

WKM DynaCentric High-Performance Butterfly Valves

TECHNOLOGY



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WKM DYNACENTRIC HIGH-PERFORMANCE BUTTERFLY VALVES

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WKM DynaCentric High-performance Butterfly Valves

Cameron's WKM® DynaCentric® high-performance butterfly valve brings low cost and light weight to high-pressure water, oil, steam, gas and slurry applications.

These valves satisfy a wide range of industrial applications and are available in carbon steel or stainless steel, as well as lug and wafer body styles.

DynaCentric high-performance butterfly valves offer the high performance of ball and gate valves with the low-cost, lightweight benefits of a butterfly valve design.

Engineered for heavy-duty, maintenance-free performance, the DynaCentric high-performance butterfly valve is most commonly selected for the following applications:

- Chemical and petrochemical processing
- Utilities
- Pulp and paper
- Oil and gas production
- Fuel handling systems
- Air conditioning and refrigeration
- Marine

FEATURES AND BENEFITS

Two Body Styles

Flangeless wafer and threaded lug styles are available.

Heavy-duty Disc

The heavy-duty disc is designed to withstand the higher stresses associated with high-pressure applications. The wide disc edge provides greater sealing area.

Thrust Bearing/Disc Spacer

A corrosion-resistant, single-component thrust bearing/disc spacer reduces body wear and ensures positive centering of disc in the valve bore.

Internal Stop

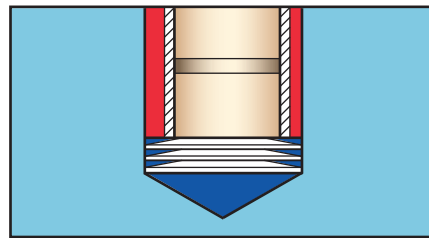
The internal stop prevents seat damage caused by disc over-travel. It also ensures proper disc alignment in the closed position.

Deep Stuffing Box for Extended Life

The deep stuffing box design includes stainless steel fasteners as standard and is available with TFE Chevron or high-temperature compression packing for long life and positive stem seal. Live loaded packing assemblies are available upon special request.

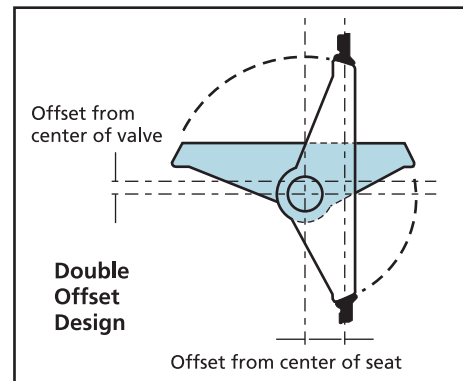
Lower Stem Disc Spring

The lower stem disc springs allow for thermal expansion and provide constant grounding.

