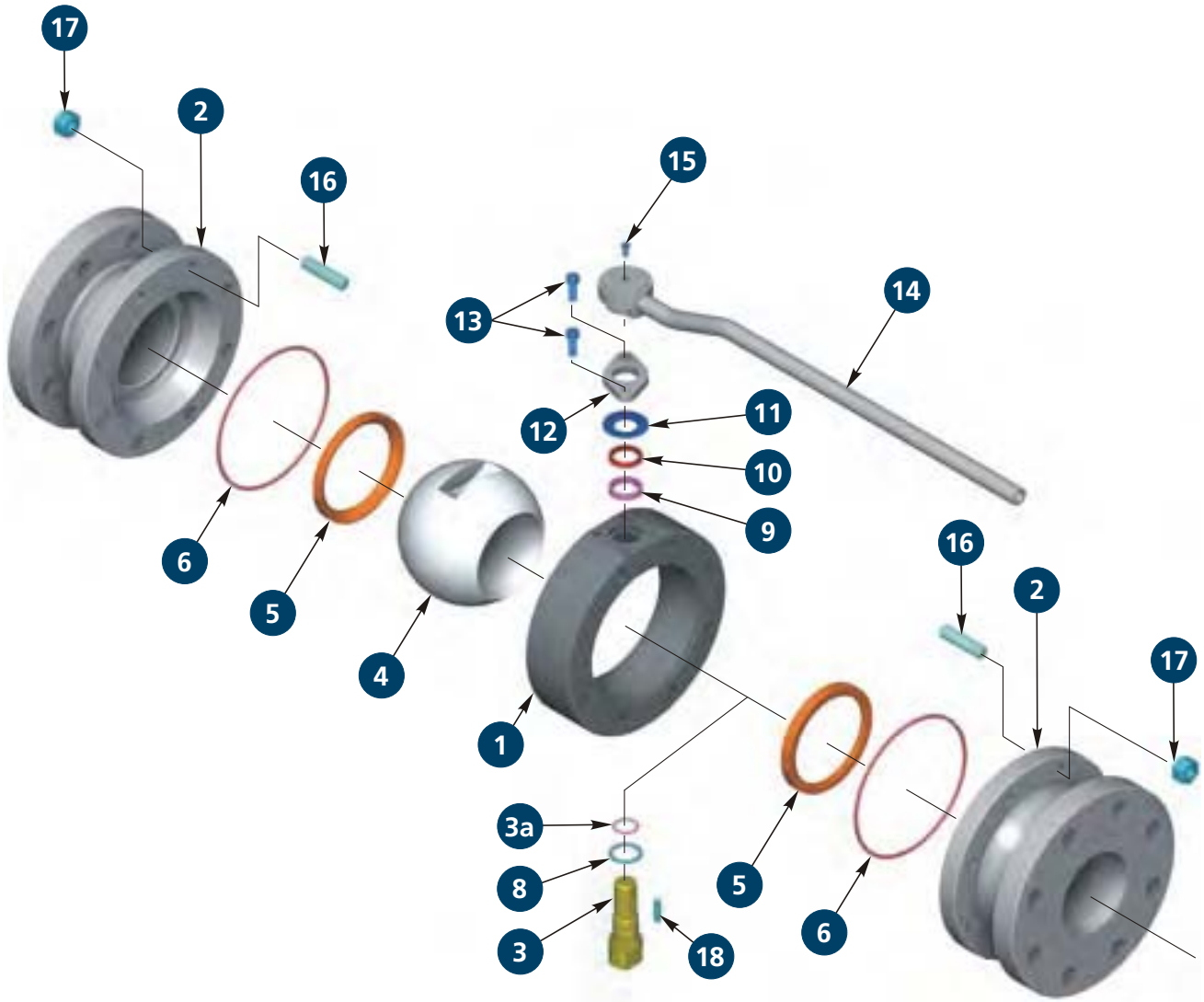
ITEM	PART	ASME CLASS	STANDARD -20°F (-29°C)	SOUR -20°F (-29°C)
1	Body	All	ASTM A105	ASTM A105
2	End Caps	600, 900 & 1500	ASTM A105	ASTM A105
■ 3 ■• 3a	Stem Stem O-Ring	All All	ASTM A322 Gr. 4130, Plated HSN	ASTM A564 17-4PH HSN
■ 4	Ball	All	ASTM A675 CHR. PL.	ASTM A351 Gr. CF8M
■• 5	Seats	600 900 & 1500	Teflon Delrin	Teflon Delrin
■• 6	Body Seals	All	Spiral Wound Gasket	Spiral Wound Gasket
■• 8	Thrust Washer	600 900 & 1500	Teflon Delrin	Teflon Delrin
■• 9	Packing	All	Graphite	Graphite
10	Packing Follower	All	Carbon Steel, Plated	Stainless Steel
11	Belleville Washer	All	Carbon Steel	Stainless Steel
12	Gland Flange	All	Carbon Steel, Plated	Carbon Steel, Plated
13	Cap Screws	All	Carbon Steel	Stainless Steel
14	Handle Nut	All	Carbon Steel	Carbon Steel
15	Pipe	All	Carbon Steel	Carbon Steel
16	Studs	All	ASTM A193 B7	ASTM A193 B7M
17	Nuts	All	ASTM A194 2H	ASTM A194 2HM
18	Key	All	Carbon Steel	Carbon Steel
19	Screw	All	Carbon Steel, Plated	Carbon Steel, Plated
20	Screw	All	Carbon Steel, Plated	Carbon Steel, Plated

ITEM	PART	ASME CLASS	SOUR & LOW TEMP -50°F (-46°C)	STAINLESS STEEL -50°F (-46°C)
1	Body	All	ASTM A350 LF2	ASTM A479 TYPE 316
2	End Caps	All	ASTM A350 LF2	ASTM A479 TYPE 316
■ 3 ■• 3a	Stem Stem O-Ring	All All	ASTM A564 17-4PH HSN	ASTM A564 17-4PH with Nitriding HSN
■ 4	Ball	All	ASTM A351 Gr. CF8M	ASTM A351 Gr. CF8M
■• 5	Seats	600 900 & 1500	Teflon Delrin	Teflon PEEK
■• 6	Body Seals	All	Spiral Wound Gasket	Spiral Wound Gasket
■• 8	Thrust Washer	600 900 & 1500	Teflon Delrin	Teflon PEEK
■• 9	Packing	All	Graphite	Graphite
10	Packing Follower	All	Stainless Steel	Stainless Steel
11	Belleville Washer	All	Stainless Steel	Stainless Steel
12	Gland Flange	All	Carbon Steel, Plated	Carbon Steel, Plated
13	Cap Screws	All	Stainless Steel	Stainless Steel
14	Handle Nut	All	Carbon Steel	Carbon Steel
15	Pipe	All	Carbon Steel	Carbon Steel
16	Studs	All	ASTM A320 L7M	ASTM A320 L7M, Coated
17	Nuts	All	ASTM A194 L7M	ASTM A194 L7M, Coated
18	Key	All	Carbon Steel	Carbon Steel
19	Screw	All	Carbon Steel, Plated	Carbon Steel, Plated
20	Screw	All	Carbon Steel, Plated	Carbon Steel, Plated

■ Major repair kit.
• Minor repair kit.

Note: Fire safe trim offered as standard whenever possible.
Consult Cooper Cameron Valves - Nutron Sales Department for fire safe trim.

4 in. (100 mm) FULL PORT / 6 in. (150 mm) REDUCED PORT ASME CLASS 150 & 300 (PN 20 & 50)



MATERIALS LIST

4 in. (100 mm) FULL PORT & 6 in. (150 mm) REDUCED PORT
ASME CLASS 150 & 300 (PN 20 & 50)

ITEM	PART	SOUR -20°F (-29°C)	SOUR & LOW TEMP -20°F (-29°C)
1	Body	ASTM A105	ASTM A350 LF2
2	End Caps	ASTM A350 LF2	ASTM A350 LF2
■ 3	Stem	ASTM A564 17-4PH	ASTM A564 17-4PH
■• 3a	Stem O-Ring	HSN	HSN
■ 4	Ball	ASTM A351 Gr. CF8M	ASTM A351 Gr. CF8M
■• 5	Seats	Teflon	Teflon
■• 6	Body O-Rings	Viton	Viton
■• 8	Thrust Washer	Teflon	Teflon
■• 9	Packing	Graphite	Graphite
10	Packing Follower	Stainless Steel	Stainless Steel
11	Belleville Washer	Stainless Steel	Stainless Steel
12	Gland Flange	Carbon Steel, Plated	Carbon Steel, Plated
13	Cap Screws	Stainless Steel	Stainless Steel
14	Handle	Carbon Steel	Carbon Steel
15	Cap Screw, Hex Head	Carbon Steel	Carbon Steel
16	Studs	ASTM A193 B7M	ASTM A320 L7M
17	Nuts	ASTM A194 2HM	ASTM A194 L7M
18	Key	Carbon Steel	Carbon Steel

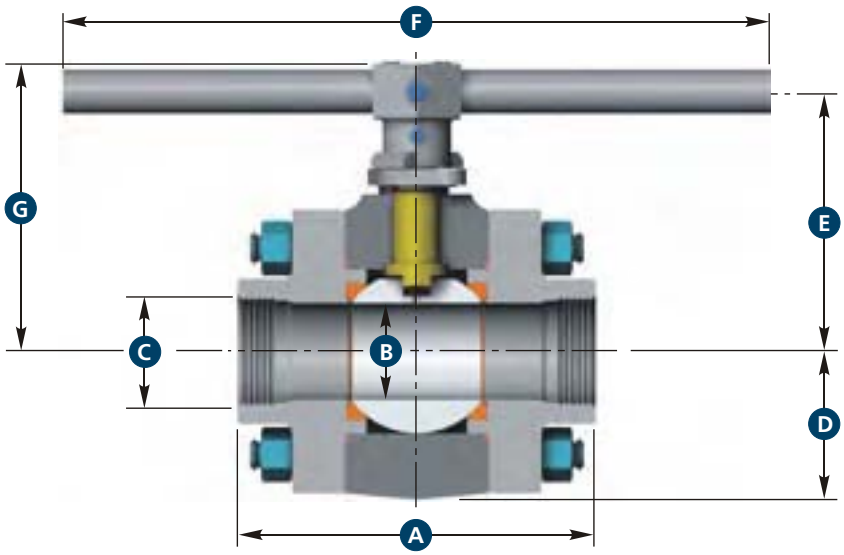
ITEM	PART	STAINLESS STEEL -50°F (-46°C)
1	Body	ASTM A479 TYPE 316
2	End Caps	ASTM A479 TYPE 316
■ 3	Stem	ASTM A564 17-4PH with Nitriding
■• 3a	Stem O-Ring	HSN
■ 4	Ball	ASTM A351 Gr. CF8M
■• 5	Seats	Teflon
■• 6	Body O-Rings	Teflon
■• 8	Thrust Washer	Teflon
■• 9	Packing	Graphite
10	Packing Follower	Stainless Steel
11	Belleville Washer	Stainless Steel
12	Gland Flange	Carbon Steel, Plated
13	Cap Screws	Stainless Steel
14	Handle	Carbon Steel
15	Cap Screw, Hex Head	Carbon Steel
16	Studs	ASTM A320 L7M, Coated
17	Nuts	ASTM A194 L7M, Coated
18	Key	Carbon Steel

■ Major repair kit.
• Minor repair kit.

FLOATING BALL VALVES

THREADED

FULL PORT
3 in. (80 mm)
REDUCED PORT
4 in. (100 mm)



DIMENSIONS

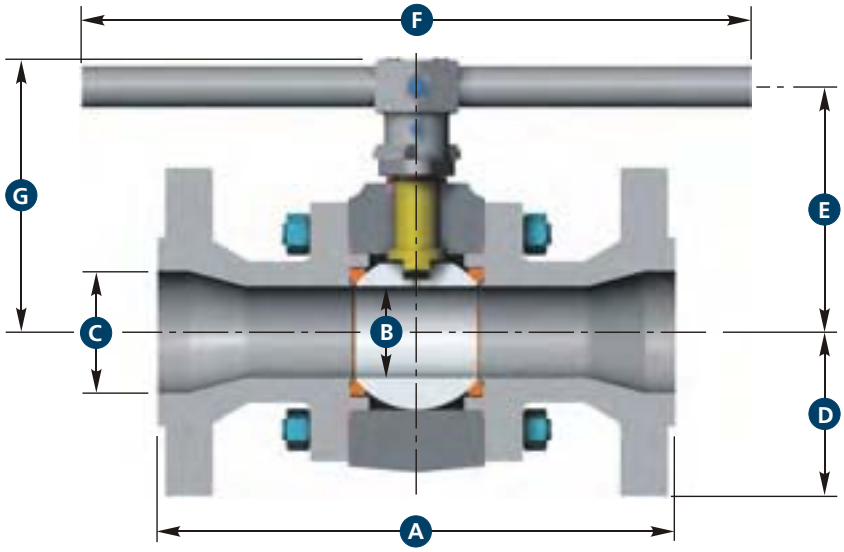
SIZE in. (mm)	WOG	A	B	C	D	E	F	G	C_v	WEIGHT lb. (kg)
3 FP (80 FP)	2000	10.0 (254)	3.0 (76)	3.0 (76)	4.45 (113)	7.55 (192)	22.0 (559)	7.55 (192)	1300	131.0 (59.4)
	4000	10.0 (254)	3.0 (76)	3.0 (76)	4.45 (113)	7.55 (192)	22.0 (559)	7.55 (192)	1300	131.0 (59.4)
4 RP (100 RP)	2000	12.0 (305)	3.0 (76)	4.0 (102)	4.45 (113)	7.55 (192)	22.0 (559)	7.55 (192)	770	145.0 (65.7)

NOTE: " A " dimension to be within ± 0.062 in. (1.5 mm).

FLOATING BALL VALVES

FLANGED

FULL PORT
3 in. (80 mm)
REDUCED PORT
4 in. (100 mm)



DIMENSIONS

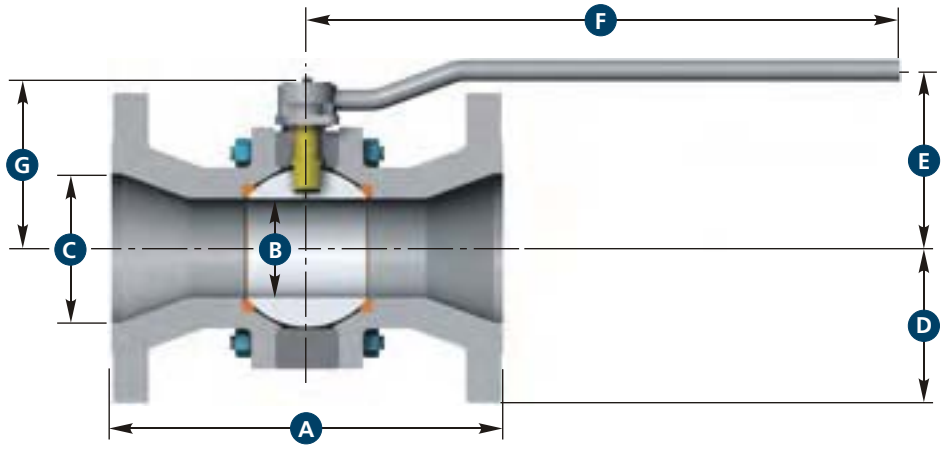
SIZE in. (mm)	ASME CLASS	(PN)	A RF	A RTJ	B	C	D	E	F	G	C_v	WEIGHT lb. (kg)
3 FP (80 FP)	600	(100)	14.0 (356)	14.12 (359)	3.0 (76)	3.0 (76)	4.12 (105)	7.55 (192)	22.0 (559)	7.55 (192)	1300	161.0 (73.0)
	900	(150)	15.0 (381)	15.12 (384)	3.0 (76)	3.0 (76)	4.75 (121)	7.55 (192)	22.0 (559)	7.55 (192)	1300	191.0 (86.6)
	1500	(250)	18.5 (470)	18.62 (473)	3.0 (76)	3.0 (76)	5.25 (133)	7.55 (192)	22.0 (559)	7.55 (192)	1300	239.0 (108.4)
4 RP (100 RP)	600	(100)	17.0 (432)	17.12 (435)	3.0 (76)	4.0 (102)	5.37 (136)	7.55 (192)	22.0 (559)	7.55 (192)	770	211.0 (95.7)
	900	(150)	18.0 (457)	18.12 (460)	3.0 (76)	4.0 (102)	5.75 (146)	7.55 (192)	22.0 (559)	7.55 (192)	770	242.0 (109.7)
	1500	(250)	21.5 (546)	21.62 (549)	3.0 (76)	4.0 (102)	6.12 (155)	7.55 (192)	22.0 (559)	7.55 (192)	770	292.0 (132.4)

NOTE: " A " dimension to be within ± 0.062 in. (1.5 mm).

FLOATING BALL VALVES

FLANGED

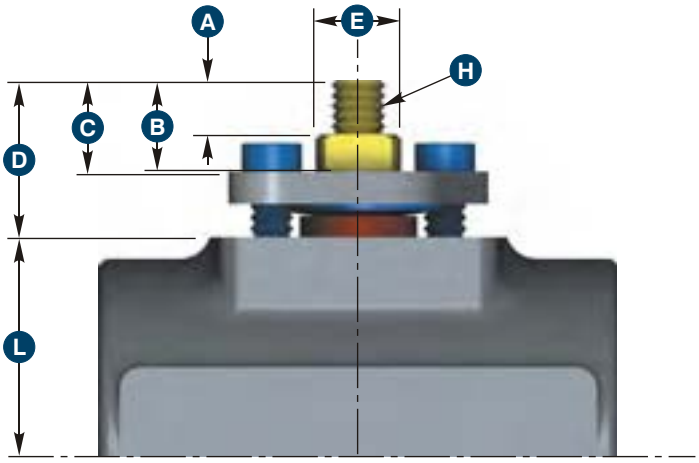
FULL PORT
4 in. (100 mm)
REDUCED PORT
6 in. (150 mm)

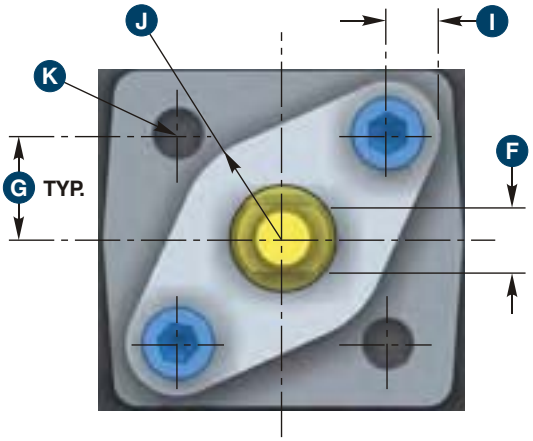


DIMENSIONS

SIZE in. (mm)	ASME CLASS	(PN)	A	B	C	D	E	F	G	C_v	WEIGHT lb. (kg)
4 FP (100 FP)	150	(20)	9.00 (229)	4.00 (102)	4.00 (102)	4.88 (124)	7.60 (193)	24.00 (610)	6.65 (169)	2300	101 (45.8)
	300	(50)	12.00 (305)	4.00 (102)	4.00 (102)	5.00 (127)	7.60 (193)	24.00 (610)	6.65 (169)	2300	143 (64.8)
6 RP (150 RP)	150	(20)	10.50 (267)	4.00 (102)	6.00 (152)	5.50 (140)	7.60 (193)	24.00 (610)	6.65 (169)	1800	128 (58.0)
	300	(50)	15.88 (403)	4.00 (102)	6.00 (152)	6.25 (160)	7.60 (193)	24.00 (610)	6.65 (169)	1800	143 (64.8)

ACTUATOR MOUNTING DIMENSIONS





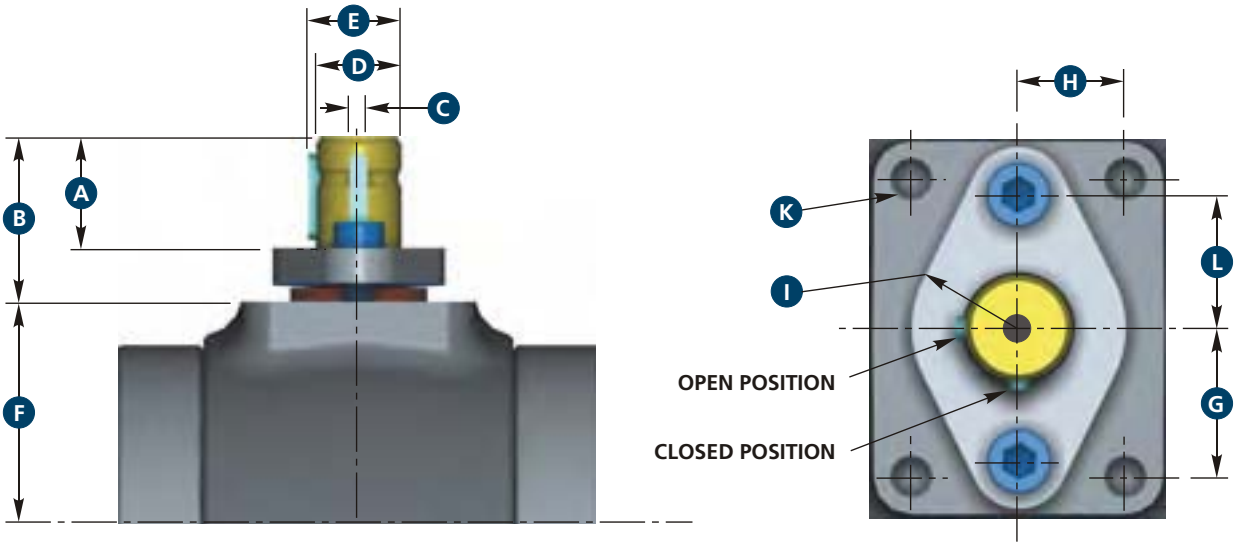
DIMENSIONS

SIZE in. (mm)	A	B	C	D	E	F	G	H	I	J	K	L
1/4 FP (8 FP)	0.300 (7.6)	0.440 (11.1)	0.500 (12.7)	0.725 (18.4)	0.464 (11.8)	0.253 (6.4)	0.468 (11.9)	0.250-20 UNC (6.35-20 UNC)	0.23 (5.8)	0.50 (12.7)	#10-32 UNF-2B x 0.31 DP. (#10-32 UNF-2B x 7.9 DP.)	1.002 (25.5)
3/8 FP (10 FP)	0.300 (7.6)	0.440 (11.1)	0.500 (12.7)	0.725 (18.4)	0.464 (11.8)	0.253 (6.4)	0.468 (11.9)	0.250-20 UNC (6.35-20 UNC)	0.23 (5.8)	0.50 (12.7)	#10-32 UNF-2B x 0.31 DP. (#10-32 UNF-2B x 7.9 DP.)	1.002 (25.5)
1/2 FP / 3/4 RP (15 FP / 20 RP)	0.300 (7.6)	0.440 (11.1)	0.500 (12.7)	0.725 (18.4)	0.464 (11.8)	0.253 (6.4)	0.468 (11.9)	0.250-20 UNC (6.35-20 UNC)	0.23 (5.8)	0.50 (12.7)	#10-32 UNF-2B x 0.31 DP. (#10-32 UNF-2B x 7.9 DP.)	1.002 (25.5)
3/4 FP / 1 RP (20 FP / 25 RP)	0.312 (7.9)	0.515 (13.1)	0.560 (14.2)	0.905 (23.0)	0.496 (12.6)	0.314 (7.9)	0.498 (12.6)	0.312-18 UNC (7.92-18 UNC)	0.25 (6.4)	0.50 (12.7)	0.25-28 UNF-2B x 0.30 DP. (6.35-28 UNF-2B x 7.6 DP.)	1.250 (31.8)
*1 1/2 FP / 2 RP (*40 FP / 50 RP)	0.475 (12.1)	0.826 (21.0)	0.900 (22.9)	1.270 (32.3)	0.811 (20.6)	0.441 (11.2)	0.737 (18.7)	0.438-14 UNC (11.1-14 UNC)	0.40 (10.2)	0.75 (19.1)	0.312-24 UNF-2B x 0.437 DP. (7.92-24 UNF-2B x 11.1 DP.)	2.250 (57.2)
2 FP / 3 RP (50 FP / 80 RP)	0.690 (17.5)	1.180 (30.0)	1.225 (31.1)	1.821 (46.3)	1.000 (25.4)	0.628 (16.0)	0.875 (22.2)	0.625-11 UNC (15.9-11 UNC)	0.41 (10.4)	1.00 (25.4)	0.375-24 UNF-2B x 0.50 DP. (9.53-24 UNF-2B x 12.7 DP.)	3.000 (76.2)
3 FP / 4 RP (80 FP / 100 RP)	0.690 (17.5)	1.180 (30.0)	1.225 (31.1)	1.821 (46.3)	1.000 (25.4)	0.628 (16.0)	0.875 (22.2)	0.625-11 UNC (15.9-11 UNC)	0.41 (10.4)	1.00 (25.4)	0.375-24 UNF-2B x 0.50 DP. (9.53-24 UNF-2B x 12.7 DP.)	3.500 (88.9)

* Applies to B3 1 1/2 in. (40 mm) full port & 2 in. (50 mm) reduced port ASME Class 600, 900 & 1500 valves.
** Applies to B3 2 in. (50 mm) full port & 3 in. (80 mm) reduced port ASME Class 600, 900 & 1500 valves.
*** Applies to B3 3 in. (80 mm) full port & 4 in. (100 mm) reduced port ASME Class 150 & 300 valves.