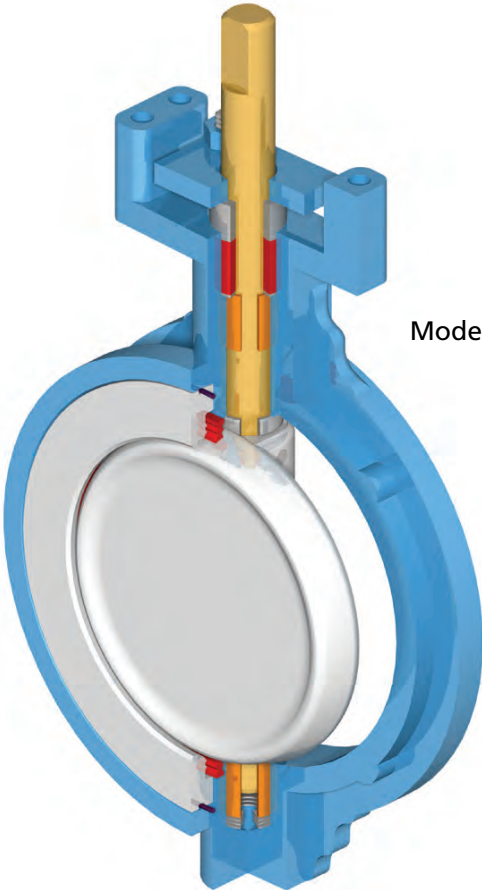


Disc Design Reduces Seat Wear

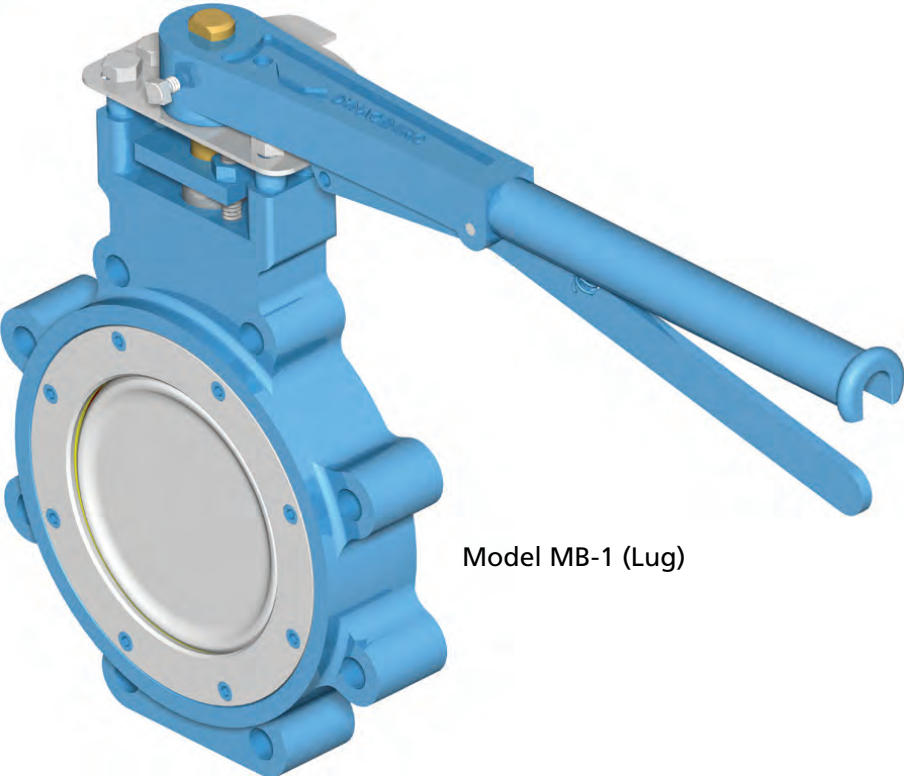
Precision machined from carbon or alloy steels, the rugged valve disc is designed for gradual engagement into the seat to prevent pinching or cutting. Eccentric positioning of the stem allows the disc to swing free of the seat in the open position, reducing operating torque and wear. Special surface coatings such as Stellite overlay are available for critical or severe service conditions.



BODY STYLES

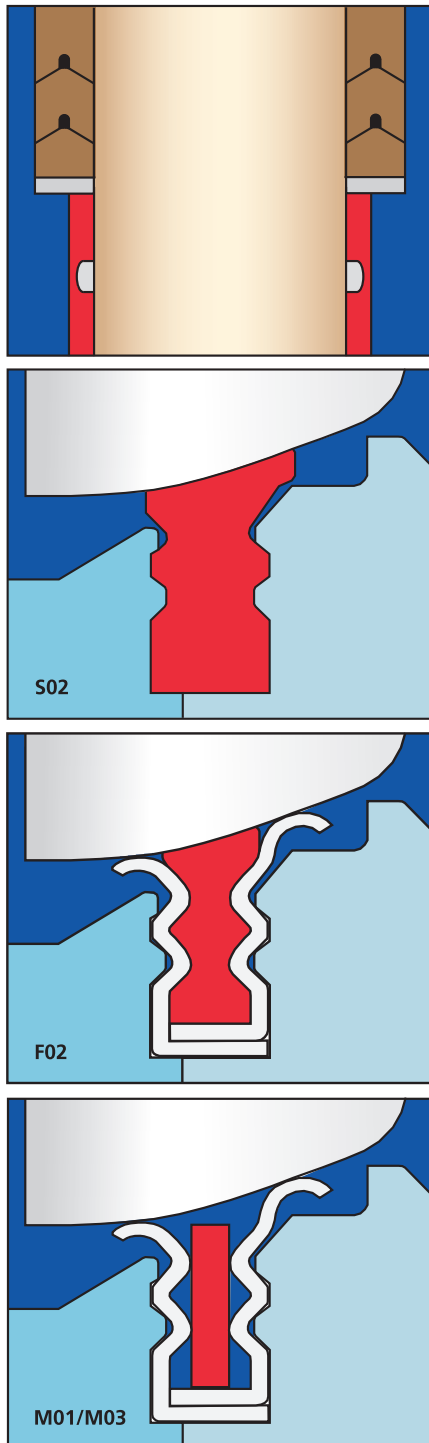


Model MB-1 (Wafer)



Model MB-1 (Lug)

FEATURES AND BENEFITS (continued)



Positively Retained Stem Prevents Blowouts

The tamper-proof design not only meets but exceeds the requirements of ASME B16.34. The disc, disc pins and stem design meet ASME requirements for maximum torsional and bending stress. Additional blowout prevention is provided by stem retainer pins inserted in the stem below the stuffing box.

Three Seat Designs

The standard TFM™ seat (S02) is bi-directional with an extended pressure-responsive sealing lip. The S02 seat design is capable of drop-tight sealing to 740 psi.

The patented fire-tested, bi-directional metallic seats with TFM seat insert (F02) provide a metal-to-metal pressure-responsive triple seal. DynaCentric high-performance butterfly valves with the F02 seat design and high-temperature seals have been fire-tested and are qualified to meet the stringent requirements of API 607 4th Edition. This unique design provides fire-test capabilities regardless of flow direction. The F02 seat design is capable of drop-tight sealing to 1480 psi.

DynaCentric high-performance butterfly valves constructed of 316 stainless steel and assembled with the proper trims and Ni-Cr alloy (UNS 6625) seats (M03) are capable of handling temperatures to 1000° F (538° C). Metal seats of 316 SS (M01) are suitable for temperatures to 750° F (399° C).

READILY AUTOMATED



SPECIFICATIONS See page 7 for technical specifications.

Sizes

- 2-1/2" through 36" (65 mm through 900 mm)
- Working pressure ASME Class 150, 2-1/2" through 36" (65 mm through 900 mm)
- ASME Class 300, 2-1/2" through 24" (65 mm through 600 mm)
- ASME Class 600, 3" through 12" (80 mm through 300 mm)

Operating Temperatures

- Up to 1000° F (538° C)

Body Styles

- Flangeless wafer, threaded lug

Standard Materials

- Body – Carbon steel, stainless steel
- Stem – 17-4 Stainless steel
- Disc – Stainless steel
- Seat – S02 – TFM
F02 – Fire-tested
M01/ M03 – Metal seat

Optional Materials

- Additional trim materials are listed on page 7.

SPECIAL SERVICE VALVES

High-temperature Service

DynaCentric high-performance butterfly valves for high-temperature service are equipped with a 316 stainless steel seat (M01), 316 stainless steel stem bearings and high-temperature seals.

This seat/seal combination is rated up to 750° F (399° C) in carbon steel bodies. Ni-Cr alloy (UNS 6625) seats (M03) and stainless steel bodies can be utilized up to 1000° F (538° C). Leakage rates for metal seated valves can be provided within the service limits of ANSI/FCI 70-2.

Standard leakage rate of metal seated valves is Class IV.

Valves furnished with this seat perform well in steam, hot oil and heat transfer fluids.

Vacuum Service

The drop-tight sealing capabilities of these valves make them an excellent selection for vacuum service.

S01, S02 and F02 seat-seal codes are suitable for vacuum service to 20 microns absolute.

Inverted packing configuration is available on request.

Sour Oil and Gas Service

DynaCentric high-performance butterfly valves with sour gas trims are available for H₂S service in accordance with NACE MR0175.

Low-temperature Service

DynaCentric high-performance butterfly valves for temperatures to -50° F (-46° C) are available in both 316 stainless steel construction and low-temperature carbon steel.

Steam Service

DynaCentric high-performance butterfly valves also are suited for applications in steam service. Reinforced TFM seats (S02) with high-temperature packing are the standard steam service seal materials.

For higher saturation pressures, 316 stainless steel seats with TFM inserts (F02) are available.