ACTUATOR MOUNTING DIMENSIONS*

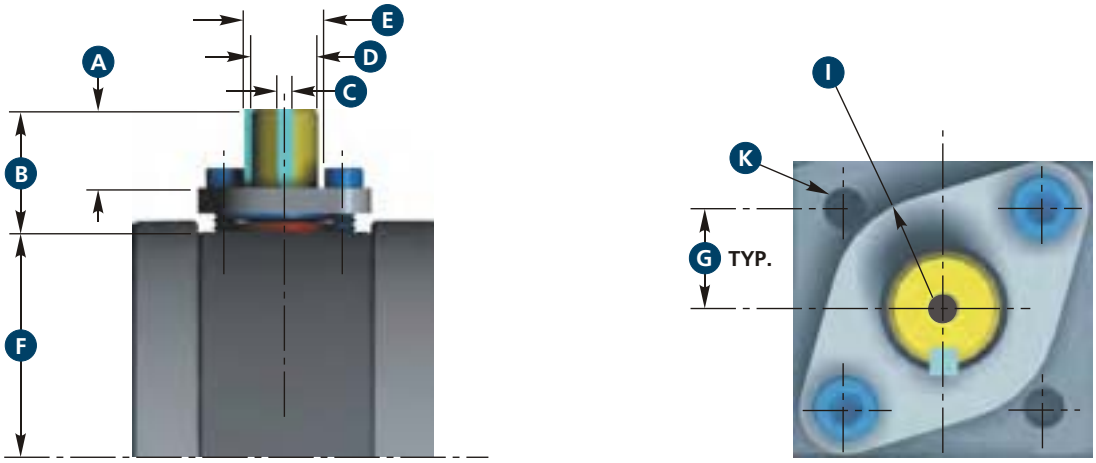
3 in. (80 mm) FULL PORT
4 in. (100 mm) REDUCED PORT



DIMENSIONS

SIZE in. (mm)	A	B	C	D	E	F	G	H	I	K	L
3 FP / 4 RP	1.64	2.395	0.25	1.248	1.362	4.875	1.75	1.25	1.25R	0.5-13UNC-2B x 0.62 DP.	1.566
(80 FP / 100 RP)	(41.7)	(60.8)	(6.4)	(31.7)	(34.6)	(123.8)	(44.4)	(31.8)	(31.8R)	(12.7-13UNC-2B x 15.7 DP.)	(39.8)
(ASME 600-1500, WOG 2000-4000)											

4 in. (100 mm) FULL PORT
6 in. (150 mm) REDUCED PORT

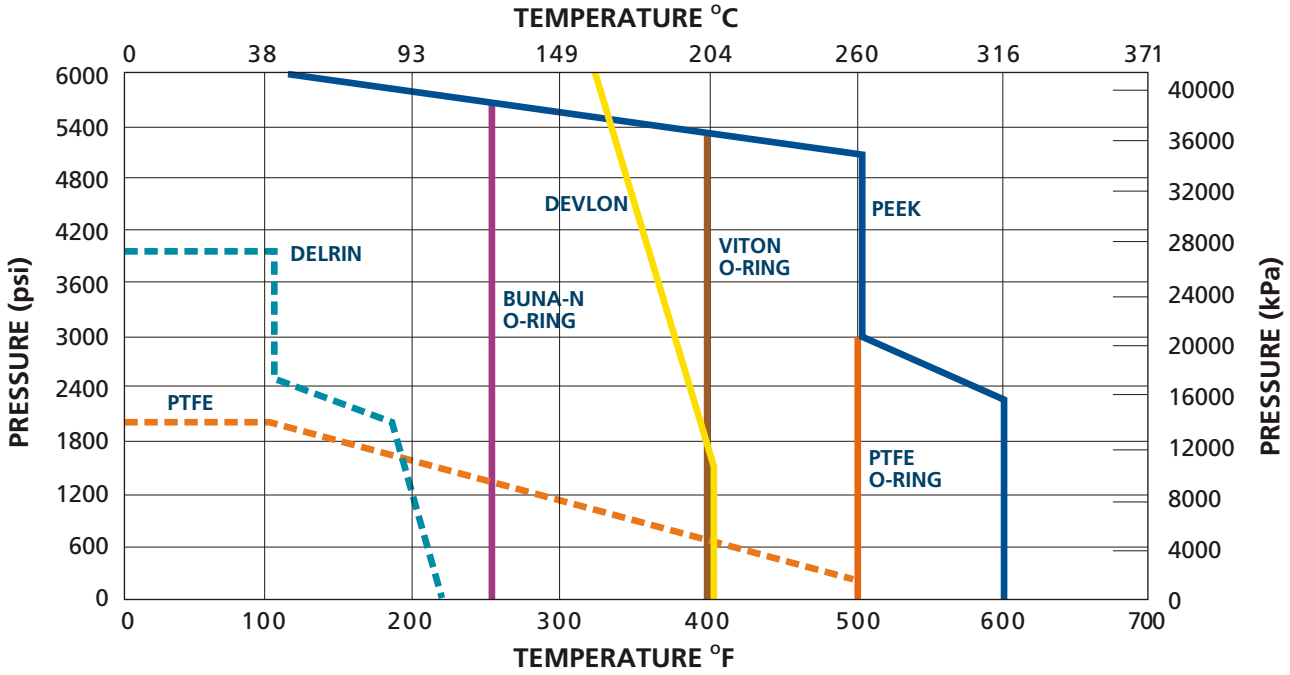


DIMENSIONS

SIZE in. (mm)	A	B	C	D	E	F	G	K	I
4 FP / 6 RP	1.255	1.85	0.25	1.00	1.11	4.688	0.877	0.375-24UNF-2B x 0.5 DEEP	1.00
(100 FP / 150 RP)	(31.9)	(47.0)	(6.4)	(25.4)	(28.2)	(119.1)	(22.3)	(9.5-24UNF-2B x 12.7 DEEP)	(25.4)
(ASME 150 / 300)									

* For B3 1 1/2 in., 2 in., 3 in. & 4 in. (40 mm, 50 mm, 80 mm & 100 mm) valves, see footnote on page 25.

PRESSURE/TEMPERATURE RATINGS (SEATS AND SEALS)*



* Consult ASME B16.34 for Body and Adapter Material Pressure/Temperature Ratings.

BREAKAWAY TORQUE DATA

Torque=inch-pounds

Bore Size in.	(DN)	ASME CLASS (PN) Pressure (psi) Seat Material	0	150 (20) 285	300 (50) 740	1000	600 (100) 1480	2000	900 (150) 2220	3000	1500 (250) 3705	4000	5000	2500 (420) 6000
1/2	(15)	Peek	72	84	96	108	120	132	144	156	180	192	216	240
		Devlon	72	84	96	108	120	132	144	156	180	192	216	240
		Delrin	60	72	84	96	108	120	132	144	168	180	-	-
		Teflon	60	72	84	96	108	120	-	-	-	-	-	-
7/8	(22)	Peek	276	276	276	276	276	300	324	360	420	444	540	660
		Devlon	96	108	120	132	144	156	168	180	192	204	240	300
		Delrin	96	108	120	132	144	156	168	180	192	204	-	-
		Teflon	96	108	120	132	144	156	-	-	-	-	-	-
1 1/2	(40)	Peek	600	648	696	744	792	840	864	936	1020	1080	1200	1500
		Devlon	360	420	480	576	660	720	792	900	960	1020	1080	1260
		Delrin	336	396	480	576	660	720	792	900	960	1020	-	-
		Teflon	336	360	396	420	456	504	-	-	-	-	-	-
2	(50)	Peek	840	1080	1440	1680	1920	2100	2280	2700	3120	3300	3600	4200
		Devlon	600	720	900	1080	1200	1500	1680	1920	2160	2400	2400	2880
		Delrin	600	720	900	1080	1320	1560	1740	2040	2280	2520	-	-
		Teflon	600	636	816	936	1128	1344	-	-	-	-	-	-
3	(80)	Peek	960	1440	2760	3840	4800	5760	6480	7200	8400	9000	-	-
		Devlon	720	1200	1920	2400	2880	3360	3600	4080	4800	5760	-	-
		Delrin	840	1380	2280	2640	3000	3600	3900	4200	4800	5760	-	-
		Teflon	720	1320	1920	2400	2880	3600	-	-	-	-	-	-
4	(100)	Peek	1440	2400	3840	-	-	-	-	-	-	-	-	-
		Devlon	1200	2040	3120	-	-	-	-	-	-	-	-	-
		Teflon	1080	1944	2820	-	-	-	-	-	-	-	-	-

Torque values shown are to be used as a guide for actuator selection. All above torque values are based upon clean liquid service. Additional factors such as media characteristics, number of cycles and temperature may require an additional safety factor. Please contact the actuator supplier/manufacturer for these factors.

TERMS AND CONDITIONS

1. CONTRACT ACCEPTANCE:
Any written or oral purchase order received from Buyer by Cooper Cameron Corporation, Cameron Division and Cooper Cameron Valves ("Seller") shall be construed as a written acceptance of Seller's offer to sell and shall be filled in accordance with the terms and conditions of sale set forth herein. SELLER'S ACCEPTANCE OF THIS ORDER IS EXPRESSLY CONDITIONED ON BUYER'S ASSENT TO THE TERMS CONTAINED HEREIN. The terms and conditions of Seller's proposal (if any) and acknowledgement shall prevail over any conflicting or different terms in Buyer's order unless Buyer notifies Seller in writing of its objections thereto within fifteen (15) days from receipt of Seller's acknowledgement. Buyer's standard terms of purchase will not be considered a counteroffer to Seller's terms and conditions of sale. The failure of Seller to object to any provision in conflict herewith whether contained on Buyer's purchase order or otherwise shall not be construed as a waiver of the provisions hereof nor as an acceptance thereof.

2. QUOTATIONS AND PRICES:
All quotations are made for prompt acceptance and any terms quoted therein are subject to change without notice after thirty (30) days from the date quoted unless specifically stated otherwise on the quotation. Any product, service capability or manufacturing capability which may be available at the time a quotation is made is subject to prior sale. Prices quoted are valid for thirty (30) days unless specifically stated otherwise on the quotation and are subject to change without notice. The price in effect at the time of shipment including any escalation formula will apply, unless a valid quotation or written agreement to the contrary exists between Buyer and Seller. All prices shown are in U.S. dollars and are F.O.B. Seller's shipping point.
Any documentation pertaining to traceability requirements for raw materials or products or documentation required for any routine or special processes must be identified by the Buyer at the time of quotation (if any) or at the time of order placement.

3. TAXES:
Any tax or other charge imposed by law on the sale or production of goods or the performance of services shall be paid by the Buyer, unless the law specifically provides that such payment must be made by Seller, in which case Buyer shall reimburse Seller for such payment as part of the purchase price. Custom duties, consular fees, insurance charges and other comparable charges will be borne by Buyer.

4. SHIPPING SCHEDULE AND DELIVERY:
Shipment schedules are given as accurately as conditions permit and every effort will be made to make shipments as scheduled. Seller will not be responsible for deviations in meeting shipping schedules nor for any losses or damages to Buyer (or any third party) occasioned by deviations in the shipping schedule, whether due to Acts of God, orders bearing priority ratings established pursuant to law, differences with workmen, local labor shortages, fire, flood, shortages or failure of raw materials, supplies, fuel, power or transportation, breakdown of equipment or any other causes beyond Seller's reasonable control, whether of similar or dissimilar nature than those enumerated. Seller shall have additional time within which to perform as may be reasonably necessary under the circumstances and shall have the right to apportion its production among its customers in such a manner as it may consider to be equitable.
Seller reserves the right to furnish commercially equivalent or better substitutes for materials or to subcontract the Buyer's order or portions thereof as Seller deems necessary. In no event shall Seller be liable for any consequential damages for labor resulting from failure or delay in shipment. If Buyer requires drawings, procedures, standards or similar material for approval, shipping schedules will be calculated from the time such approvals are received by Seller, since shipping schedules are based on Seller having all required information and a firm order from Buyer which is enterable into production. Any hold points, witness points or the need for inspection by Buyer's representatives must be identified by Buyer at the time of quotation (if any) and/or order placement in order that the effect on the prices or shipping schedules (if any) can be taken into account. Additional inspection or testing required by Buyer which affects normal production sequence will be considered as extending the shipping dates accordingly.

5. MINIMUM BILLING:
Seller reserves the right to impose a minimum billing charge on all sales, change orders or order supplements.

6. TERMS OF PAYMENT:
Terms of payment for all materials and service are 30 days from invoice date, at net price, provided satisfactory credit has been established. All unpaid invoices are subject to the maximum legal interest rate per annum commencing with the due date.

7. CANCELLATIONS AND RETURNS:
Purchase orders once placed by Buyer and accepted by Seller can be canceled only with Seller's written consent and upon terms which will save Seller from loss. No products may be returned for credit or adjustment without written permission from Seller's office authorized to issue such permission.

8. WARRANTIES:
All products of Seller's manufacture are warranted against defects of material and workmanship for a period of twelve (12) months from the date of installation or eighteen (18) months from date of shipment, whichever period first expires, when such products are used in the service and within the pressure range for which they were manufactured. In the case of products or parts not wholly of Seller's manufacture, Seller's liability shall be limited to the extent of its recovery from the manufacturer of such products or parts under its liability to Seller.

Any repair work performed by Seller is warranted for one year from completion of such repairs and applies only to work performed.

If, within these specified periods, Seller receives notice from Buyer of any alleged defect in or nonconformance of any product or repair and if, in the Seller's sole judgment, the product or repair does not conform or is found to be defective in material or workmanship, then, Buyer shall, at Seller's request, return the part or product F.O.B. to Seller's designated plant or service location. Seller has no liability for removal or reinstallation of products or equipment from below the surface of the water. Seller, at its option and expense, shall repair or replace the defective part or product, or repay to Buyer the full price paid by Buyer for such defective part, repair or product. Any repayment of purchase price shall be without interest.

Seller's warranty liability, including defects caused by Seller's negligence, shall be limited to such repair, replacement or refund, and shall not include claims for labor costs, expenses of Buyer resulting from such defects, recovery under general tort law or strict liability or for damages resulting from delays, loss of use, or other direct, indirect, incidental or consequential damages of any kind. Seller will not be responsible for failures of products which have been in any way tampered with or altered by anyone other than an authorized representative of Seller, failures due to lack of compliance with recommended maintenance procedures or products which have been repaired or altered in such a way (in Seller's judgment) as to affect the products adversely. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, STATUTORY OR IMPLIED, INCLUDING THE WARRANTY OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE WHICH EXCEED THE FOREGOING WARRANTY.

9. NUCLEAR SALES:
The products sold hereunder are not designed or manufactured for use in or with any atomic installation or activity. If the Buyer or ultimate user of these products intends to use them in such an installation or activity, Seller's Nuclear Terms of Sale shall be part of and control this contract. Seller will furnish Buyer with a copy of its Nuclear Terms of Sale upon request.

10. PATENT INFRINGEMENT:
Seller warrants that the use or sale of material or apparatus sold or rented by it to Buyer hereunder will not infringe United States' patents of others covering such material or apparatus by itself, and hereby agrees to indemnify Buyer against judgment for damages for such infringement of any such patent, provided that Buyer shall, upon receipt of any claim for infringement of any such patent or threat of suit for such infringement or upon the filing of any suit for infringement, whichever comes first, promptly notify Seller in writing and afford Seller full opportunity, at its option and its own expense, to answer such claim or threat of suit, assume the control of the defense of said suit, and settle or compromise same in any way Seller sees fit. Other than court-awarded judgments as aforesaid Seller shall not be liable

for any delays, loss of use or for other direct, indirect, incidental or consequential damages incurred by reason of any such judgment. Seller does not warrant that such material or apparatus (a) will not infringe any such patent when not manufactured by or for Seller or when specially made in whole or in part to the Buyer's design specification and such infringement arises from the inclusion of such specified design or (b), if used or sold in combination with other material or apparatus, or if used in the practice of a process, will not, as a result of such combination or use, infringe any patent covering such combination or process; and Seller shall not be liable for and does not indemnify Buyer for damages or losses of any nature whatsoever resulting from actual or alleged patent infringement arising pursuant to (a) or (b) above.

11. SELLER'S RIGHT TO MANUFACTURE:
Seller in its sole discretion shall have the right to manufacture the products provided hereunder as far in advance of its estimated shipping schedule as it deems appropriate. Seller expressly reserves the right to change or modify the design and construction of any product in due course of Seller's manufacturing procedure without incurring any obligation or liability to furnish or install such changes, modifications or improvements to products previously or subsequently sold.

12. ENGINEERING AND SERVICE:
Upon request, Seller will provide engineering and/or technical information regarding its products and their uses and if feasible, will provide personnel to assist Buyer in effecting field installations and/or field service. Any such information, service or assistance so provided, whether with or without charge, shall be advisory only. In that regard, neither Seller nor Buyer assumes any liability for the acts or omissions of the other party except as may be provided in these terms.

13. LABOR STANDARDS:
Seller hereby certifies that these products were produced in accordance with all applicable requirements of Section 6, 7 and 12 of the Fair Labor Standards Act as amended and of regulations and orders of the United States Department of Labor issued under Section 14 thereof.

14. INSPECTION:
Unless otherwise agreed in writing, final inspection and acceptance of products must be made at Seller's plant or other shipping or receiving point designated by Seller and shall be conclusive except as regards latent defects. Buyer's representatives may inspect at the Seller's plant or shipping point during working hours prior to shipment in such manner as will not interfere with operations.

15. DELIVERY AND ACCEPTANCE:
Delivery shall be in accordance with the requirements in the Purchase Contract, provided, in the event Buyer is unable to accept delivery upon completion of the manufacture of the Goods in accordance with such requirements, Buyer agrees that (i) title and risk of ownership shall pass to Buyer on date of Seller's invoice and (ii) Buyer will make payments within thirty days after date of such invoice. Seller shall retain custodial risk of loss until delivery is made in accordance with such requirements.

16. TRANSPORTATION CHARGES, ALLOWANCES, CLAIMS:
All prices are F.O.B. Seller's plant or other designated shipping point.

No freight is allowed unless stated in Seller's quotation (if any) or in a written contract which may exist between Seller and Buyer at the time of shipment. If Seller's quotation or a written contract states that all or a portion of freight is allowed, all prices are F.O.B. Seller's plant or other designated shipping point, with most economical surface transportation allowed. If the quoted or contractual price includes transportation, Seller reserves the right to designate the common carrier and to ship in the manner it deems most economical. Added costs due to special routing requested by the Buyer are chargeable to the Buyer. Under no circumstances is any freight allowance which is absorbed by Seller to be deducted from the selling price. If the quoted price or contract includes transportation, no deduction will be made in lieu thereof whether Buyer accepts shipment at plant, warehouse, freight station, or otherwise supplies its own transportation. When sales are made from the Seller's warehouse, Seller reserves the right to charge either actual or pro-rated freight from Seller's principle point of manufacture to Seller's warehouse. Buyer assumes risk of loss upon delivery to the carrier, regardless of who pays shipping costs.

Seller endeavors to pack or prepare all shipments so that they will not break, rust or deteriorate in transit, but does not guarantee against such damage. Unless requested in writing by the Buyer, no shipments are insured by Seller against damage or loss in transit. Seller will place insurance as nearly as possible in accordance with Buyer's written instructions but in such case Seller acts only as agent between the insurance company and the Buyer and assumes no liability whatsoever.

Any claims for shipping loss, breakage or damage (obvious or concealed) are Buyer's responsibility and should be made to the carrier. All claims regarding shortages must be made within thirty (30) days from receipt of shipment and must be accompanied by the packing list(s) covering the shipment.