The combination of rotary operation, streamlined flow and positive shutoff can result in years of maintenance-free service without the seizures on cool-down, flashing or stem leakage associated with conventional globe or gate valves.

Enhanced Fugitive Emission Control

The valve stuffing box can be modified for live loaded packing assemblies.

Product Specifications

STANDARDS AND COMPLIANCE

DynaCentric high-performance butterfly valves comply with the following design and testing standards:

- ASME B16.5 (steel pipe flanges and flange fittings)
- ASME B16.34 (steel valves)
- MSS-SP-6 (standard finishes for pipe flanges)
- MSS-SP-25 (standard marking system for valves)
- MSS-SP-55 (quality standard for steel castings)
- MSS-SP-68
- United States Coast Guard Category (A) Acceptance on API-607 qualified valves
- API-609 (dimensions)

In addition, DynaCentric high-performance butterfly valves can be supplied to comply with these standards:

- ASME B31.1 (power piping)
- ASME B31.3 (chemical plant and petroleum refinery piping)
- MSS-SP-61 (pressure testing of steel valves)
- API 609, API 598 (valve inspection and testing)
- API 607 4th Edition (fire-test specifications)
- CE PED (pressure equipment directive) 97/23/EC

DynaCentric high-performance butterfly valves trimmed for sour gas service in accordance with NACE MR0175 are available in both carbon steel and alloy construction.

HOW TO ORDER

X X			A5* X X X B5* X X X			X X		X X X		X X		X X	
Size in. (mm)			Body Group			Trim Group		Seal Group		Packing Group ⁴		Actuation	
2-1/2	(65)	2-1/2	Class 1 = 150	Material 1 = CS	Style 0 = Wafer** 2-1/2" to 12" Slip-in Seat Retainer	CS Disc ⁵	01	TFE	S01	TFE VEE	11	Bare Stem	00
3	(80)	03				SS Disc	02	TFM	S02	High-temp. Graphitized	13	Handle	HL
4	(100)	04	3 = 300	2 = SS	1 = Lug Model A (Class 600) Bolted Seat Retainer	SS Disc	03	SS / TFM	F02 ³	Grafoil	14	Handwheel	WG
5	(125)	05				Ni-Cr ⁶ Stem	03	Ni-Cr ⁶ Alloy (UNS 6625)/ TFM	F03			Less Gear with Flange	FG
6	(150)	06	6 = 600	3 = CS2 ¹	2 = Wafer 14" to 24" Bolted Seat Retainer	Ni-Cu ⁷ Disc and Stem	04			316 SS	M01	Chainwheel	CH
8	(200)	08				SS Disc	05	Ni-Cr ⁶ Alloy (UNS 6625)	M03				
10	(250)	10			3 = Lug Model B Bolted Seat Retainer	SS Disc	06						
12	(300)	12				SS Disc	07						
14	(350)	14				HF-6 O/L ⁸	08						
16	(400)	16				SS Disc	09						
18	(450)	18				Ni-Cr ⁶ Stem	10						
20	(500)	20				CS/QPQ Disc	11						
24	(600)	24				SS/QPQ Disc	12						
30	(750)	30				CS/QPQ Disc	13						
36	(900)	36											

* MODEL / SIZE AVAILABILITY:

- Model B:** 2-1/2" and 5" (65 mm and 125 mm)
Class 150 and Class 300 lug
4" and 6" (100 mm and 150 mm) through
24" (600 mm) Class 150 and Class 300 lug
and wafer
3" (80 mm) Class 150, Class 300 and
Class 600 lug and wafer, 36" (900 mm) Class 150 lug
- Model A:** 4" and 6" (100 mm and 150 mm) through 12" (300 mm)
Class 600 lug and wafer, 30" (750 mm) Class 150 lug

¹ Controlled hardness carbon steel (H₂S service).

² Valves equipped with 316 SS stems may require derating, depending on size and class. See page 11 for actual valve ratings.

³ Standard seat for Class 600 valves.

- ⁴ Stainless steel packing adjustment studs and nuts are standard.
⁵ Carbon steel discs 14" (350 mm) and larger – consult factory.
⁶ Reference Inconel.
⁷ Reference Monel.
⁸ Reference Stellite overlay.

NOTE: Other materials of construction and valve options are available on application.

Model Numbers

- MA-1 / MB-1 Standard HPBFV Assembly
MA-2 / MB-2 Standard HPBFV Assembly with MTRs
MA-3 / MB-3 CE Compliant HPBFV Assembly

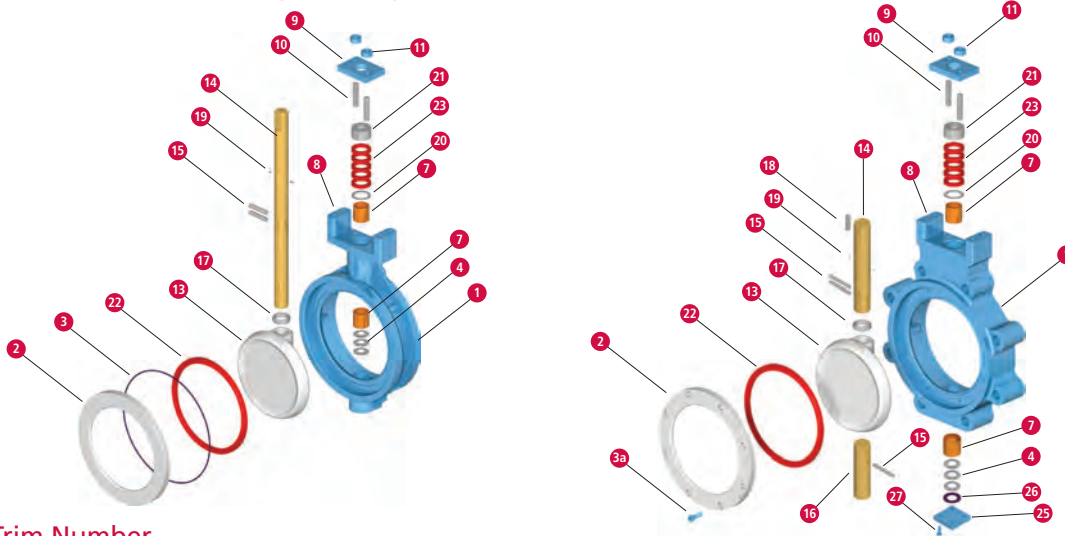
** Wafer valves 2-1/2 to 12" (65 mm to 300 mm) come standard with an unbolted inset seat retainer, held firmly in place for shipping and handling by an interference fit O-ring retention design (see page 8). By design, the seat retainer is secured in place by the piping flange during normal installation procedure.

STANDARD MATERIALS LIST

MB-1 DynaCentric High-performance Butterfly Valves

2-1/2" through 24" (65 mm through 600 mm) ASME Classes 150 and 300

3" (80 mm) ASME Class 600, 36" (900 mm) ASME Class 150



Body Group Trim Number

No.	PART	CARBON STEEL	STAINLESS STEEL	CARBON STEEL (H ₂ S)
1	Body	A216 Gr. WCC	A351 Gr. CF8M	A216 Gr. WCC RC-22
2	Seat Retainer	A516 Gr. 70	A276 Type 316	A516 Gr. 70 RC-22
3	Seat Retainer O-ring		Nitrile	
3a	Seat Retainer Screw	A193 Gr. B7	18-8 SS	18-8 SS
4	Stem/Disc Spring		18-8 SS	
7	Stem Bearing	TFE/Steel	Teflon/316 SS	Teflon/316 SS
8	Nameplate		18-8 SS	
9	Gland Retainer	Carbon Steel	Stainless Steel	Carbon Steel
10	Gland Retainer Stud		18-8 SS	
11	Gland Retainer Nut		18-8 SS	
■25	Bottom Cover	Carbon Steel	Stainless Steel	Carbon Steel RC-22
■26	Bottom Cover Gasket		Composite Fiber	
■27	Bottom Cover Screw	A193 Gr. B7	18-8 SS	A193 Gr. B7

Internal Group Trim Number

13	Disc		A351 Gr. CF8M*	
▲14	Upper Stem		A564 Type 630, H1150 + H1150	
15	Stem Pins		A564 Type 630, H1150 + H1150	
▲16	Lower Stem		A564 Type 630, H1150 + H1150	
17	Disc Spacer		316 SS	
18	Stem Key (8" or 200 mm and larger)		Carbon Steel	
19	Stem Retainer Pins		316 SS	
20	Packing Spacer		316 SS	
21	Gland Ring		316 SS	