17. CONSULAR INVOICES:
Consular fees for legalizing invoices, stamping bills of lading, or other documents required by the laws of any country or destination are not included in quotations or selling prices. If instructed in writing, Seller will make arrangements for consular documents and declarations as agent of the Buyer, but Seller assumes no liability whatsoever as a result of making such arrangements. Seller assumes no responsibility for any fines or other charges imposed due to errors or incorrect declarations.

18. INDEMNIFICATION AND LIMITATION OF LIABILITY:

A. INDEMNIFICATION:
Seller agrees to indemnify Buyer and hold Buyer harmless against any claims, demands or causes of action for property damage or personal injury (including death) caused by the negligent act or omission of any employee, agent or sub-contractor of Seller and not contributed to by the negligence of Buyer, its employees, its agents or any third party. Seller shall not be responsible for the acts and workmanship of employees, agents, contractors or subcontractors of Buyer or any third party, nor for failure or malfunction of any tools, materials, equipment, products, supplies, facilities or devices not manufactured and supplied by Seller. Buyer agrees to hold Seller harmless from any and all losses, claims, or damages arising from subsurface damage, surface damage caused by subsurface damage, loss of hydrocarbons and from pollution, regardless of whether such damages, losses or claims were caused by the negligence or sole negligence of Seller, it being the intent of the parties that this indemnity shall apply to property of Buyer or to that of any third party.

B. LIMITATION OF LIABILITY:
UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR ANY SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES, INCLUDING, BUT NOT LIMITED TO LOSS OF ANTICIPATED PROFITS, LOSS OF USE OF EQUIPMENT OR OF ANY INSTALLATION, SYSTEM OR FACILITY INTO WHICH SELLER'S EQUIPMENT MAY BE LOCATED OR AT WHICH SELLER, ITS AGENT OR SUBCONTRACTOR MAY BE PERFORMING WORK. Seller's total responsibility for any claims, damages, losses or liabilities arising out of or related to its performance of this contract or the products or services covered hereunder shall not exceed the purchase price.

19. MODIFICATION, RESCISSION & WAIVER:
The terms herein may not be modified or rescinded nor any of its provisions waived unless such modification, rescission or waiver is in writing and signed by an authorized employee of Seller at its office in Houston, Texas.

Failure of Seller to insist in anyone or more instances upon the performance of any of the terms and conditions of the contract or the failure of Seller to exercise any of its rights hereunder shall not be construed as a waiver or relinquishment of any such term, condition, or right hereunder and shall not affect Seller's right to insist upon strict performance and compliance with regard to any unexecuted portions of this contract or future performance of these terms and conditions.

All orders must be accepted by an authorized employee of Seller. The rights and duties of the parties and construction and effect of all provisions hereof shall be governed by and construed according to the internal laws of the State of Texas. Any disputes which arise under this agreement shall be venued in the District Court of Harris County, Texas or in the Southern District of Texas.

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Teflon	E.I. DuPont De Nemours & Company

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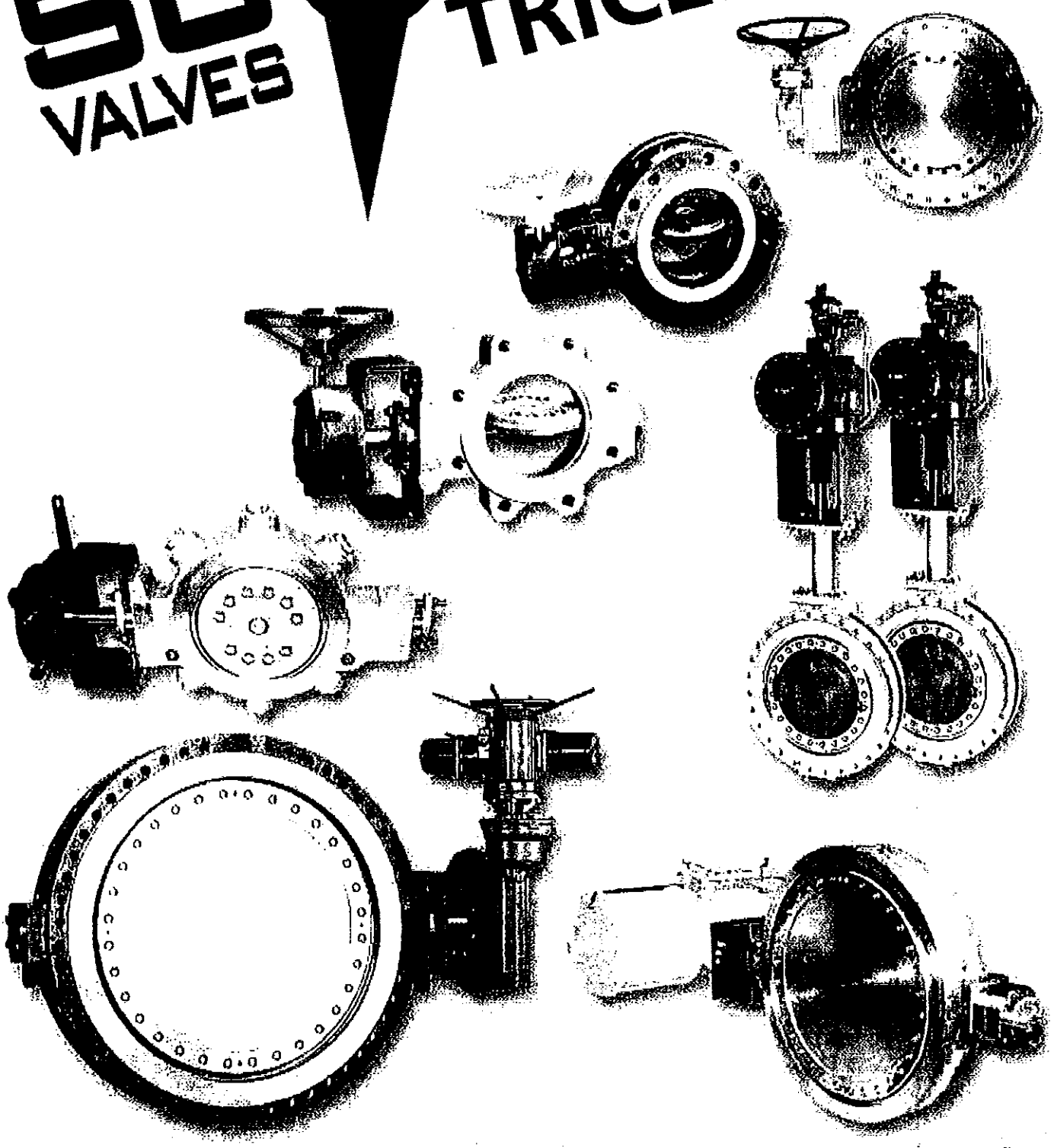
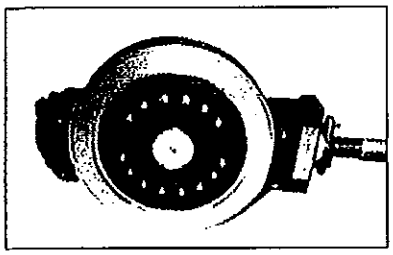
SCORE VALVES TRICENTRIC®

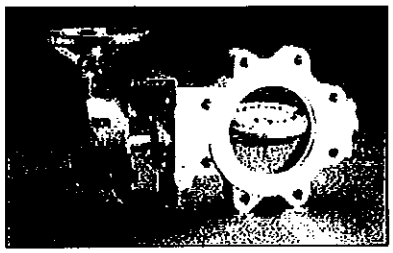


HIGH PERFORMANCE BUTTERFLY VALVES

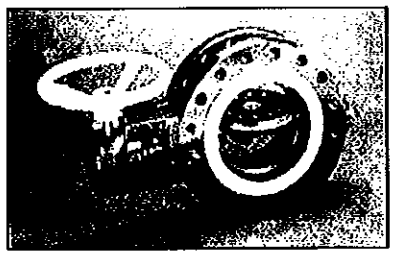
Score-TRICENTRIC® Valves
Metal-to-Metal Seated



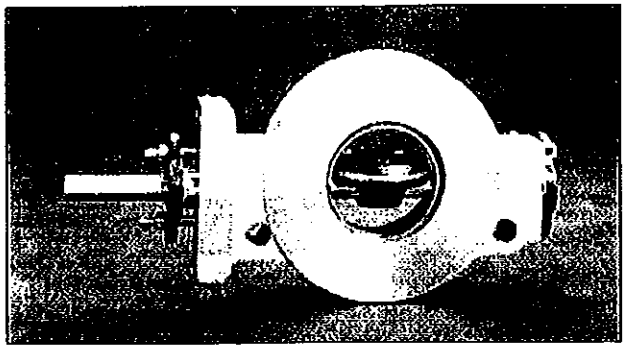
PLAIN WAFER



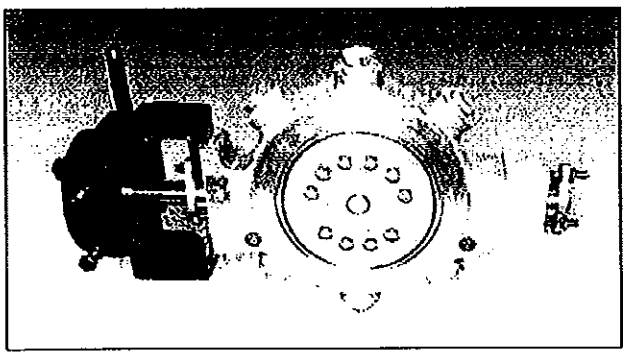
TAPPED LUGGED WAFER



DOUBLE FLANGED

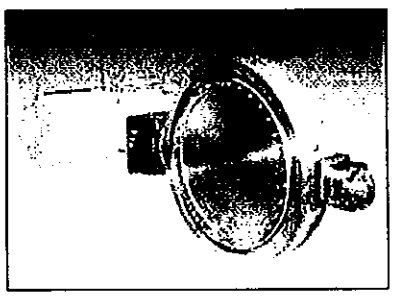


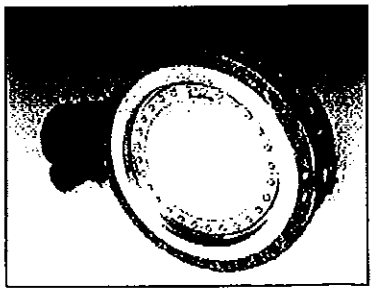
Score-TRICENTRIC® Reduced Port Valves to match reducing flanges where jacketed piping systems are required. Valves can be steam jacketed and equipped with steam traced shafts, if required.

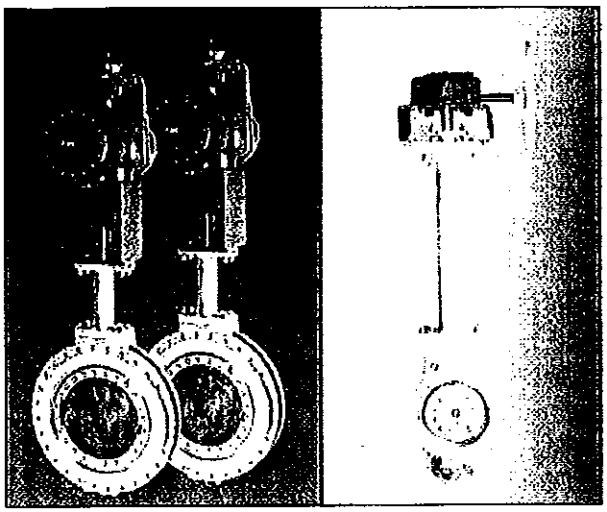


Score-TRICENTRIC® Steam Jacketed Valves with steam traced shafts for molten sulphur and pitch applications

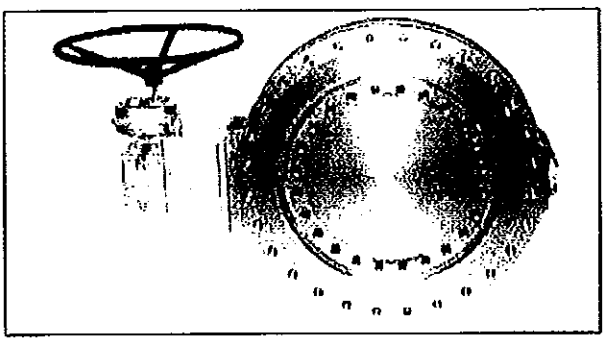
Score-TRICENTRIC® Acid Gas/Tail Gas/Flow Gas Valves. Triple offset seat design assures a frictionless seal for high cycle and extended valve life. Torque seated design assures tight shut-off at low and high pressures. Steam jacketed and steam traced shafts when required by application. No elastomers or teflon.





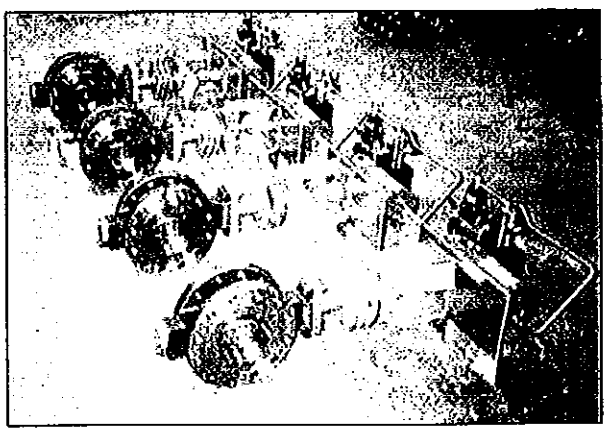


Score-TRICENTRIC® Cryogenic Valves. Tight shut-off, zero leakage at temperatures as low as -425° F. Liquid oxygen, nitrogen and liquid natural gas



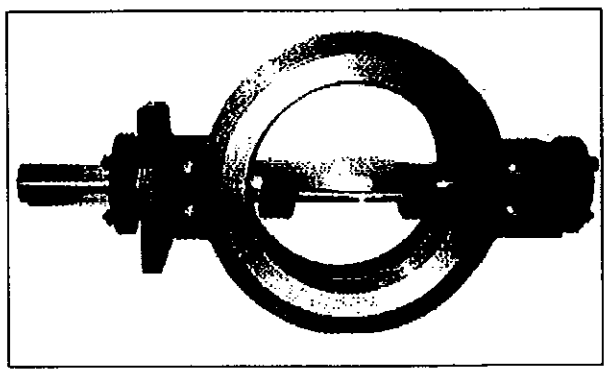
Score-TRICENTRIC® Valves for Sea Water Service.

- Nickel-Aluminum Bronze
- Monel
- Duplex
- Zeron - 100



Score-TRICENTRIC® Valves for High Temperatures.

- High temperature materials
- Bonnet extensions
- Cooling Fins on bonnet



Score-TRICENTRIC® Control Valves

- Swing thru disc
- Designed for flow control
- Liquids
- High temperature gases
- Excellent flow and throttling characteristics in a wide range of applications.

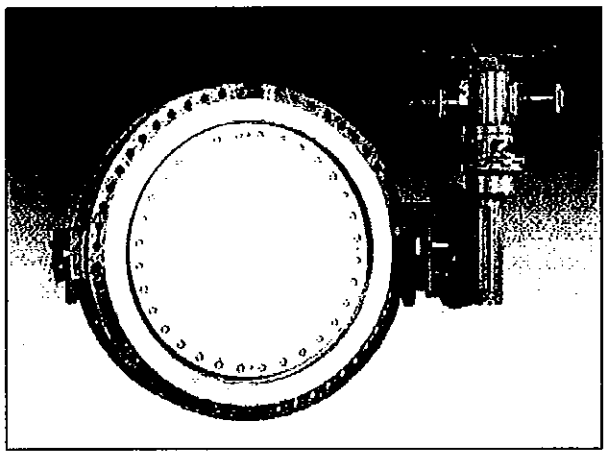
Score-TRICENTRIC®

The valve that outperforms any other valve. Proven as an industry leader in:

- Chemical Plants
- Refineries
- Gas Plants
- Oxygen Plants
- Aluminum Smelters
- Power Plants
- Pulp & Paper Mills
- Steel Mills

The Score-TRICENTRIC® valves are proven in many applications:

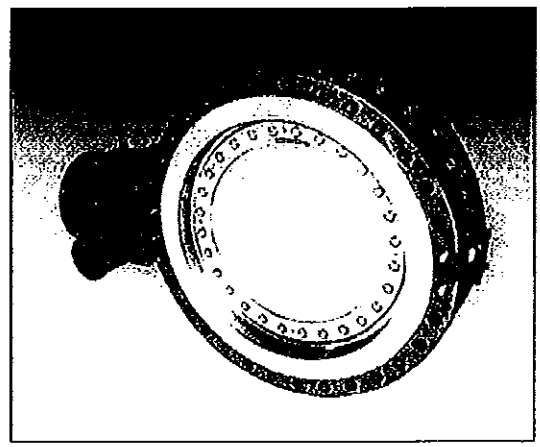
- Hydrogen gas
- Dirty hot cracking gas
- Acid gas & Tail gas
- Sulphur service
- CO_2 Vapours
- Ethylene service
- Liquid or gaseous oxygen
- Fuel oil storage
- Hot oil service
- Steam service
- Brine
- Black Liquor
- Red Liquor
- Blast furnace isolation
- Coke service
- Pump isolation
- Heat exchangers
- Pitch
- Gas pipeline switching valves
- Cryogenics
- Service water
- Sea water
- Control & throttling service
- Cooling water
- Green Liquor
- Pulp Stock



Score-TRICENTRIC® valves are manufactured to the highest quality and standards. Built to customer requirements for special applications and severe service conditions.

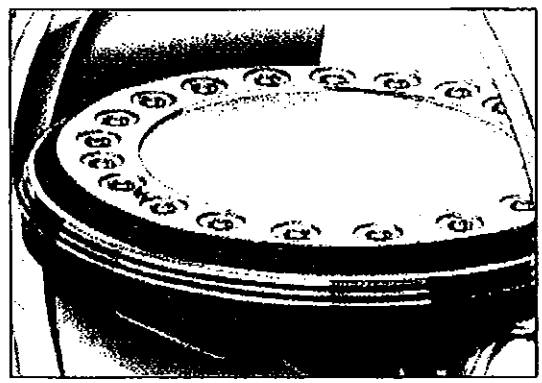
DESIGN

- **ASME B16.34 (ANSI B16.34)**
- **Fire safe (tested) API 607 4th Edition**
- **Fully complies with API 609 5th Edition**
- **Body Flange Bolting B16.5, B16.47 Series A, B16.47 Series B**
- **Testing API 598 0-Leakage or ANSI FCI-70.2 Class VI**
- **Boilers Safety Association Approved (CRN-0C0765-2)**
- **Face-to-face dimension API609, ISO5752 and B16.10**



Disc Seal

Valve closure is always positive. This unique metal disc seal design allows the seal to move clear of the seat at all points without jamming and is particularly good for frequent cycling operations. There are no elastomeric seal parts, thus the Score-TRICENTRIC® seal is inherently firesafe and can handle continuous temperatures of -425° F to 1200° F.



The Score-TRICENTRIC® High Performance Butterfly Valve has been a leader in performance and reliable service since it was originally designed in 1975. Its unique high quality design, dependable service in sensitive situations, and positive non-binding patented sealing system have enabled the Score-TRICENTRIC® valve to cover a broad range of applications in nearly every industry.

Built for dependability and severe service, Score-TRICENTRIC® valves have proven themselves time and time again, to become the first choice on many approved vendor lists across the continent.

SCORE ENERGY PRODUCTS INC., manufactures the Score-TRICENTRIC® valve in Alberta, Canada. The Score-TRICENTRIC® valve is built to exacting standards, and exciting new designs have increased the opportunities for use of Score-TRICENTRIC® design. Standard 3" to 60" 150 ANSI, 3" to 42" 300 ANSI, and 6" to 24" 600 ANSI class valves are now being built in Alberta, with many optional features for custom applications. Unique and sensitive applications are a specialty for the Score-TRICENTRIC® team, and we can build custom specialty valves where required.

STANDARD OPTIONS AVAILABLE

Cryogenic service ..... see Score Bulletin 101

High temperature service ..... see Score Bulletin 102

Reduced port applications ..... see Score Bulletin 103

Reduced pressure classes (EG/CL900x300, CL900x600) ..... see Score Bulletin 104

Steam jacketed body, steam traced shaft or disc ..... see Score Bulletin 105

Standard gear operator dimensions and data ..... see Score Bulletin 106

Live loaded packing/Fugitive emission control ..... see Score Bulletin 107

Special Bearing Designs - Seal, purge, and lubrication ..... see Score Bulletin 108

Blow out proof design per API 609 - 5th Edition ..... see Score Bulletin 109

Block and bleed service ..... see Score Bulletin 110

Score-TRICENTRIC® High Performance Butterfly Valves

A primary consideration in the selection of high performance valves is the ability to provide tight shutoff. Because of the unique design, Score-TRICENTRIC® valves are able to cover a broad range of applications in nearly every industry. Built for services that demand performance in the chemical processing, petroleum, pulp and paper, refinery, steel and utility industries, Score-TRICENTRIC® as a standard combines performance and dependability. As a precision machined valve, it is able to provide positive shutoff in vacuum services and pressures to 1480 psi (100 BAR). The patented sealing system has been the subject of extensive testing under carefully controlled conditions in our testing lab and at independent labs.*

* For copies of test reports, contact SCORE's Sales Department.

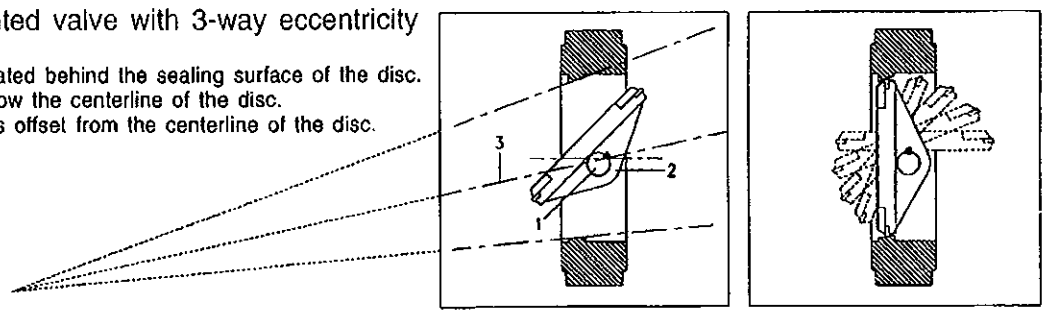
Off-the shelf features that mean reliable service . . .