Seal Group Trim Code (Note Pressure Classes)

22	Seat		See Note (1)	
23	Packing Set		TFE VEE, High Temperature, Graphitized or Grafoil	

NOTE (1): Seat assemblies consist of the following:

TYPE S – Class 150 – Virgin TFE (available in Class 150 only); Standard Class 150 and 300 – TFM

TYPE F – Metal, fire-tested, Class 150, 300 and 600 – Stainless steel with TFM insert – STD seat for all Class 600 valves

TYPE M – Metal, high-temperature, Class 150, 300 and 600 – 316 stainless steel with 316 stainless steel insert

* Hard chrome plated on F02, M01 and M03

One-piece stem 2-1/2" (65 mm) through 12" (300 mm) Class 300

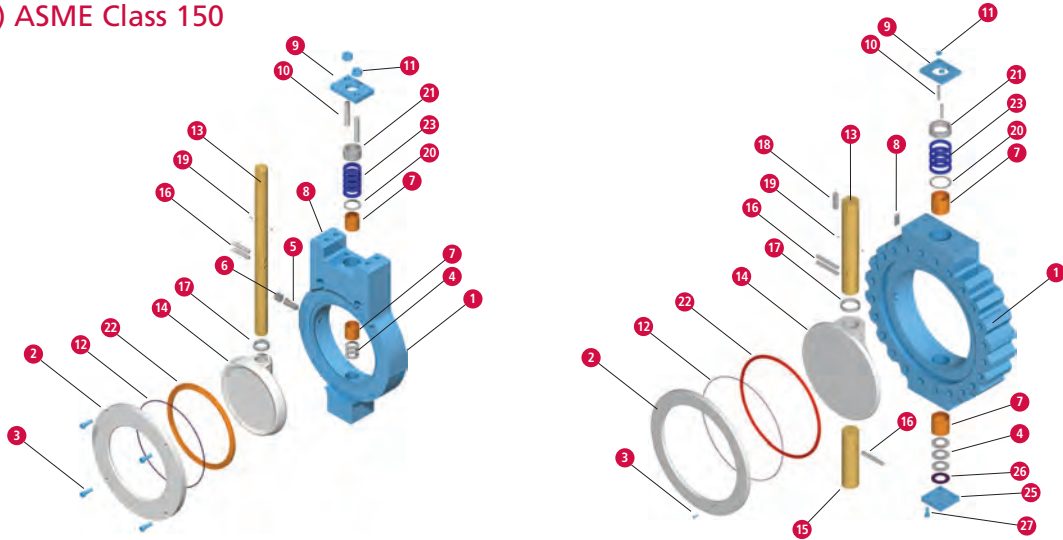
▲ Two-piece stem 12" (300 mm) Class 600 through 36" (900 mm) Class 150

■ 10" (250 mm) Class 300, 12" (300 mm) Class 150 and 300, and 14" (350 mm) through 36" (900 mm) Class 150

TYPICAL VALVE CONSTRUCTION SHOWN – SOME SIZES MAY VARY

MA-1 DynaCentric High-performance Butterfly Valves

4", 6", 8", 10" and 12" (100 mm, 150 mm, 200 mm, 250 mm and 300 mm) ASME Class 600
 30" (750 mm) ASME Class 150



Body Group Trim Number

No.	PART	CARBON STEEL	STAINLESS STEEL	CARBON STEEL (H ₂ S)
1	Body	A216 Gr. WCC	A351 Gr. CF8M	A216 Gr. WCC RC-22
2	Seat Retainer	A516 Gr. 70	A276 Type 316	A516 Gr. 70 RC-22
3	Seat Retainer Screw	A193 Gr. B7	18-8 SS	18-8 SS
4	Stem/Disc Spring		18-8 SS	
5	Stop Pin (4" through 10" only)		316 SS	
6	Stop Pin Plug (4" through 10" only)	Carbon Steel	316 SS	316 SS
7	Stem Bearing	TFE/Steel	Teflon/316 SS	Teflon/316 SS
8	Nameplate		18-8 SS	
9	Gland Retainer	Carbon Steel	Stainless Steel	Carbon Steel
10	Gland Retainer Stud		18-8 SS	
11	Gland Retainer Nut		18-8 SS	
12	Body Gasket		See Note (2)	
25	Bottom Cover Plate	Carbon Steel	Stainless Steel	Carbon Steel RC-22
26	Bottom Cover Gasket		Composite Fiber	
27	Bottom Cover Screw	A193 Gr. B7	18-8 SS	A193 Gr. B7