1. A metal to metal sealing system so unique it's patented.
2. Standard valve is of API 607 fire tested design and constructed of NACE MR0175 compliant materials.
3. Seal stack is stainless steel laminated with non-asbestos gasketing material in disc.
4. The shaft is keyed to the disc and operator for improved operational reliability.
5. Annular key is connected to the shaft and locked in place, preventing stem blowout.
6. Torque seated, self compensating for temperature variances and no chance of override no matter how fast the closure rate.
7. Score-TRICENTRIC® geometry minimizes seat wear by eliminating interference.
8. Lugged, plain wafer and double flanged styles sizes 3" - 60" ANSI Class 150, 300 & 600. 80 - 1500 mm, 16 - 100 BAR. Larger sizes and pressures as noted or per applications.
9. Excellent flow, throttling and shut off characteristics, covering a wide range of applications, cryogenic to high temperature.
10. Meets API-609, MSS-SP-68 and ISO 5752 face to face dimensions.
11. Score-TRICENTRIC® valves are designed for bi-directional service at full body rating.
12. Shell tested to ANSI, MSS & API standards. Seat leakage tested to: API 598 zero leakage, ANSI/FCI 70-2, API 6D.
13. Efficient operation with worm gear, electric, pneumatic or hydraulic actuators.
14. Gasket surface is uninterrupted by seat/seal retainer bolt holes.
15. Canadian Boiler Safety Association registered valve design CRN 0C0765.2
16. All valves manufactured under an ISO registered quality assurance program.

Score-TRICENTRIC® Sealing System

The only patented valve with 3-way eccentricity

1. The shaft is located behind the sealing surface of the disc.
2. The shaft is below the centerline of the disc.
3. The cone axis is offset from the centerline of the disc.



SCORE VALVES SCORE ENERGY PRODUCTS INC. TRICENTRIC® Division

The Score-TRICENTRIC® Seal

Various disc seals are available for different temperature and service applications for Score-TRICENTRIC® valves. Solid metal seals are often used for temperatures above 950° F and up to 1500° F. Most frequently used is the laminated stainless steel seal, which consists of thin, stainless metal laminations with an intermediate gasketing material. Grafoil or Klingersil C4401 are used for laminating. The laminated seal is secured to the disc with a bolt-on steel clamp ring, and is easily accessible for replacement, if required. The Grafoil laminated seal stack is suitable for temperatures of -40° F and up to 1200° F (depending on application). Klingersil C4401 laminated seal stacks are also available, when required, by application.

The ultimate benefit of the Score-TRICENTRIC® seal is a tight shut-off. The Score-TRICENTRIC® seal leakage meets or exceeds ANSI FCI-70-2-1991, API 598 or API 6D and the Score-TRICENTRIC® valve is designed for bi-directional tight shut-off.

Under some severe and extreme conditions involving foreign matter in the line the seal stack may become damaged, but will still exhibit a very good sealing result. Unlike rubber-seated valves, any damage to the seal would not tend to worsen and cause the valve to fail completely. Any minor leakage problems can be rectified during the next scheduled shutdown by simply replacing the seal stack. From a maintenance standpoint, the cost of unscheduled shut-downs can be drastically reduced.

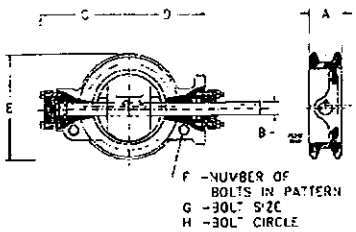
These features coupled with its unique sealing system allow for the use of the Score-TRICENTRIC® valve in many varied applications.

The Score-TRICENTRIC® Standard of Quality

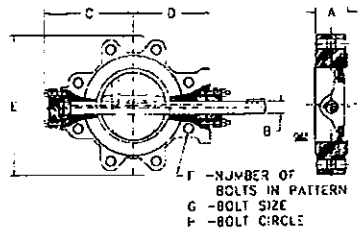
Score Energy Products Inc. manufactures the Score-TRICENTRIC® valve under a quality assurance program registered to the ISO 9000 series. Fire tested and approved to API 607 4th Edition, registered and approved by Boilers Safety Association (CRNOCO765-2).

In addition to standard dimensional inspection, visual inspection and pressure tests, supplementary examinations can be performed by qualified personnel for liquid penetrant and magnetic particle testing. Standard traceability of parts includes pressure retaining components and the valve shaft, with complete traceability available by request.

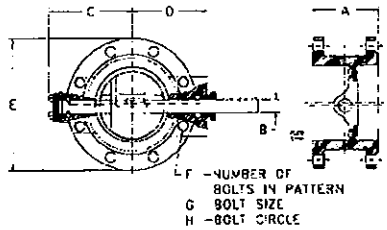
Score-TRICENTRIC®
Metal Seated High Performance Butterfly Valves
Class 150 - Sizes 3"- 24"



WAFER



LUGGED



DOUBLE FLANGE

DIMENSIONS

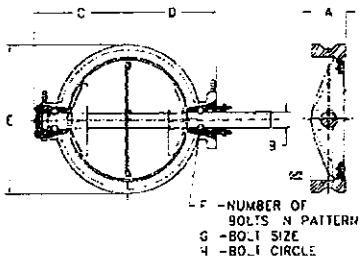
Valve Size	Style	A in.	B in.	C in.	D in.	E in.	F no.	G size.	H in.	Approximate Weight lbs.	Cv
3	Wafer Lugged Double Flange	1 7/8 1 7/8 4 1/2	3/4	4 1/2	4 3/8	7 1/2	4	5/8"-11	6	20 20 34	188
4	Wafer Lugged Double Flange	2 1/8 2 1/8 5	7/8	5 1/2	5 1/8	6 3/4 9 9	8	5/8"-11	7 1/2	24 31 50	343
6	Wafer Lugged Double Flange	2 1/4 2 1/4 5 1/2	1 1/8	6 1/2	6 1/2	8 5/8 11 11	8	3/4"- 10	9 1/2	37 44 72	930
8	Wafer Lugged Double Flange	2 1/2 2 1/2 6	1 1/4	7 3/4	7 5/8	10 7/8 13 1/2 13 1/2	8	3/4"- 10	11 3/4	56 68 111	1,812
10	Wafer Lugged Double Flange	2 13/16 2 13/16 6 1/2	1 1/2	9	9 3/8	13 1/4 16 16	12	7/8"- 9	14 1/4	88 107 161	2,750
12	Wafer Lugged Double Flange	3 3/16 3 3/16 7	1 5/8	10 1/2	10 1/2	16 19 19	12	7/8"- 9	17	135 175 238	3,900
14	Wafer Lugged Double Flange	3 5/8 3 5/8 7 1/2	1 1/4	11 1/2	11 5/16	17 5/8 21 21	12	1"- 8	18 3/4	181 235 315	5,515
16	Wafer Lugged Double Flange	4 4 8 1/2	2	12 13/16	12 1/2	20 1/8 23 1/2 23 1/2	16	1"- 8	21 1/4	270 330 410	8,440
18	Wafer Lugged Double Flange	4 1/2 4 1/2 8 3/4	2 1/4	13 9/16	13 13/16	21 1/2 25 25	16	1 1/8"- 8	22 1/4	330 404 515	11,285
20	Wafer Lugged Double Flange	5 5 9	2 1/2	14 7/8	15 3/16	23 3/4 27 1/2 27 1/2	20	1 1/4"- 8	25	450 560 610	14,092
24	Wafer Lugged Double Flange	6 1/16 6 1/16 10 1/4	3	17 1/2	18 3/16	28 1/8 32 32	20	1 1/4"- 8	29 1/2	662 878 900	20,587

Dimensions & Weights subject to change without notice. Consult Score Energy Products for confirmation.

Score-TRICENTRIC®

Metal Seated High Performance Butterfly Valves

Class 150 - Sizes 30"- 60"



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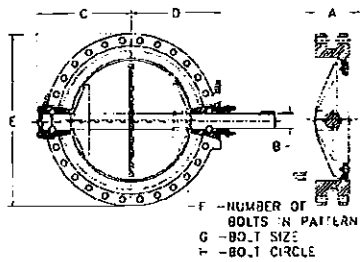

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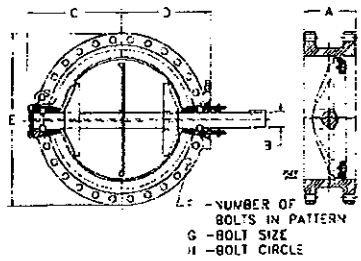


DOUBLE FLANGE

DIMENSIONS

Valve Size	Style	A in.	B in.	C in.	D in.	Series A E in.	Series A F no.	Series A G size.	Series A H in.	Series A Approximate Weight lbs.	Series B E in.	Series B F no.	Series B G size.	Series B H in.	Series B Approximate Weight lbs.	Cv
30	Wafer Lug	6 5/8	3	20 7/8	20 5/16	33 3/4 38 3/4	28	1 1/4	36	1110 1350	32 34 15/16	44	3/4	33 5/16	1000 1080	33,700
	Double Flange ISO	12 1/2				38 3/4				1800	34 15/16				*	
	Double Flange Opt.	15								*					*	
36	Wafer Lug	8	3 1/2	24 7/16	24 7/16	40 1/4 46	32	1 1/2	42 3/4	1780 2250	38 1/4 41 5/8	44	7/8	39 3/4	1680 1700	50,470
	Double Flange ISO	13				46				2550	41 5/8				*	
	Double Flange Opt.	13								*					*	
40	Wafer Lug	8 9/16	3 3/4	27 3/4	27 1/4	44 1/4 50 3/4	36	1 1/2	47 1/4	2250 3200	42 1/2 46 1/4	44	1	44 1/8	2150 2600	64,000
	Double Flange ISO	16 1/16				50 3/4				3500	46 1/4				*	
	Double Flange Opt.	15								*					*	
42	Wafer Lug	8 5/8	4	27 15/16	27 11/16	47 53	36	1 1/2	49 1/2	2900 3600	44 1/2 48 1/4	48	1	46 1/8	2720 2950	71,100
	Double Flange ISO	16 1/16				53				3900	48 1/4				*	
	Double Flange Opt.	15								*					*	
46	Wafer Lug	10	4 3/4	31 5/16	32	51 57 1/4	40	1 1/2	53 3/4	3300 4550	48 5/8 52 13/16	40	1 1/8	50 9/16	3200 3800	87,300
	Double Flange ISO	18 9/16				57 1/4				4700	52 13/16				*	
	Double Flange Opt.	15								*					*	
48	Wafer Lug	9 5/8	4 1/2	31 1/4	31 1/8	53 1/2 59 1/2	44	1 1/2	56	3900 5000	50 3/4 54 13/16	44	1 1/8	52 9/16	3700 4250	95,740
	Double Flange ISO	18 9/16				59 1/2				5200	54 13/16				*	
	Double Flange Opt.	15								*					*	
54	Wafer Lug	12	4 1/4	35 5/8	36 1/2	59 1/2 66 1/4	44	1 3/4	62 3/4	5500 7000	56 3/4 61	56	1 1/8	58 3/4	4900 5800	120,750
	Double Flange ISO	20 3/4				66 1/4				6500	61				*	
	Double Flange Opt.	15								*					*	
60	Wafer Lug	13 1/8	6	42 3/8	41 5/8	66 73	52	1 3/4	69 1/4	7100 9200	63 67 15/16	52	1 1/4	65 7/16	6400 7600	147,000
	Double Flange ISO	21				73				8000	67 15/16				*	
	Double Flange Opt.	15								*					*	

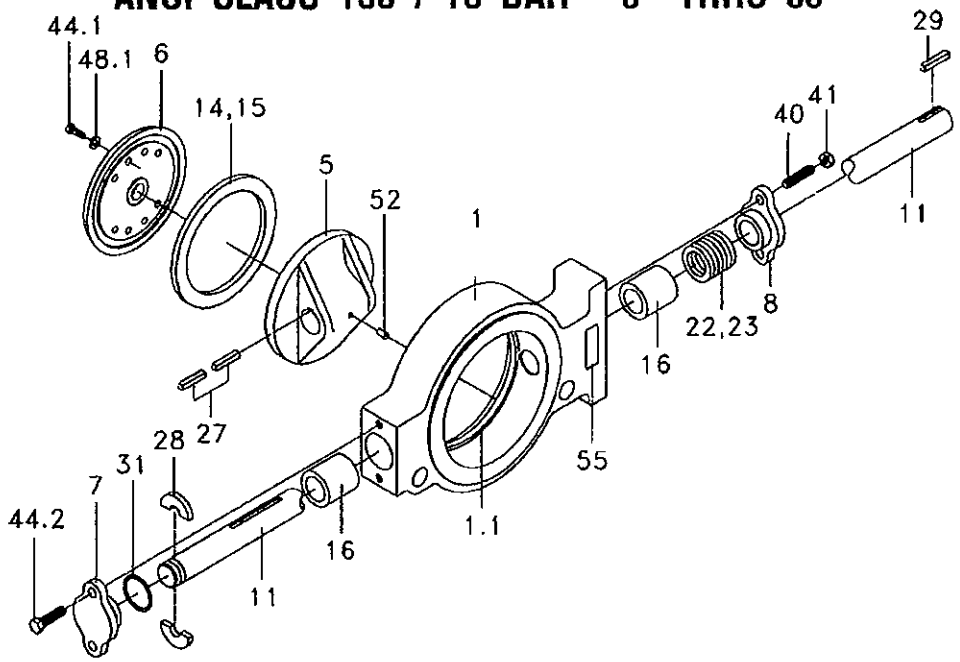
ISO = represents ISO 5752 short face-to-face

Opt = represents Manufacturers optional face-to-face

*Consult Score Energy Products Inc.

Dimensions & Weights subject to change without notice. Consult Score Energy Products for confirmation.

Plain Wafer, Lugged Wafer and Double Flanged
Standard Materials of Construction
ANSI CLASS 150 / 16 BAR - 3" THRU 60"



Item #	Description	Carbon Steel	316 Stainless Steel
1	Body	Carbon Steel/A216 GR WCB with Integral Seat	316 SST/A351 GR CF8M with Integral Seat
1.1	Seat	Integral w/body, w/316 overlay	Integral w/body
5	Disc	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M
6	Clamp Ring	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M
7	Cover Plate	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M
8	Packing Gland	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M
11	Shaft	17-4PH Double H1150 A564 T 630	17-4PH Double H1150 A564 T 630
14	Seal Stack	316 SST/Grafoil	316 SST/Grafoil
15	Bottom Gasket	Grafoil	Grafoil
16	Bearing	Carbon	Carbon
22	Packing Grafoil	John Crane 236/Grafoil	John Crane236/Grafoil

Item #	Description	Carbon Steel	316 Stainless Steel
23	Braided End Ring	John Crane 387-I	John Crane 387-I
27	Disc Key	316 SST	316 SST
28	Annular Key	A312 TP 316/Nitronic 60	A312 TP 316/Nitronic 60
29	Actuator Key	C1045	C1045
31	Metal O'Ring/Flex Gasket	Inconel 600 w/silver plate/316 SST w/Grafoil	Inconel 600 w/silver plate/316 SST w/Grafoil
40	Stud	316 SST	316 SST
41	Hex Nut	316 SST	316 SST
44.1	Disc Hex Head Cap Screw	316 SST	316 SST
44.2	Cover Hex Head Cap Screw	B8M	B8M
48.1	Disc Lock Washer	316 SST	316 SST
52	Pin	316 SST	316 SST
55	Serial Plate	304 SST	304 SST

Note:

Please contact Score Energy Products Inc. for the many optional materials that are available to meet your specific application.

Score-TRICENTRIC®

Design Characteristics - Class 150

PRESSURE/TEMPERATURE RATING		
Maximum Temperature Of	Working Pressure, psig	
	Carbon Steel	316SS
-20 to 100	285	275
200	260	235
300	230	215
400	200	195
500	170	170
600	140	140
650	125	125
700	110	110
750	95	95
800	80	80
850	Note A	65
900	_	50
950	_	35
1000	_	20

See Note A, B, C

Note:

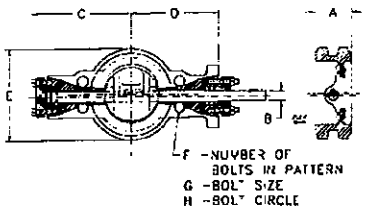
A. Permissible, but not recommended for prolonged usage above about 800° F.
B. These values may be interpolated on a linear scale for shut-off pressures between 150 psi and 285 psi.
C. Values shown are for preferred direction of shut-off under static differential pressure conditions

VALVE SEATING/UNSEATING TORQUES		
Valve Size	Half-Rated at 150 psi	Full-Rated at 285 psi
	in.-lb.	in.-lb.
3	812	1540
4	1165	2210
6	2209	4190
8	3144	5965
10	4585	8700
12	9434	17900
14	11753	22300
16	14809	28100
18	19773	37520
20	25797	48950
24	28037	53200
30	70000	112000
36	100000	160000
40	122000	214000
42	135000	220000
46	173000	303000
48	182000	320000
54	193000	_
60	320000	_

Score-TRICENTRIC®

Metal Seated High Performance Butterfly Valves

Class 300 - Sizes 3"- 24"



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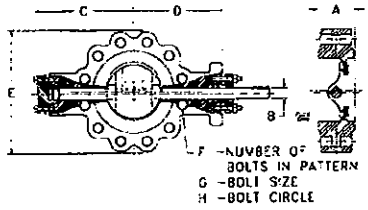

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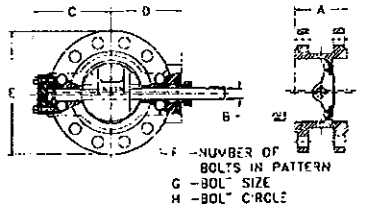


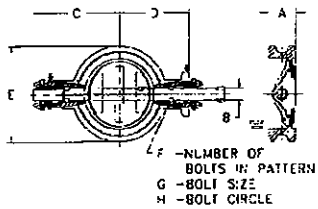
DOUBLE FLANGE

DIMENSIONS

Valve Size	Style	A in.	B in.	C in.	D in.	E in.	F no.	G size.	H in.	Approximate Weight lbs.	Cv
3	Wafer Lugged Double Flange	1 7/8 1 7/8 4 1/2	3/4	6 3/4 6 3/4 5	6 3/8 6 3/8 5	5 3/4 8 1/8 8 1/8	8	3/4"- 10	6 5/8	30 34 65	188
4	Wafer Lugged Double Flange	2 1/8 2 1/8 5	7/8	7 7/8 7 7/8 5 7/8	7 1/4 7 1/4 5 5/8	7 9 3/8 9 3/8	8	3/4"- 10	7 7/8	40 47 85	343
6	Wafer Lugged Double Flange	2 5/16 2 5/16 5 1/2	1 1/4	9 3/16 9 3/16 7 1/8	8 3/4 8 3/4 7 1/8	9 3/4 12 1/8 12 1/8	12	3/4"- 10	10 5/8	62 76 120	868
8	Wafer Lugged Double Flange	2 7/8 2 7/8 6	1 1/2	10 10 8 9/16	10 10 8 7/8	12 14 3/4 14 3/4	12	7/8"- 9	13	108 133 186	1,678
10	Wafer Lugged Double Flange	3 1/4 3 1/4 6 1/2	1 5/8	11 5/8 11 5/8 9 1/8	11 1/4 11 1/4 9 3/4	14 1/8 17 1/4 17 1/4	16	1"- 8	15 1/4	151 193 260	2,500
12	Wafer Lugged Double Flange	3 5/8 3 5/8 7	1 3/4	12 1/8 12 1/8 11 5/16	11 9/16 11 9/16 11 1/16	16 1/2 20 20	16	1 1/8"- 8	17 3/4	240 258 375	3,510
14	Wafer Lugged Double Flange	4 5/8 4 5/8 7 1/2	2 1/4	13 5/8 13 5/8 12 7/8	14 3/16 14 3/16 13 9/16	18 7/8 23 23	20	1 1/8"- 8	20 1/4	360 456 600	4,942
16	Wafer Lugged Double Flange	5 1/4 5 1/4 8 1/2	2 1/2	14 13/16 14 13/16 14 1/16	15 1/2 15 1/2 15	21 25 1/4 25 1/4	20	1 1/4"- 8	22 1/2	420 610 770	7,596
18	Wafer Lugged Double Flange	5 7/8 5 7/8 8 3/4	2 3/4	16 5/8 16 5/8 15 1/4	17 3/8 17 3/8 16 3/8	23 1/8 27 3/8 27 3/8	24	1 1/4"- 8	24 3/4	556 900 1000	10,394
20	Wafer Lugged Double Flange	6 1/4 6 1/4 9	3	17 3/16 17 3/16 16 3/4	17 5/8 17 5/8 17 3/8	25 1/2 30 30	24	1 1/4"- 8	27	700 1032 1175	12,965
24	Wafer Lugged Double Flange	7 1/8 7 1/8 10 1/2	3 1/2	19 15/16 19 15/16 19 11/16	21 3/8 21 3/8 21 1/8	30 1/4 36 36	24	1 1/2"- 8	32	1000 1650 1775	18,962

Dimensions & Weights subject to change without notice. Consult Score Energy Products for confirmation

Score-TRICENTRIC®
Metal Seated High Performance Butterfly Valves
Class 300 - Sizes 30"- 42"



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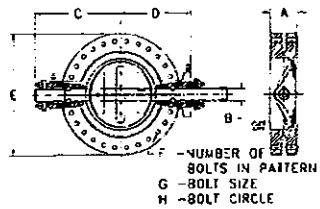

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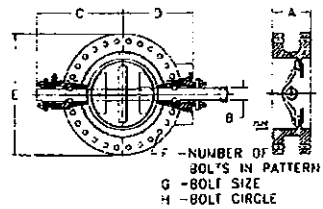


DOUBLE FLANGE

DIMENSIONS

Valve Size	Style		A in.	B in.	C in.	D in.	ASME B16.47 Series A E in.	F no.	G size.	H in.	Approximate Weight lbs.	ASME B16.47 Series B E in.	F no.	G size.	H in.	Approximate Weight lbs.	Cv
30	Wafer		10	4	$29^{13}/_{16}$	$24^{13}/_{16}$	33¾	28	1¼	39¼	1800	33¼	36	1⅜	36¼	*	29,600
	Lugged						43				2950	39				*	
	Double Flange		12½				43				3150	39				*	
36	Wafer		12	5	$35^{7}/_{16}$	$29^{7}/_{16}$	40¼	32	2	46	3150	39¾	32	1⅝	42⅞	*	42,700
	Lugged						50				4750	46⅛				*	
	Double Flange		13				50				4900	46⅛				*	
42	Wafer		12¾	5	$37^{13}/_{16}$	$31^{13}/_{16}$	44¾	32	1⅝	47½	4150	46	36	1¾	49	*	58,100
	Lugged						50¾				5350	52½				*	
	Double Flange	ISO	$16\ ^{3}/_{16}$				50¾				5600	52½				*	
		OPT	14¾														

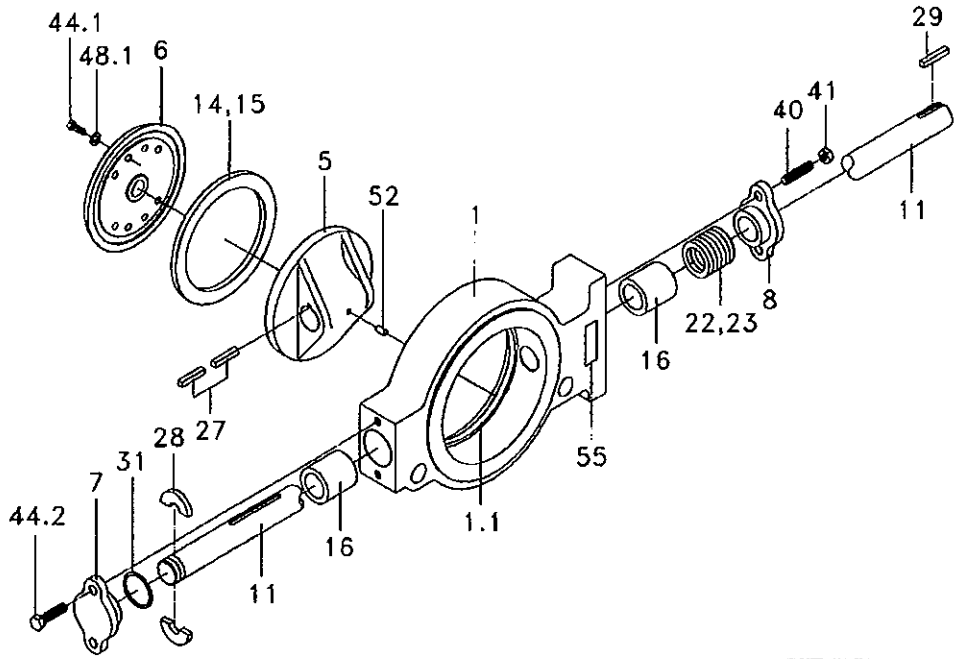
ISO = represents ISO 5752 short face-to-face

Opt = represents Manufacturers optional face-to-face

* Consult Score Energy Products Inc.