Internal Group Trim Number

▲13	Upper Stem		A564 Type 630, H1150 + H1150	
14	Disc	A216 Gr. WCC** A351 Gr. CF8M*	A351 Gr. CF8M*	A351 Gr. CF8M*
▲15	Lower Stem		A564 Type 630, H1150 + H1150	
16	Stem Pins		A564 Type 630, H1150 + H1150	
17	Disc Spacer		316 SS	
18	Stem Key (6" or 150 mm and larger)		Carbon Steel	
19	Stem Retainer Pins		316 SS	
20	Packing Spacer		316 SS	
21	Gland Ring		316 SS	

Seal Group Trim Code (Note Pressure Classes)

22	Seat	See Note (1)
23	Packing Set	TFE VEE, High Temperature, Graphitized or Grafoil

NOTE (1): Seat assemblies consist of the following:

TYPE S – Class 150 only – Virgin TFE, Class 150 and 300 – TFM

TYPE F – Metal, fire-tested, Class 150, 300 and 600 – Stainless steel with TFM insert – STD seat for all Class 600 valves

TYPE M – Metal, high-temperature, Class 150, 300 and 600 – 316 stainless steel with 316 stainless steel insert

NOTE (2): Standard valves do not require body gaskets. F02 fire-tested, fire-safe and high-temperature M01/M03 valves are equipped with composite fiber body gaskets.

* Hard chrome plated on F02, M01 and M03

** Electroless nickel-plated 14" through 30" (350 mm through 750 mm)

▲ One-piece stem 2-1/2" (65 mm) through 12" (300 mm) Class 300; Two-piece stem 12" (300 mm) Class 600 through 36" (900 mm) Class 150

■ 8" (200 mm), 10" (250 mm) and 12" (300 mm) Class 600, and 30" (750 mm) Class 150

TYPICAL VALVE CONSTRUCTION SHOWN – SOME SIZES MAY VARY

SEAT/SEAL MATERIAL CODES AND RATINGS

Material Codes

This chart is an abbreviated guide to the chemical resistance and pressure temperature limitations of seat seal materials used in DynaCentric high-performance butterfly valves.

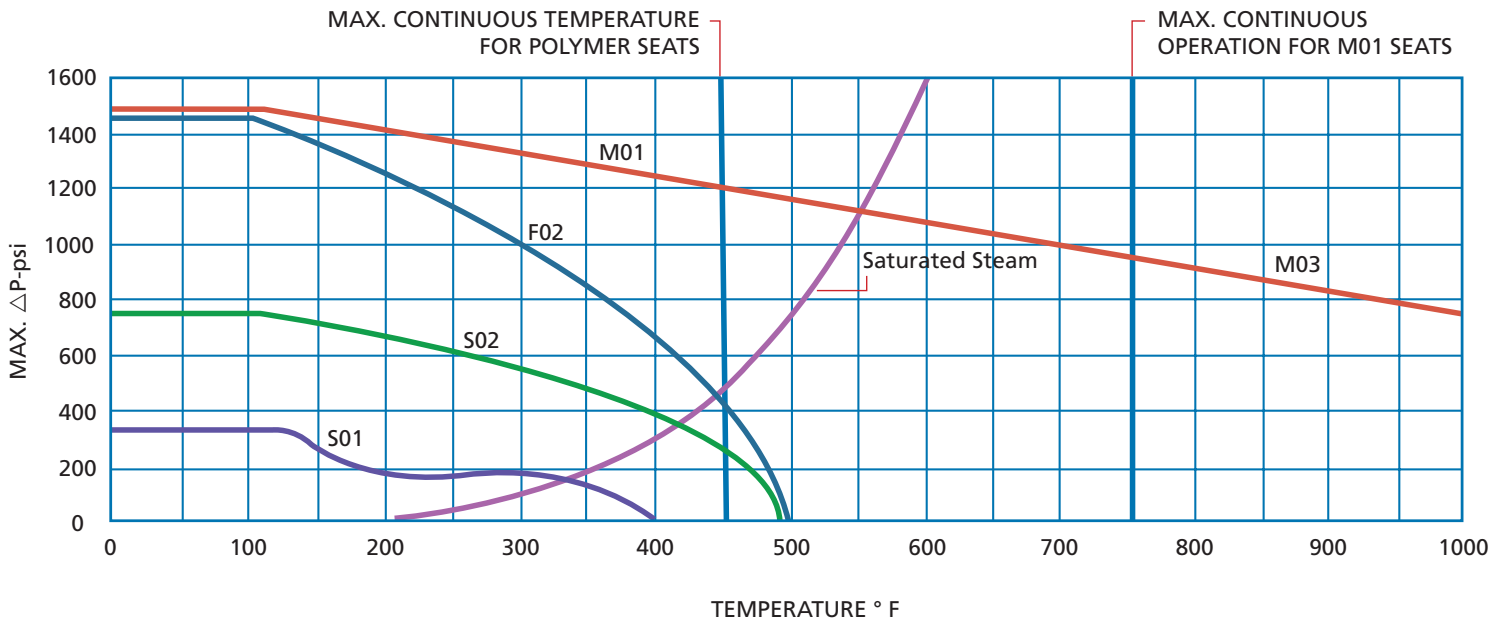
Complete ratings curves are shown below. For additional information, please consult your Cameron representative.