Dimensions & Weights subject to change without notice. Consult Score Energy Products for confirmation

Plain Wafer, Lugged Wafer and Double Flanged
Standard Materials of Construction
ANSI CLASS 300 / 40 BAR - 3" THRU 24"

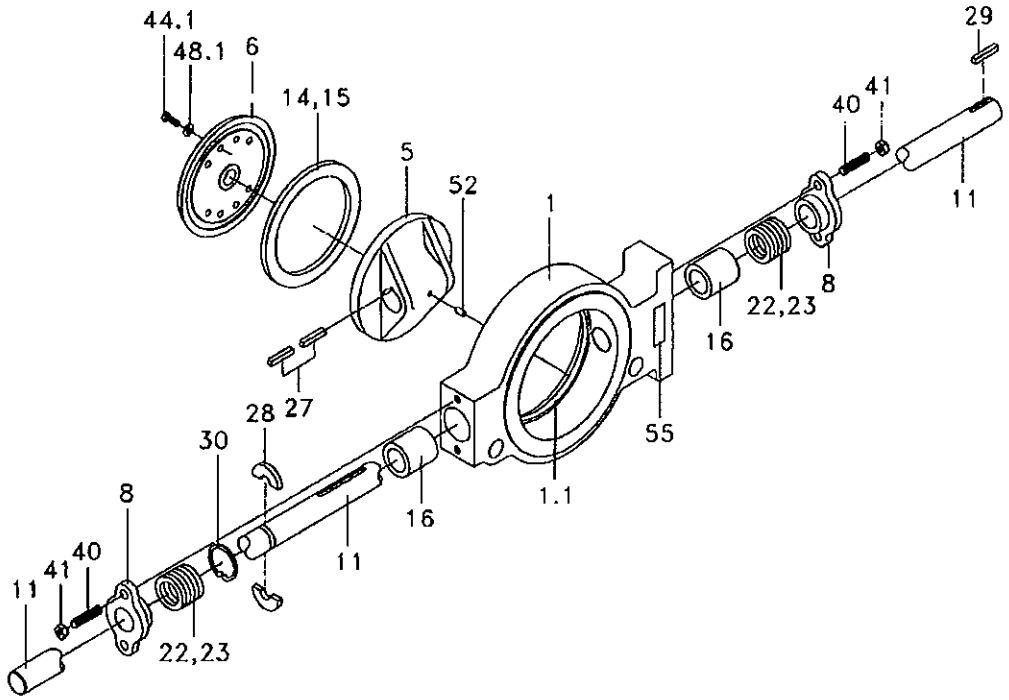


Item #	Description	Carbon Steel	316 Stainless Steel
1	Body	Carbon Steel/A216 GR WCB with Integral Seat	316 SST/A351 GR CF8M with Integral Seat
1.1	Seat	Integral w/body, w/316 overlay	Integral w/body
5	Disc	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M
6	Clamp Ring	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M
7	Cover Plate	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M
8	Packing Gland	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M
11	Shaft	17-4PH Double H1150 A564 T 630	17-4PH Double H1150 A564 T 630
14	Seal Stack	316 SST/Grafoil	316 SST/Grafoil
15	Bottom Gasket	Grafoil	Grafoil
16	Bearing	Nitronic 60	Nitronic 60
22	Packing Grafoil	John Crane 235/Grafoil	John Crane 235/Grafoil

Item #	Description	Carbon Steel	316 Stainless Steel
23	Braided End Ring	John Crane 387-I	John Crane 387-I
27	Disc Key	316 SST	316 SST
28	Annular Key	316 SST/Nitronic 60	316 SST/Nitronic 60
29	Actuator Key	C1045	C1045
31	Metal O'Ring/Flex Gasket	Inconel 600 w/silver plate/316 SST w/Grafoil	Inconel 600 w/silver plate/316 SST w/Grafoil
40	Stud	316 SST	316 SST
41	Hex Nut	316 SST	316 SST
44.1	Disc Hex Head Cap Screw	316 SST	316 SST
44.2	Cover Hex Head Cap Screw	B8M	B8M
48.1	Disc Lock Washer	316 SST	316 SST
52	Pin	316 SST	316 SST
55	Serial Plate	304 SST	304 SST

Note: Please contact Score Energy Products Inc. for the many optional materials that are available to meet your specific application.

Plain Wafer, Lugged Wafer and Double Flanged
Standard Materials of Construction
ANSI CLASS 300 / 40 BAR - 30" THRU 42"



Item #	Description	Carbon Steel	316 Stainless Steel
1	Body	Carbon Steel/A216 GR WCB with Integral Seat	316 SST/A351 GR CF8M with Integral Seat
1.1	Seal	Integral w/body, w/316 overlay	Integral w/body
5	Disc	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M
6	Clamp Ring	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M
8	Packing Gland	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M
11	Shaft	17-4PH Double H1150 A564 T 630	17-4PH Double H1150 A564 T 630
14	Seal Stack	316 SST/Grafoil	316 SST/Grafoil
15	Bottom Gasket	Grafoil	Grafoil
16	Bearing	Nitronic 60	Nitronic 60
22	Packing Grafoil	John Crane 235/Grafoil	John Crane 235/Grafoil

Item #	Description	Carbon Steel	316 Stainless Steel
23	Braided End Ring	John Crane 387-I	John Crane 387-I
27	Disc Key	316 SST	316 SST
28	Annular Key	Nitronic 60	Nitronic 60
29	Actuator Key	C1045	C1045
30	Retaining Ring	Alloy Steel	Stainless Steel
40	Stud	316 SST	316 SST
41	Hex Nut	316 SST	316 SST
44.1	Disc Hex Head Cap Screw	316 SST	316 SST
48.1	Disc Lock Washer	316 SST	316 SST
52	Pin	316 SST	316 SST
55	Serial Plate	304 SST	304 SST

Note: Please contact Score Energy Products Inc. for the many optional materials that are available to meet your specific application.

Score-TRICENTRIC®

Design Characteristics - Class 300

PRESSURE/TEMPERATURE RATING		
Maximum Temperature Of	Working Pressure, psig	
	Carbon Steel	316SS
-20 to 100	740	720
200	675	620
300	655	560
400	635	515
500	600	480
600	550	450
650	535	445
700	535	430
750	505	425
800	410	420
850	Note A	420
900	_	415
950	_	385
1000	_	350
1050	_	345
1100	_	305
1150	_	235
1200	_	185
1250	_	145
1300	_	115
1350	_	95
1400	_	75
1450	_	60
1500	_	40

VALVE SEATING/UNSEATING TORQUES		
Valve Size	Half-Rated at 370 psi	Full-Rated at 740 psi
	in.-lb.	in.-lb.
3	1200	2400
4	1750	3500
6	3650	7300
8	6650	13300
10	8350	16700
12	11100	22200
14	18400	36800
16	27750	55500
18	34800	69600
20	45850	91700
24	77705	155410
30	146500	293000
36	234000	468000
42	355000	710000

See Note A, B, C

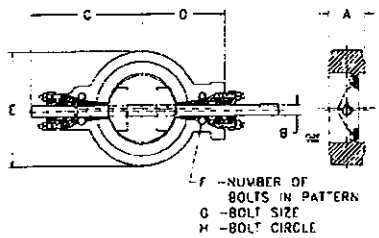
Note:

A. Permissible, but not recommended for prolonged usage above about 800° F.

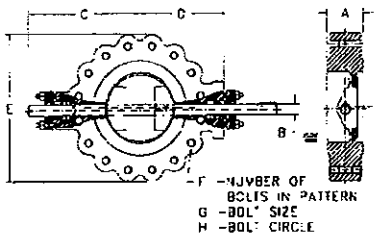
B. These values may be interpolated on a linear scale for shut-off pressures between 370 psi and 740 psi.

C. Values shown are for preferred direction of shut-off under static differential pressure conditions

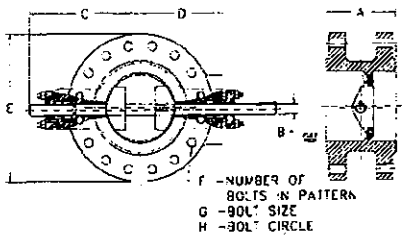
Score-TRICENTRIC®
Metal Seated High Performance Butterfly Valves
Class 600 - Sizes 6"-24"



WAFER



LUGGED



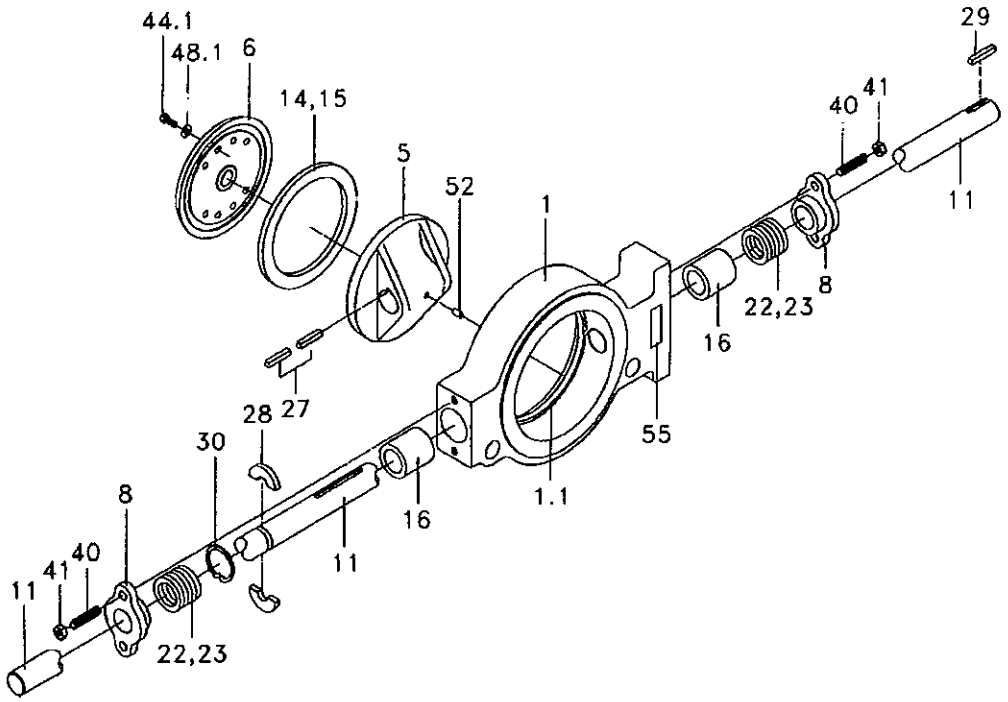
DOUBLE FLANGE

DIMENSIONS

Valve Size	Style	A in.	B in.	C in.	D in.	E in.	F no.	G size.	H in.	Approximate Weight lbs.	Cv
6	Wafer Lugged Double Flange	3 9/32 3 9/32 8 5/16	1½	11 3/16	8⅝	10 14 14	12	1"- 8	11½	100 124 150	744
8	Wafer Lugged Double Flange	4 4 9 1/16	1⅞	12⅜	9¾	12⅛ 16½ 16½	12	1⅛"- 8	13¾	154 208 250	1,450
10	Wafer Lugged Double Flange	4⅝ 4⅝ 9⅞	2⅛	14⅛	11½	15 ½ 20 20	16	1¼"- 8	17	226 311 340	2,125
12	Wafer Lugged Double Flange	6½ 6½ 10⅝	2¾	15 11/16	12 13/16	17 ¾ 22 22	20	1¼"- 8	19¼	328 443 550	2,730
14	Wafer Lugged Double Flange	6⅞ 6⅞ 11 7/16	3	16⅝	13¾	19⅛ 23¾ 23¾	20	1⅜"- 8	20¾	535 735 750	4,217
16	Wafer Lugged Double Flange	7 7 12¼	3⅛	17⅛	14⅝	22 27 27	20	1½"- 8	23¾	700 885 950	6,487
18	Wafer Lugged Double Flange	7⅞ 7⅞ 13	3¼	20 7/16	17 1/16	23⅞ 29¼ 29¼	20	1⅝"- 8	25¾	950 1268 1300	8,874
20	Wafer Lugged Double Flange	8½ 8½ 13 13/16	3½	21⅞	18⅜	26½ 32 32	24	1⅝"- 8	28½	1040 1560 1640	11,071
24	Wafer Lugged Double Flange	9⅛ 9⅛ 15⅜	4	23⅝	20⅛	30¼ 37 37	24	1⅞"- 8	33	1820 2340 2450	16,188

Dimensions and weights subject to change without notice; consult SCORE Energy Products for confirmation.

Plain Wafer, Lugged Wafer and Double Flanged
Standard Materials of Construction
ANSI CLASS 600 / 100 BAR - 6" THRU 24"



Item #	Description	Carbon Steel	316 Stainless Steel	Item #	Description	Carbon Steel	316 Stainless Steel
1	Body	Carbon Steel/A216 GR WCB with Integral Seat	316 SST/A351 GR CF8M with Integral Seat	23	Braided End Ring	John Crane 387-I	John Crane 387-I
1.1	Seat	Integral w/body, w/316 overlay	Integral w/body	27	Disc Key	316 SST	316 SST
5	Disc	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M	28	Annular Key	Nitronic 60	Nitronic 60
6	Clamp Ring	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M	29	Actuator Key	C1045	C1045
8	Packing Gland	Carbon Steel/A216 GR WCB	316 SST/A351 GR CF8M	30	Retaining Ring	Alloy Steel	Stainless Steel
11	Shaft	17-4PH Double H1150 A564 T 630	17-4PH Double H1150 A564 T 630	40	Stud	316 SST	316 SST
14	Seal Stack	316 SST/Grafoil	316 SST/Grafoil	41	Hex Nut	316 SST	316 SST
15	Bottom Gasket	Grafoil	Grafoil	44.1	Disc Hex Head Cap Screw	316 SST	316 SST
16	Bearing	Nitronic 60	Nitronic 60	48.1	Disc Lock Washer	316 SST	316 SST
22	Packing Grafoil	John Crane 235/Grafoil	John Crane 235/Grafoil	52	Pin	316 SST	316 SST

Note: Please contact Score Energy Products Inc. for the many optional materials that are available to meet your specific application.

Score-TRICENTRIC®

Design Characteristics - Class 600

PRESSURE/TEMPERATURE RATING		
Maximum Temperature Of	Working Pressure, psig	
	Carbon Steel	316SS
-20 to 100	1480	1440
200	1350	1240
300	1315	1120
400	1270	1025
500	1200	955
600	1095	900
650	1075	890
700	1065	870
750	1010	855
800	825	845
850	Note A	835
900	_	830
950	_	775
1000	_	700
1050	_	685
1100	_	610
1150	_	475
1200	_	370
1250	_	295
1300	_	235
1350	_	190
1400	_	150
1450	_	115
1500	_	85

VALVE SEATING/UNSEATING TORQUES		
Valve Size	Half-Rated at 740 psi	Full-Rated at 1480 psi
	in.-lb.	in.-lb.
6	13000	26000
8	16000	32000
10	25000	50000
12	52500	105000
14	62500	125000
16	75500	151000
18	93000	186000
20	118000	235000
24	170000	340000

See Note A, B, C

Note:

A. Permissible, but not recommended for prolonged usage above about 800° F.

B. These values may be interpolated on a linear scale for shut-off pressures between 740 psi and 1480 psi.

C. Values shown are for preferred direction of shut-off under static differential pressure conditions.

ANSI and DIN VALVE DATA

Weights (pounds)

Valve Size:

ANSI CLASS/BAR	STYLE	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"	40"	42"	46"	48"	54"	60"
150/16	Wafer	20	24	37	56	88	135	181	270	330	450	662	1,110	1,780	2,250	2,900	3,300	3,900	5,500	7,100
150/16	Lugged	20	31	44	68	107	175	235	330	404	560	878	1,350	2,250	3,200	3,600	4,550	5,000	7,000	9,200
150/16	Double	34	50	72	111	181	238	315	410	515	610	900	1,800	2,550	3,500	3,900	4,700	5,200	6,500	8,000
300/40	Wafer	30	40	62	108	151	240	410	581	556	800	1,400	1,800	3,150		4,150				
300/40	Lugged	34	47	76	133	193	258	456	680	900	1,032	1,160	2,950	4,750		5,350				
300/40	Double	65	85	120	186	260	375	510	660	860	1,100	1,600	3,150	4,900		5,600				
600/100	Wafer			100	154	226	328	535	700	950	1,040	1,820								
600/100	Lugged			124	208	311	443	735	885	1,268	1,560	2,340								
600/100	Double			150	250	340	550	750	950	1,300	1,840	2,450								

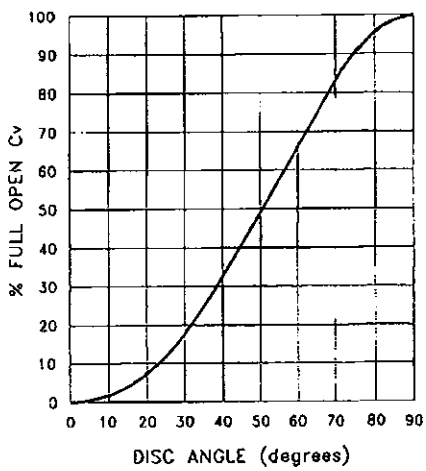
Cv Values

Valve Size:

ANSI CLASS/BAR	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"	40"	42"	46"	48"	54"	60"
150/16	188	343	930	1,812	2,750	3,900	5,515	8,440	11,285	14,092	20,587	33,700	50,470	64,000	71,100	87,300	95,740	120,750	147,000
300/40	188	343	868	1,678	2,500	3,510	4,942	7,596	10,394	12,965	18,962	29,600	42,700		58,100				
600/100			744	1,450	2,125	2,730	4,217	6,487	8,874	11,071	16,188								

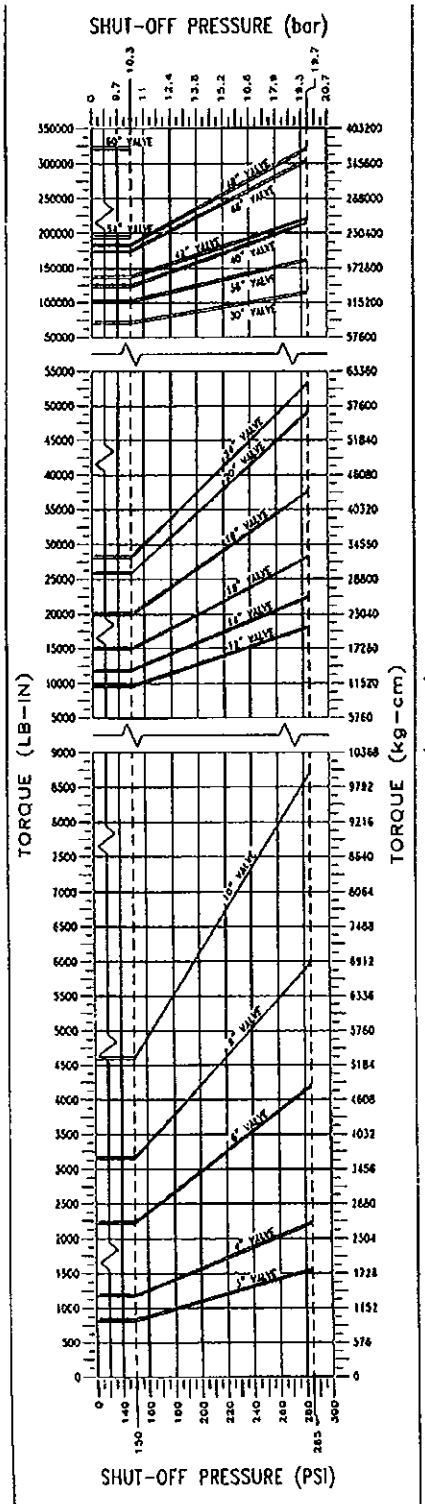
Typical Flow Characteristic

For control applications a wide variety of actuators and accessories can be provided. At moderate pressure drop conditions, turndown approaching 100 to 1 can be achieved because of the camming action of the disc opening. The disc lifts off the seat very quickly and an equal percentage control curve is produced between 15° to 75°.

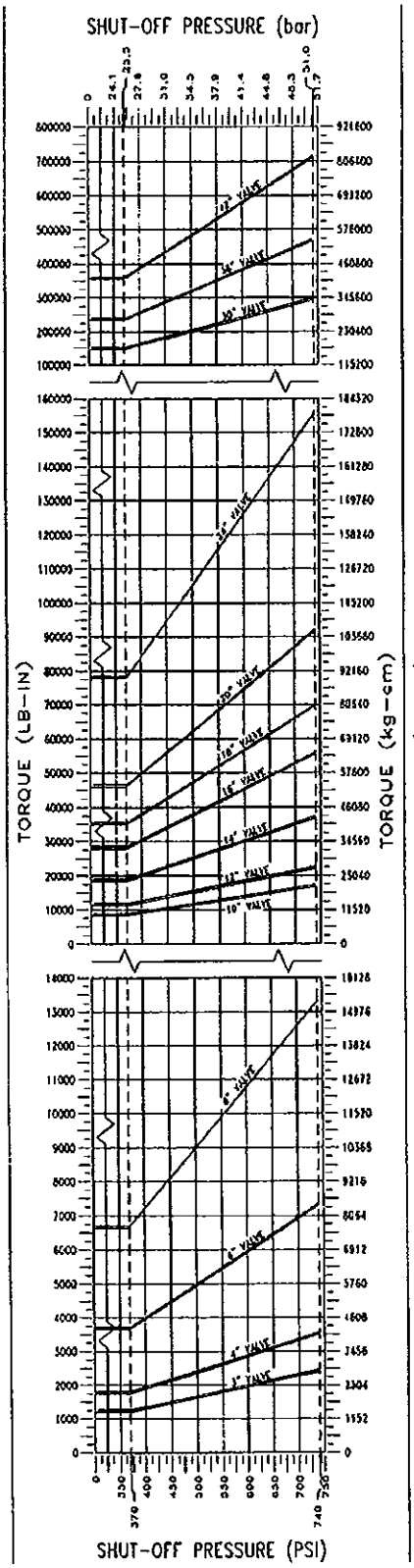


Torque Requirements

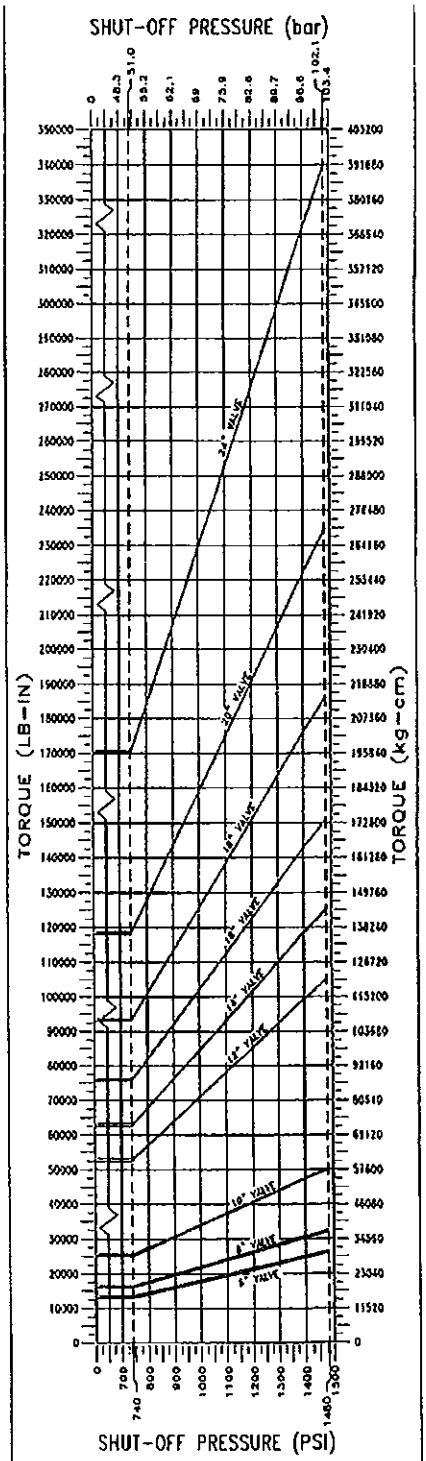
ANSI CLASS 150/16 BAR



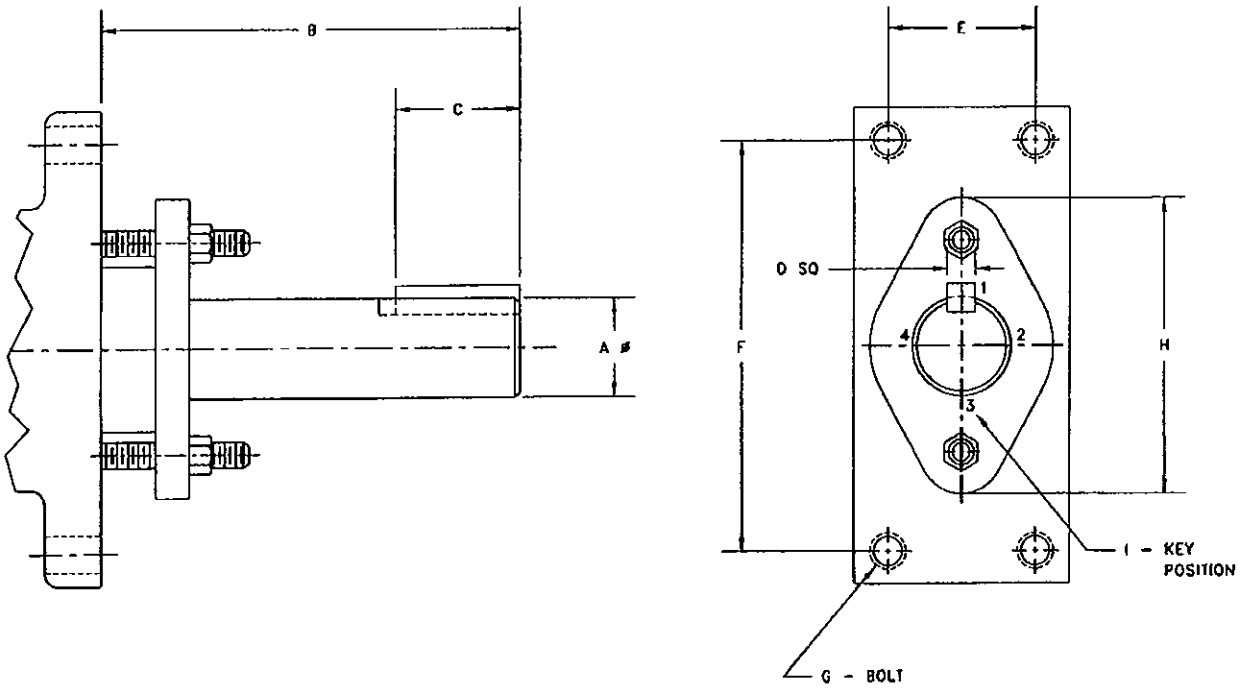
ANSI CLASS 300/40 BAR



ANSI CLASS 600/100 BAR



Actuator Mounting Data



ANSI CLASS 150/16 BAR

		3"	4"	6"	8"	10"	12"	14"	16"	18"
A	Lug/Wafer Double Flange	¾	⅞	1⅛	1¼	1½	1⅝	1¾	2	2¼
B	Lug/Wafer Double Flange	4½	4½	5	5½	5½	7⅜	7⅜	7⅜	7⅜
C	Lug/Wafer Double Flange	⅞	⅞	1 7/16	1⅞	1 13/16	2⅝	2⅝	2½	2 9/16
D	Lug/Wafer Double Flange	3/16	¼	¼	¼	⅜	⅜	⅜	½	½
E	Lug/Wafer	1	1¼	1¼	1¼	1¼	2	2	2	3⅛
	Double Flange	3½	4	4	4	3	3½	3½	3½	4
F	Lug/Wafer	5	5	5	5	5	6¼	6¼	6¼	6¾
	Double Flange	3½	4	4	4	4⅞	6¼	6¼	6¼	6¾
G	Lug/Wafer	⅜"- 16	⅜"- 16	⅜"- 16	⅜"- 16	⅜"- 16	½"- 13	½"- 13	½"- 13	⅝"- 11
	Double Flange	⅜"- 16	⅜"- 16	⅜"- 16	⅜"- 16	⅜"- 16	½"- 13	½"- 13	⅝"- 11	¾"- 10
H	Lug/Wafer	3 23/32	3 23/32	3 23/32	3 23/32	4 11/32	4 11/32	4 11/32	5 3/32	5 3/32
I	Lug/Wafer Double Flange	1	1	1	1	1	1	1	1	1

ANSI CLASS 150/16 BAR CONTINUED

		20"	24"	30"	36"	40"	42"	46"	48"	54"	60"
A	Lug/Wafer Double Flange	2½	3	3	3½	3¾	4	4¾	4½	4¼	6
B	Lug/Wafer Double Flange	7⅜	7⅜	12	12	12	12	12	12	14¼	14⅛
C	Lug/Wafer Double Flange	2⅜	3 5/16	4⅜	4⅝	4½	4⅞	5	5¾	4½	5 7/16
D	Lug/Wafer Double Flange	⅝	¾	¾	⅞	⅞	1	1¼	1	1	1½
E	Lug/Wafer	3⅛	3⅛	3½	4½	4½	4½	4½	4½	6½	7
	Double Flange	4	5	3½	4	4½	4½	4½	4½	6½	7
F	Lug/Wafer	6¾	6¾	11	12¼	14	12¼	12¼	12¼	13¼	15
	Double Flange	6¾	6¾	11	12¼	14	12¼	12¼	12¼	13¼	15
G	Lug/Wafer	⅝"- 11	⅝"- 11	1" - 8	1" - 8	1" - 8	1" - 8	1" - 8	1" - 8	1¼" - 8	1¼" - 8
	Double Flange	¾"- 10	¾"- 10	1" - 8	1" - 8	1" - 8	1" - 8	1" - 8	1" - 8	1¼" - 8	1¼" - 8
H	Lug/Wafer	5 3/32	5 15/16	6	7	7½	7½	8	8	7¾	10¼
I	Lug/Wafer Double Flange	1	1	1	1	1&4	1	1&3	1	1&3	1&3

ANSI CLASS 300/40 BAR

		3"	4"	6"	8"	10"	12"	14"	16"	18"
A	Lug/Wafer Double Flange	¾	⅞	1¼	1½	1⅝	1¾	2¼	2½	2¾
B	Lug/Wafer Double Flange	5 5/16	5 5/16	5 11/16	7⅛	7⅛	7⅛	7	7	7
C	Lug/Wafer Double Flange	2 3/16	1 15/16	2¾	2 9/16	2 1/16	2⅝	1½	1 11/16	1 9/16
D	Lug/Wafer Double Flange	3/16	¼	¼	⅜	⅜	⅜	½	⅝	⅝
E	Lug/Wafer	1	1	1	1¼	2	2	3	3	4
	Double Flange	3⅜	4	3¼	4½	4½	3½	5½	5½	5½
F	Lug/Wafer	5	5	5	6¼	6¼	6¼	9¾	9¾	9¾
	Double Flange	3⅜	4	5	4½	4½	6¼	9¾	9¾	9¾
G	Lug/Wafer	⅜"- 16	⅜"- 16	⅜"- 16	⅜"- 16	½"- 13	½"- 13	⅝"- 11	⅝"- 11	¾"- 10
	Double Flange	⅜"- 16	⅜"- 16	⅜"- 16	½"- 13	½"- 13	⅝"- 11	⅝"- 11	¾"- 10	⅞" - 9
H	Lug/Wafer Double Flange	4⅛	4⅛	4⅛	5¼	5¼	5¼	6⅞	6⅞	7⅛
I	Lug/Wafer Double Flange	1	1	1	1	1	1	1	1	1

ANSI CLASS 300/40 BAR CONTINUED

		20"	24"	30"	36"	42"
A	Lug/Wafer Double Flange	3	3½	4	5	5
B	Lug/Wafer Double Flange	7	7	12	12	14
C	Lug/Wafer Double Flange	1½	1¾	3⅞	4	5 1/16
D	Lug/Wafer Double Flange	¾	⅞	1	1¼	1¼
E	Lug/Wafer	4	4	6	8	8
	Double Flange	5½	6¾	8	8	8
F	Lug/Wafer	9¾	9¾	12	12	12
	Double Flange	9¾	9¾	12	12	12
G	Lug/Wafer	¾"- 10	¾"- 10	1¼" - 8	1⅜" - 8	1⅝" - 8
	Double Flange	⅞" - 9	1" - 8	1¼" - 8	1⅜" - 8	1⅝" - 8
H	Lug/Wafer Double Flange	7⅛	8½	8½	10½	10½
I	Lug/Wafer Double Flange	1	1&3	1&3	1&3	1&3

ANSI CLASS 600/100 BAR

		6"	8"	10"	12"	14"	16"	18"	20"	24"
A	Lug/Wafer	1½	1⅞	2⅛	2¾	3	3⅛	3¼	3½	4
B	Lug/Wafer	7 11/16	7 11/16	8¼	8 31/32	9 3/16	10½	10½	10½	10½
C	Lug/Wafer	3 11/16	3⅜	2¾	2¼	3⅞	3⅞	5 3/16	2¼	3 5/16
D	Lug/Wafer	⅜	½	½	⅝	¾	¾	¾	⅞	1
E	Lug/Wafer	2	2	2¾	3⅛	4⅝	4¾	5	5	6
F	Lug/Wafer	6¼	6¼	6	7 9/16	7½	9½	11	12	14
G	Lug/Wafer	½" - 13	½" - 13	¾" - 10	¾" - 10	1" - 8	1" - 8	1" - 8	1" - 8	1" - 8
H	Lug/Wafer	4¼	5	5	6½	6¾	6⅝	7	8¼	8⅞
I	Lug/Wafer	1	1	1	1&3	1	1	1	1	1

Consult SCORE Energy Products Inc. for CL600 Double Flange mounting dimensions.

Score-TRICENTRIC® Valve - Material Pressure and Temperature Ratings

Component		Material	Temperature range (°F)	Maximum body pressure rating at 100 °F (psig) CL150	CL300	CL600	Note
BODY & DISC	STANDARD	WCB - ASTM A216 (carbon steel)	-20 to 1000	285	740	1480	(1)
		CF8M - ASTM A351 (316SST)	-425 to 1500	275	720	1440	(3)(4)
	OPTIONAL	LCB - ASTM A352 (carbon steel low temp.)	-50 to 650	265	695	1390	
		LCC - ASTM A352(carbon steel low temp.)	-50 to 650	290	750	1500	
		LC3 - ASTM A352 (carbon steel low temp.)	-150 to 650	290	750	1500	
		WC6 - ASTM A217 (Cr-Mo steel)	-20 to 1050	290	750	1500	(2)(3)
		WC9- ASTM A217 (Cr-Mo steel)	-20 to 1100	290	750	1500	(2)(3)
		CF8 - ASTM A351 (304SST)	-425 to 1500	275	720	1440	(3)(4)
		CF8C - ASTM A35 (347SST)	-325 to 1500	275	720	1440	(3)(4)
		CG8M - ASTM A351 (317 SST)	-425 to 1000	275	720	1440	(3)
		CN7M - ASTM A351 (ALLOY 20)	-325 to 600	230	600	1200	(5)
		CD4MCu - ASTM A351 (Duplex)	-425 to 600	290	750	1500	
		CZ100 - ASTM A494 (Nickel)	-325 to 600	140	360	720	(6)
		CY40 - ASTM A494 (Inconel 600)	-325 to 1200	290	750	1500	(6)(3)
		M30C - ASTM A494 (Monel 400)	-325 to 900	230	600	1200	(6)
		CW12MW - ASTM A494 (Hastelloy C)	-325 to 1000	230	600	1200	(5)
		C95500 - ASTM B148 (Ni-Al-Bz)	-425 to 600	Contact Score Sales Rep.			
		GRADE 3 TITANIUM	-75 to 600	Contact Score Sales Rep.			
SEAT	STANDARD	316L SST overlay on carbon steel	per body material				
		Integral cast on stainless and exotic	per body material				
	OPTIONAL	ALLOY 6	-425 to 1500				
		ALLOY 21	-425 to 800				
		INCOLLOY 825	-20 to 1200				
SHAFT	STANDARD	S17400 (17.4 PH DH1150) - Full Rated	-325 to 850				(7)
	OPTIONAL	316SST- Reduced Rated	-425 to 600				(8) (11)
		ALLOY 20- Reduced Rated	-325 to 800				(8) (11)
		INCONEL 600- Reduced Rated	-325 to 900				(8) (11)
		INCONEL 625- Reduced Rated	-325 to 1200				(8) (11)
		MONEL K500 - Full Rated	-325 to 900				(11)
		INCONEL 718/750 - Full Rated	-20 to 1500				(11)
		Stainless or Exotic equal to body grade	per body material				(8) (11)

Component		Material	Temperature range (°F)	Maximum body pressure rating at 100 °F (psig) CL150 CL300 CL600	Note
SEAL STACK	STANDARD	316SST Laminated w/Grafoil	-400 to 1200		(9)
	OPTIONAL	316SST Laminated w/Klinger C4401	-100 to 750		
		316SST Solid	-400 to 1200		
		316SST Solid w/Stellite overlay	-400 to 1500		
		INCONEL 600 Laminated w/Grafoil	-20 to 1200		(9)
		INCONEL 625 Laminated w/Grafoil	-20 to 1000		
		MONEL 400 Laminated w/Grafoil	-400 to 900		(9)
		MONEL 400 Laminated w/Klinger C4401	-100 to 750		
BEARING	STANDARD	CL150 - Graphite	-400 to 1700		(10)
		CL300 and CL600 - Nitronic 60	-325 to 1500		
	OPTIONAL	Nitronic 60 (CL150)	-325 to 1500		
		Graphite (CL300 and CL600)	-400 to 1700		(10)(8)
		PTFE composition	-425 to 325		(8)
		Stellite #6	-425 to 1500		
		Bronze	-425 to 600		(8)
		Ceramic composition	-20 to 2500		(8)
PACKING	STANDARD	J.C. 3871 and Grafoil	-400 to 1200		(9)
	OPTIONAL	PTFE Chevron	-425 to 450		
		PTFE Braided	-425 to 450		

NOTE:

1. Per ASME B16.34 - Permissible but not recommended for prolonged use above 800° F.
2. Per ASME B16.34 - Use normalized and tempered material only.
3. Per ASME B16.34 - Use of a flanged valve in CL150 ANSI above 1000° F not recommended.
4. Per ASME B16.34 - At temperatures over 1000° F, use only when the carbon content is 0.04% or higher.
5. Per ASME B16.34 - Use solution annealed material only.
6. Per ASME B16.34 - Use annealed material only.
7. Long exposure above 600° F may cause embrittlement.
8. Use of this material may result in a reduced differential pressure rating. Contact Score sales representative.
9. Upper temperature limit reduced to 850° F in oxidizing media.
10. Upper temperature limit reduced to 650° F in oxidizing atmosphere.
11. Upper temperature limit is specified as a general guide based on code, specification and minimum torsional seating requirements. Use of material above this limit may violate these requirements. Contact a Score Sales or Engineering representative for specific application material evaluation.

General Corrosion Data

This corrosion table is only intended to give a general indication of how various materials will react when in contact with certain fluids at ambient temperature. The data cannot be absolute because concentration, temperature, pressure and other conditions may alter the suitability of a particular material. There are also economic considerations that may influence material selection. Use this table as a guide only.

A - Minimal corrosion **B - Minor to moderate effect, proceed with caution** **C - Unsatisfactory**

Al	Aluminum
Br	Brass
Steel	Carbon steel, WCB, WCC, LCB, LCC, WC9 and C5
CI	Cast Iron
416 & 440C	Also includes 410, CA15 and CA6NM
17-4	Includes 17-4 PH®, CB7Cu-1 and CB7Cu-2
304	Includes 304L, CF3 and CF8
316	Includes 316L, CF3M, CF8M, 317 and CG8M
Duplex	Includes 2205, CD3MN, Ferralium® 255, CD7MCuN, CD4MCu and others
254 SMO	Includes S31254 (Avesta® 254 SMO) and CK3MCuN
20	Includes Carpenter 20Cb-3® and CN7M
400	Includes Monel® 400, R405, M35-1, K500
C276	Includes Hastelloy® C276, CW2M, C22 and C4
B2	Includes Hastelloy® B2 and N7M
6	Cobalt-base Stellite® Alloy 6 and CoCr-A
Ti	Titanium
Zr	Zirconium

FLUID	AL	Br.	CI & Steel	416 & 440C	17-4 SST	304 SST	316 SST	Duplex SST	254 SMO	Alloy 20	Alloy 400	Alloy C276	Alloy B2	Alloy 6	Ti.	Zr.
Acetaldehyde	A	A	C	A	A	A	A	A	A	A	A	A	A	A	A	A
Acetic Acid, Air Free	C	C	C	C	C	C	A	A	A	A	A	A	A	A	A	A
Acetic Acid, Aerated	C	C	C	C	B	B	A	A	A	A	C	A	A	A	A	A
Acetone	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Acetylene	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Alcohols	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Aluminum Sulfate	C	C	C	C	B	A	A	A	A	A	B	A	A	A	A	A
Ammonia	A	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ammonium Chloride	C	C	C	C	C	C	B	A	A	A	B	A	A	B	A	A
Ammonium Hydroxide	A	C	A	A	A	A	A	A	A	A	C	A	A	A	A	B
Ammonium Nitrate	B	C	B	B	A	A	A	A	A	A	C	A	A	A	C	A
Ammonium Phosphate (Mono-Basic)	B	B	C	B	B	A	A	A	A	A	B	A	A	A	A	A
Ammonium Sulfate	C	C	C	C	B	B	A	A	A	A	A	A	A	A	A	A
Ammonium Sulfite	C	C	C	C	A	A	A	A	A	A	C	A	A	A	A	A
Aniline	C	C	C	C	A	A	A	A	A	A	B	A	A	A	A	A
Asphalt	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Beer	A	A	B	B	A	A	A	A	A	A	A	A	A	A	A	A
Benzene (Benzol)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Benzoic Acid	A	A	C	C	A	A	A	A	A	A	A	A	A	A	A	A
Boric Acid	C	B	C	C	A	A	A	A	A	A	B	A	A	A	A	A
Bromine, Dry	C	C	C	C	B	B	B	A	A	A	A	A	A	A	C	C
Bromine, Wet	C	C	C	C	C	C	C	C	C	C	A	A	A	C	C	C
Butane	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Calcium Chloride	C	C	B	C	C	B	B	A	A	A	A	A	A	A	A	A
Calcium Hypochlorite	C	C	C	C	C	C	C	A	A	A	C	A	B	B	A	A
Carbon Dioxide, Dry	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Carbon Dioxide, Wet	A	B	C	C	A	A	A	A	A	A	A	A	A	A	A	A
Carbon Disulfide	C	C	A	B	B	A	A	A	A	A	B	A	A	A	A	A
Carbonic Acid	A	B	C	C	A	A	A	A	A	A	A	A	A	A	A	A
Carbon Tetrachloride	A	A	B	B	A	A	A	A	A	A	A	A	A	A	A	A
Caustic Potash (see Potassium Hydroxide)																
Caustic Soda (see Sodium Hydroxide)																
Chlorine, Dry	C	C	A	C	B	B	B	A	A	A	A	A	A	A	C	A
Chlorine, Wet	C	C	C	C	C	C	C	C	C	C	B	B	B	C	A	A
Chromic Acid	C	C	C	C	C	C	C	B	A	C	C	A	B	C	A	A
Citric Acid	B	C	C	C	B	B	A	A	A	A	A	A	A	A	A	A
Coke Oven Acid	C	B	A	A	A	A	A	A	A	A	B	A	A	A	A	A
Copper Sulfate	C	C	C	C	C	C	B	A	A	A	C	A	A	C	A	A
Cottonseed Oil	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Creosote	C	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Dowtherm	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ethane	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ether	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A
Ethyl Chloride	C	B	C	C	B	B	B	A	A	A	A	A	A	A	A	A
Ethylene	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ethylene Glycol	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ferric Chloride	C	C	C	C	C	C	C	C	B	C	C	A	C	C	A	A
Fluorine, Dry	B	B	A	C	B	B	B	A	A	A	A	A	A	A	C	C

FLUID	AL	Br.	CI & Steel	416 & 440C	17-4 SST	304 SST	316 SST	Duplex SST	254 SM0	Alloy 20	Alloy 400	Alloy C276	Alloy B2	Alloy 6	Ti.	Zr.
Fluorine, Wet	C	C	C	C	C	C	C	C	C	C	B	B	B	C	C	C
Formaldehyde	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A
Formic Acid	B	C	C	C	C	C	B	A	A	A	C	A	B	B	C	A
Freon, Wet	C	C	B	C	B	B	A	A	A	A	A	A	A	A	A	A
Freon, Dry	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A
Furfural	A	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A
Gasoline, Refined	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Glucose	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A	A
Hydrochloric Acid (Aerated)	C	C	C	C	C	C	C	C	C	C	C	B	A	C	C	A
Hydrochloric Acid (Air Free)	C	C	C	C	C	C	C	C	C	C	C	B	A	C	C	A
Hydrofluoric Acid (Aerated)	C	C	C	C	C	C	C	C	C	C	B	B	B	C	C	C
Hydrofluoric Acid (Air Free)	C	C	C	C	C	C	C	C	C	C	A	B	B	C	C	C
Hydrogen	A	A	A	C	B	A	A	A	A	A	A	A	A	A	C	A
Hydrogen Peroxide	A	C	C	C	B	A	A	A	A	A	C	A	C	A	A	A
Hydrogen Sulfide	C	C	C	C	C	A	A	A	A	A	A	A	A	A	A	A
Iodine	C	C	C	C	A	A	A	A	A	A	C	A	A	A	C	B
Magnesium Hydroxide	B	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Mercury	C	C	A	A	A	A	A	A	A	A	B	A	A	A	C	A
Methanol	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Methyl Ethyl Ketone	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Milk	A	A	C	A	A	A	A	A	A	A	A	A	A	A	A	A
Natural Gas	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Nitric Acid	C	C	C	C	A	A	A	A	A	A	C	B	C	C	A	A
Oleic Acid	C	C	C	B	B	B	A	A	A	A	A	A	A	A	A	A
Oxalic Acid	C	C	C	C	B	B	B	A	A	A	B	A	A	B	C	A
Oxygen	C	A	C	C	B	B	B	B	B	B	A	B	B	B	C	C
Petroleum Oils, Refined	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Phosphoric Acid (Aerated)	C	C	C	C	B	A	A	A	A	A	C	A	A	A	C	A
Phosphoric Acid (Air Free)	C	C	C	C	B	B	B	A	A	A	B	A	A	B	C	A
Picnic Acid	C	C	C	C	B	B	A	A	A	A	C	A	A	A	A	A
Potash (see Potassium Carbonate)																
Potassium Carbonate	C	C	B	B	A	A	A	A	A	A	A	A	A	A	A	A
Potassium Chloride	C	C	B	C	C	B	B	A	A	A	A	A	A	A	A	A
Potassium Hydroxide	C	C	B	B	A	A	A	A	A	A	A	A	A	A	A	A
Propane	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Rosin	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A
Silver Nitrate	C	C	C	C	B	A	A	A	A	A	C	A	A	A	A	A
Soda Ash (see Sodium Carbonate)																
Sodium Acetate	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Carbonate	C	C	A	B	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Chloride	C	A	C	C	B	B	B	A	A	A	A	A	A	A	A	A
Sodium Chromate	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Hydroxide	C	C	A	B	B	B	A	A	A	A	A	A	A	A	A	A
Sodium Hypochlorite	C	C	C	C	C	C	C	C	C	C	C	A	B	C	A	A
Sodium Thiosulfate	C	C	C	C	B	B	A	A	A	A	A	A	A	A	A	A
Stannous Chloride	C	C	C	C	C	C	B	A	A	A	C	A	A	B	A	A
Steam	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Stearic Acid	C	B	B	B	B	A	A	A	A	A	A	A	A	B	A	A
Sulfate Liquor (Black)	C	C	A	C	C	B	A	A	A	A	A	A	A	A	A	A
Sulfur	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Sulfur Dioxide, Dry	C	C	C	C	C	C	B	A	A	A	C	A	A	B	A	A
Sulfur Trioxide, Dry	C	C	C	C	C	C	B	A	A	A	B	A	A	B	A	A
Sulfuric Acid (Aerated)	C	C	C	C	C	C	C	A	A	A	C	A	C	B	C	A
Sulfuric Acid (Air Free)	C	C	C	C	C	C	C	A	A	A	B	A	A	B	C	A
Sulfurous Acid	C	C	C	C	C	B	B	A	A	A	C	A	A	B	A	A
Tar	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Trichloroethylene	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	A
Turpentine	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A
Vinegar	B	B	C	C	A	A	A	A	A	A	A	A	A	A	A	A
Water, Boiler feed, Amine Treated	A	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A
Water, Distilled	A	A	C	C	A	A	A	A	A	A	A	A	A	A	A	A
Water, Sea	C	A	C	C	C	C	B	A	A	A	A	A	A	A	A	A
Whiskey and Wines	A	A	C	C	A	A	A	A	A	A	A	A	A	A	A	A
Zinc Chloride	C	C	C	C	C	C	C	B	B	B	A	A	A	B	A	A
Zinc Sulfate	C	C	C	C	A	A	A	A	A	A	A	A	A	A	A	A

REQUEST FOR QUOTATION

When requesting a quotation, please fill in the following input form as completely as possible, and submit.

DESIGN SPECIFICATION

DESIGN INPUTS (to be completed by sales/engineering)

General Info:

Sales Order No. _____ Item No. _____ Customer P.O. No. _____ Customer Item/Tag No. _____

Customer Design Specification No. _____ Valve Type: ☐ Butterfly ☐ Other _____

Model No. _____ Quantity _____ Nominal Size _____ Pressure Class _____ Design Code _____

FACE TO FACE: ☐ API 609 CAT. B ☐ ISO 5752 ☐ Other _____

END CONNECTION: ☐ Wafer ☐ Lugged ☐ Flanged ☐ Weld-end - Pipe Schedule _____

FLANGE DRILLING: ☐ ANSI B16.5 ☐ ANSI B16.47 series A ☐ ANSI B16.47 series B ☐ Other _____

Process Info:

Operating Pressure _____ Operating Differential Pressure _____ Operating Temperature _____

Design Pressure: ☐ Full ANSI Rating ☐ Other _____

Design Differential Pressure: ☐ Full ANSI Rating ☐ Other _____

Design Temperature _____ Media _____ Flow Rate _____

Intended Service: ☐ Stop ☐ Control/Throttling ☐ ESDV ☐ Other _____

Materials Info:

BODY MATERIAL:	☐ A216 WCB	☐ A351 CF8M	☐ Other _____	
DISC MATERIAL:	☐ A216 WCB	☐ A351 CF8M	☐ Other _____	
DISC SEAL MATERIAL:	☐ 316/Klinger	☐ 316/Grafoil	☐ 316/Solid	☐ Other _____
SEAT MATERIAL:	☐ 316L SST	☐ Stellite 21	☐ Stellite 6	☐ Other _____
SHAFT MATERIAL:	☐ 17-4 Ph DH1150 (NACE)	☐ 17.4 Ph H1025	☐ 316 SST	☐ Other _____
BEARING MATERIAL:	☐ Carbon Graphite	☐ Nitronic 60	☐ Other _____	
PACKING MATERIAL:	☐ Graphite	☐ PTFE Chevron	☐ PTFE Braided	☐ Other _____
INTERNAL FASTENERS:	☐ 316 SST ☐ Other _____	EXTERNAL FASTENERS:	☐ B8M CL1	☐ Other _____
EXTERIOR FINISH:	☐ Primed (WCB only)	☐ A&M Std. Paint (WCB only)	☐ Other _____	
SPECIAL CLEANING OR SURFACE PREPARATION:		☐ Degreasing for O2 Service	☐ Other _____	

Options Info:

☐ Bearing Protector	☐ Bearing Purge	☐ Steam Jacket - Steam Pressure/Temp. _____	
☐ Steam Traced Shaft	☐ Steam Traced Disc - Steam Pressure/Temp. _____		
☐ Block and Bleed	☐ High Temperature	☐ Cryogenic Temperature	☐ Double Stuffing Box
☐ Packing Lubrication	☐ Live Loading	☐ Secondary Cover Seal	☐ Other _____

REMARKS: _____

Actuation Info:

ACTUATOR MANUFACTURER: ☐ Bettis ☐ Rotork ☐ Remote ☐ Mastergear ☐ Other _____

ACTUATOR POSITION: ☐ 1 ☐ 2 ☐ 3 ☐ 4

☐ Worm Gear ☐ Handwheel ☐ Chainwheel

☐ Pneumatic Actuator - Air Supply (PSIG). _____ ☐ Double Acting ☐ Spring Return ☐ Fail Last ☐ Fail Open ☐ Fail Closed

☐ Hydraulic Actuator - Hydraulic Pressure (PSIG). _____ ☐ Double Acting ☐ Spring Return ☐ Fail Last ☐ Fail Open ☐ Fail Closed

☐ Electric Actuator - Power Source (Volts). _____ Phase _____ Frequency (Hz) _____

☐ Other Actuator _____

REMARKS: _____

Inspection and Testing Info:

Customer Release Needed: ☐ None ☐ Before Material Purchase ☐ Before Fabrication ☐ Before Shipment

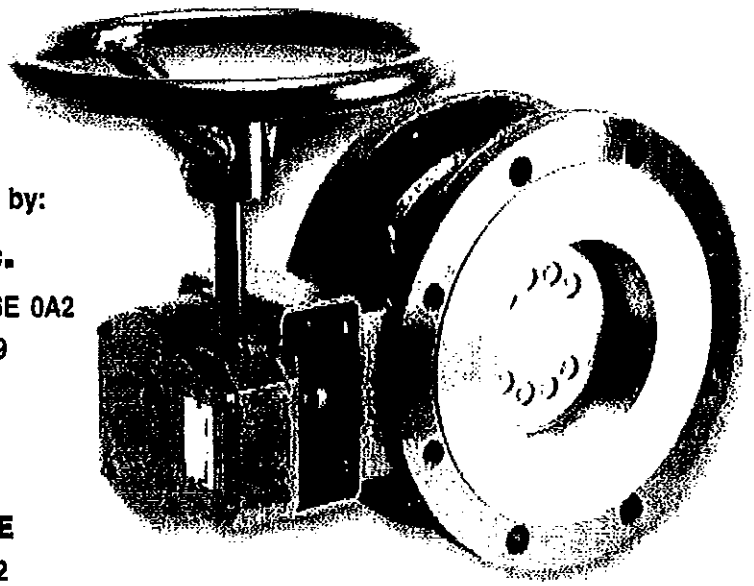
Customer Inspection: ☐ No ☐ Yes - Notice Required _____

NONDESTRUCTIVE EXAMINATION: ☐ MPI ☐ LPI ☐ UT ☐ Radiography

Area: ☐ Casting ☐ Machined Surfaces ☐ Fabrication and Repair Welds ☐ Seat Overlay ☐ Critical Areas

Test Method _____ Acceptance Criteria _____

SCORE VALVES TRICENTRIC®



Manufactured in Edmonton, Alberta, Canada by:

Score Energy Products Inc.

9821 - 41 Avenue, Edmonton, Alberta, Canada T6E 0A2

Phone: (780) 466-6782 • Fax: (780) 465-6979

email: sales@scorevalves.com

website: www.scorevalves.com

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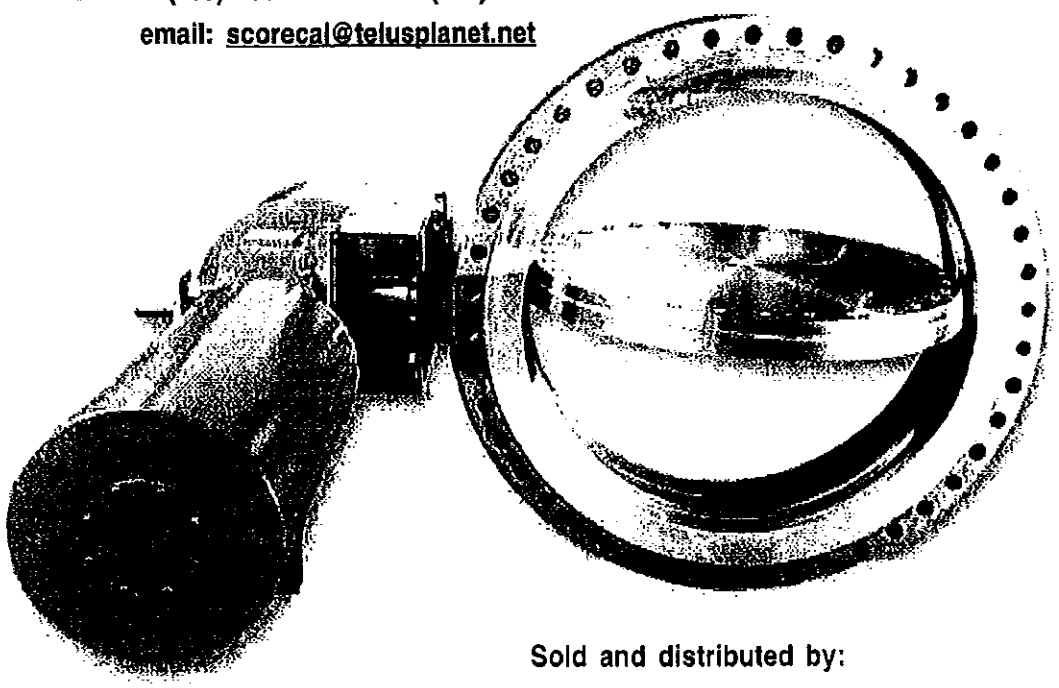
CALGARY REGIONAL SALES OFFICE

Phone: (403) 256-7217 • Fax: (403) 201-7612

email: scorecal@telusplanet.net



Sold and distributed by:

WGI Hard Seat Needle Valves – Carbon Steel

Process / Hi flow series

Specifications

Sizes
1/8" through 1” NPT

Maximum Operating Pressure
10,000 psi

Body & Bonnet Material
A105 Carbon steel

Stem Material
316 Stainless steel

Stem Packing
PTFE Teflon®

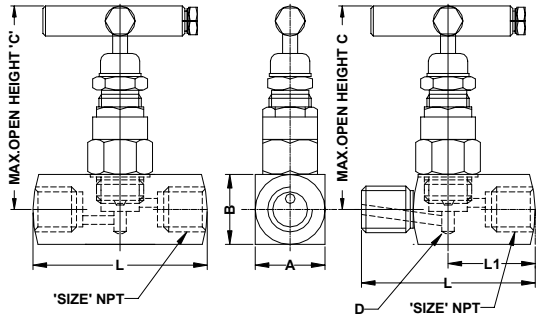
Stem
Non rotating for sizes 3/8” and above

Temperature Limits
-40° to 500°F (-40°C to 260°C)

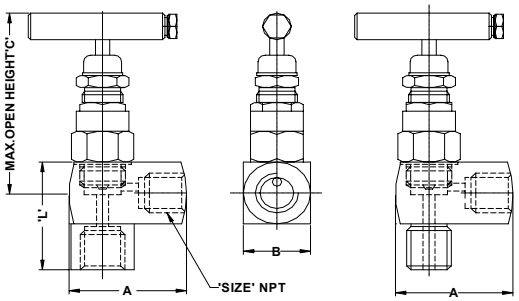
Canadian Registration Number (CRN)
CSA-OC5141.26

WN1514

Dimensions & Part Numbers



'D' ORIFICE DIAMETER



'D':ORIFICE DIAMETER

Part No.	Size	Pattern	Ends	Matl.	A	B	C	L	L1	D	Cv	List Price
WN1511	1/8”	G	FxF	C/S	28.5	28.5	83.0	60.0		4.2	0.40	**$60.08**
WN1512	1/4"	G	FxF	C/S	28.5	28.5	83.0	60.0		4.2	0.40	**$49.50**
WN1513	3/8”	G	FxF	C/S	32.0	32.0	88.0	68.0		6.4	0.90	**$65.21**
WN1514	1/2"	G	FxF	C/S	38.0	38.0	88.0	89.0		7.0	1.10	**$60.08**
WN1516	3/4”	G	FxF	C/S	40.0	40.0	92.0	89.0		9.0	2.30	**$234.03**
WN1518	1”	G	FxF	C/S	45.0	45.0	105.0	89.0		12.0	3.50	**$314.66**
WN1532	1/4"	G	MxF	C/S	28.5	28.5	83.0	76.0	30.0	4.2	0.40	**$49.50**
WN1534	1/2"	G	MxF	C/S	38.0	38.0	88.0	89.0	32.0	7.0	1.20	**$60.08**
WN1534N	1/2"	G	MxF	C/S	38.0	38.0	91.0	89.0	32.0	7.0	1.20	**$65.70**
WN1536	3/4"	G	MxF	C/S	38.0	38.0	88.0	89.0	32.0	7.0	1.20	**$261.76**
WN1537	¾”x½”	G	MxF	C/S	40.0	40.0	93.0	89.0	32.0	9.0	2.30	**$79.20**
WN1538	1”	G	MxF	C/S	38.0	38.0	92.0	89.0	39.0	7.0	1.90	**$318.36**
WN1551	1/8”	A	FxF	C/S	45.0	45.0	105.0	80.0		12.0	3.50	**$63.91**
WN1552	1/4"	A	FxF	C/S	42.0	28.0	88.0	42.0		4.2	0.70	**$63.91**
WN1553	3/8”	A	FxF	C/S	42.0	28.0	88.0	42.0		4.2	0.80	**$72.27**
WN1554	1/2"	A	FxF	C/S	42.0	28.0	88.0	42.0		6.4	1.60	**$72.27**
WN1556	3/4"	A	FxF	C/S	50.0	32.0	90.0	50.0		7.0	1.50	**$234.03**
WN1558	1”	A	FxF	C/S	50.0	36.0	90.0	50.0		9.0	4.40	**$301.63**
WN1572	1/4"	A	MxF	C/S	60.0	46.0	105.0	60.0		12.0	6.20	**$89.42**
WN1574	1/2"	A	MxF	C/S	42.0	28.0	85.0	42.0		4.2	0.60	**$101.30**

See Discount Line # 36

D= Orifice All dimensions in mm

WGI Hard Seat Needle Valves – Stainless Steel

Process / Hi flow series

Specifications

Sizes
1/8" through 1” NPT

Maximum Operating Pressure
10,000 psi

Body & Bonnet Material
316 Stainless steel

Stem Material
316 Stainless steel

Stem Packing
PTFE Teflon®

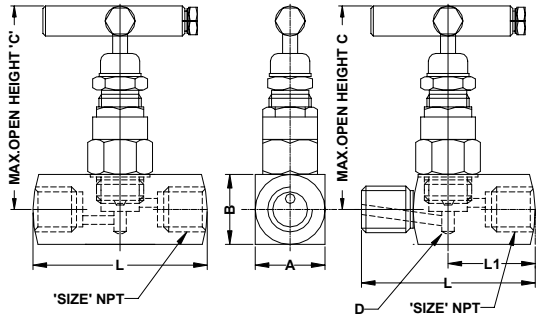
Stem
Non rotating for sizes 3/8” and above

Temperature Limits
-40° to 500°F (-40°C to 260°C)

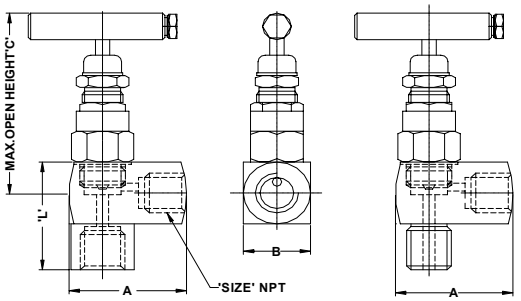
Canadian Registration Number (CRN)
CSA-OC5141.26

WN1314

Dimensions & Part Numbers



'D' ORIFICE DIAMETER



'D':ORIFICE DIAMETER

Part No.	Size	Pattern	Ends	Matl.	A	B	C	L	L1	D	Cv	List Price
WN1311	1/8”	G	FxF	C/S	28.5	28.5	83.0	60.0		4.2	0.40	**$153.63**
WN1312	1/4"	G	FxF	C/S	28.5	28.5	83.0	60.0		4.2	0.40	**$136.80**
WN1313	3/8”	G	FxF	C/S	32.0	32.0	88.0	68.0		6.4	0.90	**$165.22**
WN1314	1/2"	G	FxF	C/S	38.0	38.0	88.0	89.0		7.0	1.10	**$136.80**
WN1316	3/4”	G	FxF	C/S	40.0	40.0	92.0	89.0		9.0	2.30	**$369.10**
WN1318	1”	G	FxF	C/S	45.0	45.0	105.0	89.0		12.0	3.50	**$732.60**
WN1332	1/4"	G	MxF	C/S	28.5	28.5	83.0	76.0	30.0	4.2	0.40	**$136.80**
WN1334	1/2"	G	MxF	C/S	38.0	38.0	88.0	89.0	32.0	7.0	1.20	**$136.80**
WN1336	3/4"	G	MxF	C/S	38.0	38.0	88.0	89.0	32.0	7.0	1.20	**$386.00**
WN1337	¾”x½”	G	MxF	C/S	40.0	40.0	93.0	89.0	32.0	9.0	2.30	**$136.80**
WN1338	1”	G	MxF	C/S	38.0	38.0	92.0	89.0	39.0	7.0	1.90	**$830.00**
WN1351	1/8”	A	FxF	C/S	45.0	45.0	105.0	80.0		12.0	3.50	**$163.27**
WN1352	1/4"	A	FxF	C/S	42.0	28.0	88.0	42.0		4.2	0.70	**$163.27**
WN1353	3/8”	A	FxF	C/S	42.0	28.0	88.0	42.0		4.2	0.80	**$231.17**
WN1354	1/2"	A	FxF	C/S	42.0	28.0	88.0	42.0		6.4	1.60	**$231.17**
WN1356	3/4"	A	FxF	C/S	50.0	32.0	90.0	50.0		7.0	1.50	**$696.30**
WN1358	1”	A	FxF	C/S	50.0	36.0	90.0	50.0		9.0	4.40	**$959.33**
WN1372	1/4"	A	MxF	C/S	60.0	46.0	105.0	60.0		12.0	6.20	**$202.31**
WN1374	1/2"	A	MxF	C/S	42.0	28.0	85.0	42.0		4.2	0.60	**$266.24**
See Discount Line # 36												

D= Orifice All dimensions in mm

WGI Soft Seat Needle Valves – Carbon Steel

Process

Specifications

Sizes
1/4" through 1” NPT

Maximum Operating Pressure
6000 psi

Body & Bonnet Material
A105 Carbon steel

Stem Material
316 Stainless steel

Stem Packing
PTFE Teflon®

Stem
Non rotating for sizes 3/8” and above

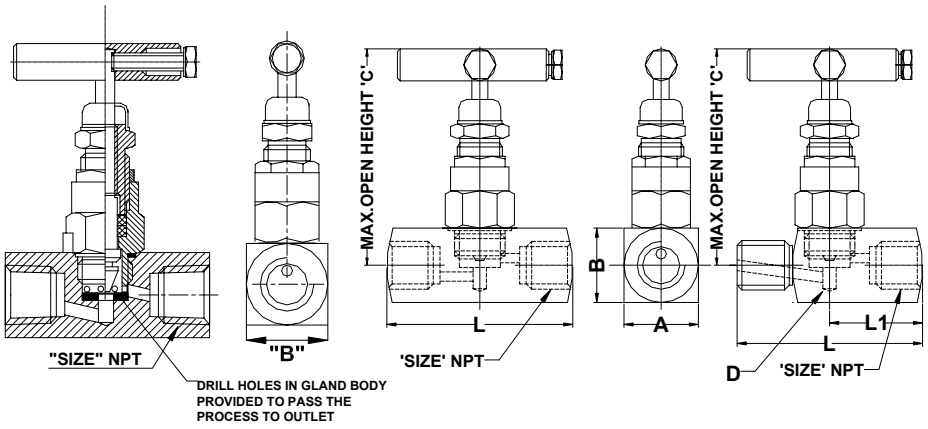
Temperature Limits
-40° to 500°F (-40°C to 260°C)

Seat Material
Replaceable Delrin® seat

Canadian Registration Number (CRN)
CSA-OC5141.26

WN5534

Dimensions & Part Numbers



Part No.	Size	Pattern	Ends	Matl.	A	B	C	L	L1	D	List Price
WN5512	1/4"	G	FxF	C/S	28.5	28.5	83.0	60.0		4.2	**$63.27**
WN5514	1/2"	G	FxF	C/S	32.0	32.0	88.0	68.0		7.0	**$63.27**
WN5516	3/4”	G	FxF	C/S	40.0	40.0	92.0	68.0		9.0	**$291.40**
WN5518	1”	G	FxF	C/S	45.0	45.0	105.0	80.0		12.0	**$314.53**
WN5532	1/4"	G	MxF	C/S	28.5	28.5	83.0	76.0	32.0	4.2	**$58.50**
WN5534	1/2"	G	MxF	C/S	38.0	38.0	88.0	89.0	32.0	7.0	**$64.62**
WN5572	1/4"	A	MxF	C/S	42.0	28.0	88.0	42.0	32.0	4.2	**$84.80**
WN5574	1/2"	A	MxF	C/S	50.0	32.0	90.0	50.0	32.0	7.0	**$89.27**
See Discount Line # 36											

WGI Soft Seat Needle Valves – Stainless Steel

Process

Specifications

Sizes
1/4" through 1” NPT

Maximum Operating Pressure
6000 psi

Body & Bonnet Material
316 Stainless steel

Stem Material
316 Stainless steel

Stem Packing
PTFE Teflon®

Stem
Rotating

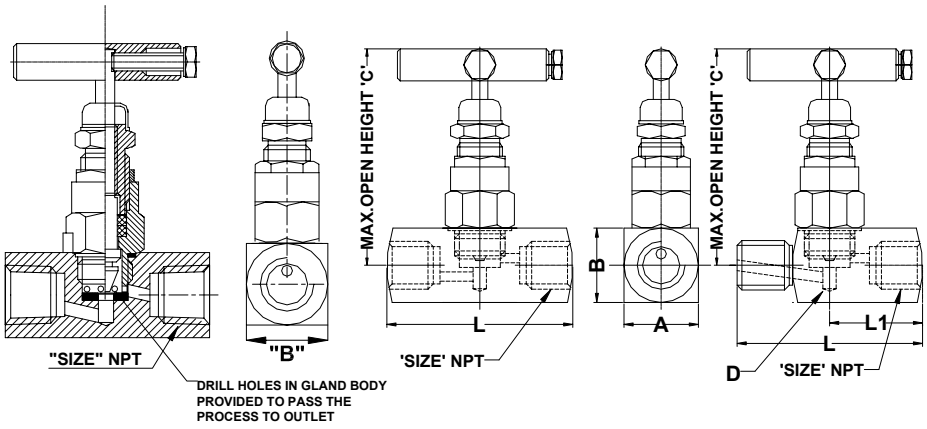
Temperature Rating
-20° to 300°F (-20 to 150°C) WOG

Seat Material
Replaceable Delrin® seat

Canadian Registration Number (CRN)
CSA-OC5141.26

WN5334

Dimensions & Part Numbers



Part No.	Size	Pattern	Ends	Matl.	A	B	C	L	L1	D	List Price
WN5312	1/4"	G	FxF	316SS	28.5	28.5	83.0	60.0		4.2	**$136.80**
WN5314	1/2"	G	FxF	316SS	32.0	32.0	88.0	68.0		7.0	**$136.80**
WN5316	3/4”	G	FxF	316SS	40.0	40.0	92.0	68.0		9.0	**$369.50**
WN5318	1”	G	FxF	316SS	45.0	45.0	105.0	80.0		12.0	**$666.00**
WN5332	1/4"	G	MxF	316SS	28.5	28.5	83.0	76.0	32.0	4.2	**$136.80**
WN5334	1/2"	G	MxF	316SS	38.0	38.0	88.0	89.0	32.0	7.0	**$136.80**
See Discount Line # 36											

WGI Block & Bleed Needle Valves

Gauge Valves

Specifications

Sizes
1/2" x 1/2"(3) or 3/4" x 1/2"(3) NPT

Maximum Operating Pressure
10,000 psi

Body & Bonnet Material
A105 Carbon steel or 316 Stainless steel

Stem Material
316 Stainless steel

Stem Packing
PTFE Teflon®

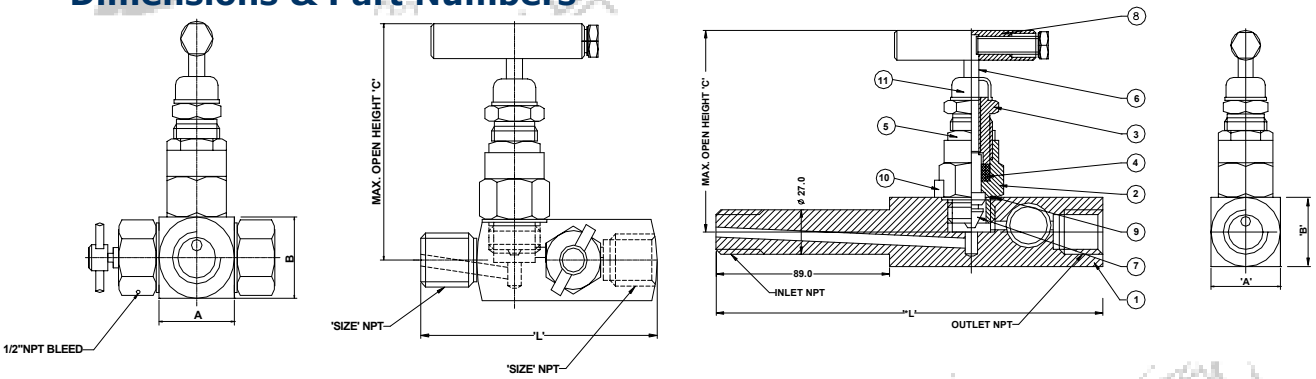
Stem
Non rotating

Temperature Limits
-40° to 500°F (-40 to 250°C)

Canadian Registration Number (CRN)
CSA-OC5141.26

WN8534

Dimensions & Part Numbers



Part No.	Size	Pattern	Ends	Matl.	A	B	C	L	*L	D	List Price
WN8534	½" x ½"	G	MxF	316SS	32.0	32.0	88.0	95.0	n/a	7.0	**$330.89**
WN8536	¾" x ½"	G	MxF	316SS	32.0	32.0	88.0	95.0	180.0	7.0	**$347.03**
WN7534	½" x ½"	G	MxF	C/S	32.0	32.0	88.0	95.0	n/a	7.0	**$175.45**
WN7536	¾" x ½"	G	MxF	C/S	32.0	32.0	88.0	95.0	n/a	7.0	**$175.45**
See Discount Line # 36											

D = Orifice ***L = Lagged Valve**

Lagged Block & Bleed Valve

3" neck extension for piping insulation

Part No.	Size	Pattern	Ends	Matl.	A	B	C	L	D	List Price
WN8536-3L	¾" x ½"	G	MxF	316SS	38.0	38.0	92.0	180.0	7.0	**$540.00**
See Discount Line # 36										

No.	Description	QTY.
1	Body	1
2	Gland Body	1
3	Gland Retainer	1
4	Gland Seal	2
5	Check Nut	1
6	Spindle	1
7	Trim	1
8	Handle	1
9	Washer	1
10	Lock Pin	1
11	Dust Cap	1

WGI Bleed Needle Valves

Carbon Steel / Stainless Steel

Specifications

Sizes
3/4" x 1/2" NPT

Maximum Operating Pressure
10,000 psi

Body & Bonnet Material
A105 Carbon steel or 316 Stainless Steel

Stem Material
316 Stainless steel

Stem Packing
PTFE Teflon®

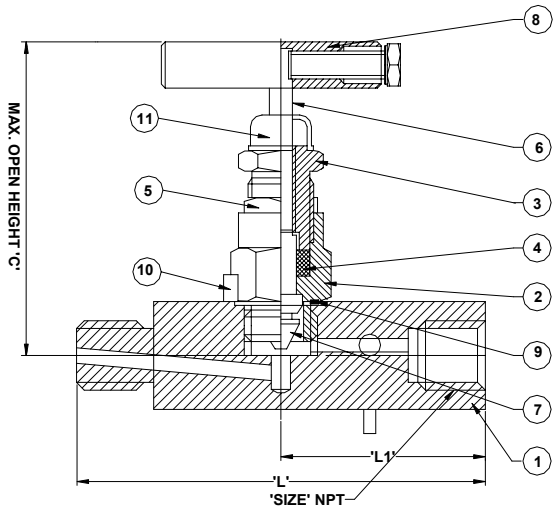
Stem
Non rotating

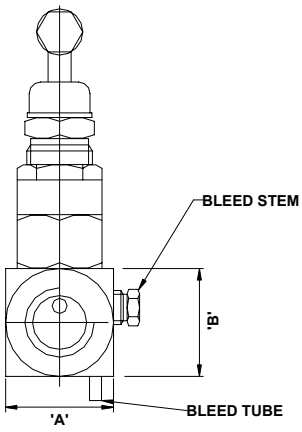
Temperature Rating
-40° to 500°F (-40 to 250°C) WOG

Canadian Registration Number (CRN)
CSA-OC5141.26

WN3337

Dimensions & Part Numbers





No.	Description	QTY
1	Body	1
2	Gland Body	1
3	Gland Retainer	1
4	Gland Seal	1
5	Check Nut	1
6	Spindle	1
7	Trim	1
8	Handle	1
9	Washer	1
10	Lock Pin	1
11	Dust Cap	1

Part No.	Size	Pattern	Ends	Matl.	A	B	C	L	D	Cv	List Price
WN3537	¾" x ½"	G	MxF	C/S	32.0	32.0	88.0	95.0	7.0	?	**$124.92**
WN3337	¾" x ½"	G	MxF	316SS	32.0	32.0	88.0	95.0	7.0	?	**$285.56**
See Discount Line # 36											

WGI Miniature Needle Valves

Carbon Steel / Stainless Steel

Specifications

Sizes
1/8" & 1/4" NPT

Maximum Operating Pressure
6000 psi

Body & Bonnet Material
A105 Carbon steel or 316 Stainless Steel

Stem Material
316 Stainless steel

Stem Packing
PTFE Teflon®

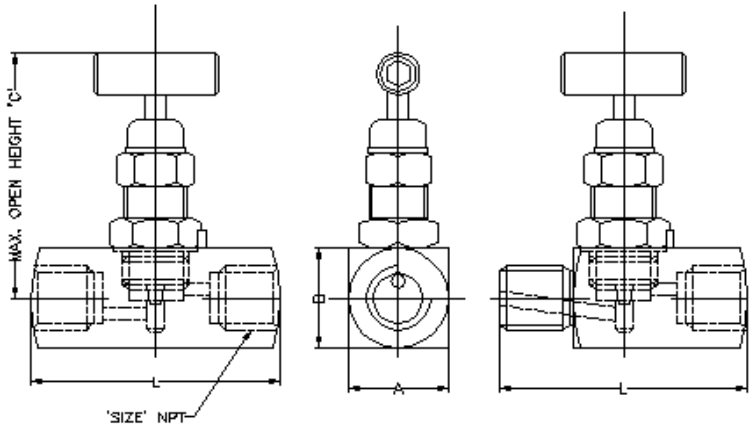
Stem
Rotating

Temperature Rating
-40° to 500°F (-40 to 250°C)

Canadian Registration Number (CRN)
CSA-OC5141.26

WN0532

Dimensions & Part Numbers



Part No.	Size	Pattern	Ends	Material	A	B	C	L	D	Cv	List Price
WN0311	1/8"	G	FxF	316SS	20.0	20.0	52.0	32.0	32.0	**0.25**	**$122.31**
WN0312	1/4"	G	FxF	316SS	20.0	20.0	52.0	32.0	32.0	**0.25**	**$104.40**
WN0332	1/4"	G	MxF	316SS	20.0	20.0	52.0	32.0	32.0	**0.25**	**$104.40**
WN0511	1/8"	G	FxF	C/S	20.0	20.0	52.0	32.0	32.0	**0.25**	**$53.55**
WN0512	1/4"	G	FxF	C/S	20.0	20.0	52.0	32.0	32.0	**0.25**	**$47.70**
WN0532	1/4"	G	MxF	C/S	20.0	20.0	52.0	32.0	32.0	**0.25**	**$47.70**

WGI Packager Needle Valves – Instrumentation Valve

Carbon Steel / Stainless Steel

Specifications

Sizes
1/4" , 1/2", or 3/4" x 1/2" NPT

Maximum Operating Pressure
6000 psi

Body & Bonnet Material
A105 Carbon steel or 316 Stainless Steel

Stem Material
316 Stainless steel

Stem Packing
PTFE Teflon®

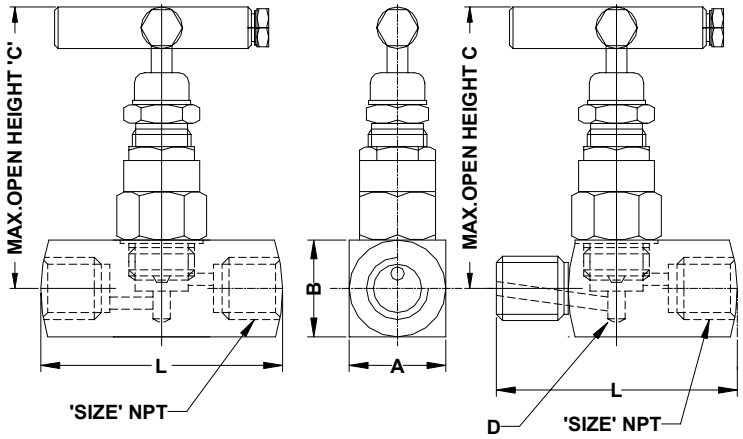
Stem
Non Rotating – 1/2" NPT and larger

Temperature Rating
-40° to 500°F (-40 to 250°C)

Canadian Registration Number (CRN)
CSA-OC5141.26

WN1432P

Dimensions & Part Numbers



'D' ORIFICE DIAMETER

Part No.	Size	Pattern	Ends	Material	A	B	C	L	D	List Price
WN1412P	¼"	G	FxF	316SS	28.5	28.5	84.0	76.0	03.2	**$70.00**
WN1414P	½"	G	FxF	316SS	28.5	28.5	84.0	76.0	03.2	**$105.00**
WN1432P	¼"	G	MxF	316SS	28.5	28.5	84.0	76.0	03.2	**$70.00**
WN1434P	½"	G	MxF	316SS	28.5	28.5	84.0	76.0	03.2	**$105.00**
WN1437P	¾"x ½"	G	MxF	316SS	28.5	28.5	84.0	76.0	03.2	**$113.37**
WN1612P	¼"	G	FxF	CS	28.5	28.5	84.0	76.0	03.2	**$37.90**
WN1612PN	¼"	G	FxF	CS NACE	28.5	28.5	84.0	76.0	03.2	**$46.50**
WN1614P	½"	G	FxF	CS	28.5	28.5	84.0	76.0	03.2	**$47.50**
WN1614PN	½"	G	FxF	CS NACE	28.5	28.5	84.0	76.0	03.2	**$55.80**
WN1632P	¼"	G	MxF	CS	28.5	28.5	84.0	76.0	03.2	**$37.90**
WN1632PN	¼"	G	MxF	CS NACE	28.5	28.5	84.0	76.0	03.2	**$46.50**
WN1634P	½"	G	MxF	CS	28.5	28.5	84.0	76.0	03.2	**$47.70**
WN1634PN	½"	G	MxF	CS NACE	28.5	28.5	84.0	76.0	03.2	**$55.80**
WN1637P	¾"x ½"	G	MxF	CS	28.5	28.5	84.0	76.0	03.2	**$59.43**
WN1637PN	¾"x ½"	G	MxF	CS NACE	28.5	28.5	84.0	76.0	03.2	**$69.23**
See Discount Line # 37										

WGI 5 Valve Soft Seat Threaded Manifold

Carbon Steel / Stainless Steel

For use with D/P transmitters or Chart recorders. Remote mounted, Two process isolation valves, Two equalizing valves and One drain valve on a single block.

Specifications

Connection
Instrument & Process – 1/2" NPT (F)

Maximum Operating Pressure @ 200°F
3000 psi

Body & Bonnet Materials
CS-A108 / A479 - 316 SS.

Stem Material
Close tolerance surface finish, cold rolled threads, ASME SA-479 Type 316 SS

Gland Packing
Adjustable, below stem thread design (PBT), prevent process fluid contact with stem threads. PTFE for Temp. below 400°F/Graphite for Temp. above 400°F.

Stem
Close tolerance surface finish, cold rolled threads, ASME SA-479 Type 316 SS

Needle Tip
Self centering hardened & ground. ASME SA-479 Type 316 SS

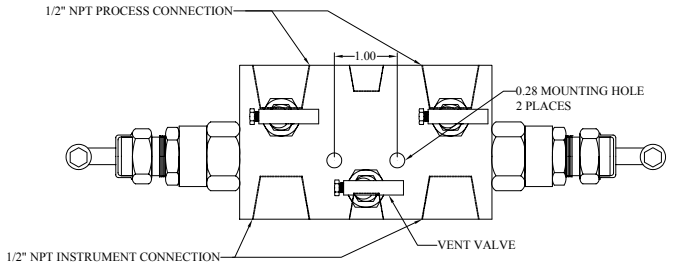
Seat Material
Delrin

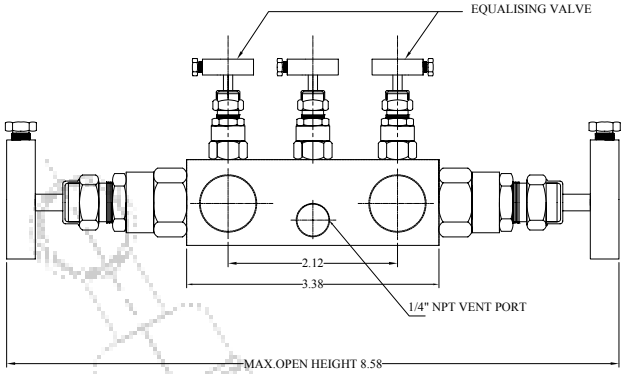
Temperature Rating
-40° to 200°F (-40 to 93°C)

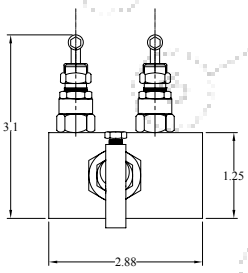
Canadian Registration Number (CRN)
CSA-OC5141.26

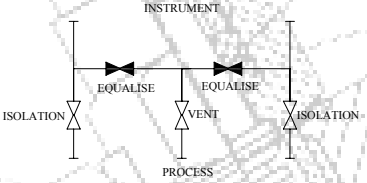
WN55314

Dimensions & Part Numbers









Part Number	Material	List Price
WM55514	C/S	$326.67
WM55314	316 SS	$500.00
See Discount Line #		