SEAL CODE	SEAT MATERIAL	ASME/FCI 70-2 SHUT-OFF CLASS	SERVICE APPLICATION
S01	TFE	6 (VI)	Seats are Virgin TFE. Use where lading contamination from glass or other fillers is not desirable, such as in food service. Available in Class 150 valves only. Temperature range is -50° F to 400° F (-46° C to 204° C). Drop tight.
S02	TFM	6 (VI)	Seat material is TFM with inert materials for use at elevated temperatures and pressures. Same chemical resistance as Virgin TFE, except slightly affected by hot alkaline solutions. Suitable for saturated steam to 200 psig.* Temperature range is -50° F to 500° F (-46° C to 260° C). Drop tight.
F02	SS / TFM	6 (VI)	Seat consists of stainless steel rings with a TFM insert. Recommended trim for fire-test applications and for higher pressure steam service.** Temperature is -50° F to 500° F (-46° C to 260° C). Drop tight.
F03	Ni-Cr Alloy (UNS 6625) / TFM	6 (VI)	Seat consists of Ni-Cr alloy (UNS 6625) with a TFM insert. Recommended trim for fire-test applications and for higher pressure steam service.* Temperature range is -50° F to 500° F (-46° C to 260° C). Drop tight.
M01	316 SS	4 (IV)	Recommended trim for superheated steam above 250 psi, hot oils and gases, and temperatures to 750° F (399° C). Pressure/temperature range is same as body rating. Meets ASME/FCI 70-2.
M03	Ni-Cr Alloy (UNS 6625)	4 (IV)	Same as M01, but for temperatures from 750° F to 1000° F (399° C to 538° C).

* Consult factory for steam applications with higher pressure.

Seat Pressure/Temperature Limitations

Seat ratings are based on differential pressures with the disc in the fully closed position and refer to seat only. Body pressure/temperature ratings appear on page 11.



VALVE BODY PRESSURE RATINGS

Pressure/Temperature Ratings for DynaCentric Valves Bodies*

All pressures are psig.

TEMP ° F	CLASS 150			CLASS 300			CLASS 600		
	CS	LCC	316 SS	CS	LCC	316 SS	CS	LCC	316 SS
■ -20 to 100	285	290	275	740	750	720	1480	1500	1440
■ 200	260	260	235	675	750	620	1350	1500	1240
■ 300	230	230	215	655	730	560	1315	1455	1120
■ 400	200	200	195	635	705	515	1270	1410	1025
■ 500	170	170	170	600	665	480	1200	1330	955
■ 600	140	140	140	550	605	450	1095	1210	900
■ 650	125	125	125	535	590	445	1075	1175	890
▲ 700	110	–	110	535	–	430	1065	–	870
▲ 750	95	–	95	505	–	425	1010	–	855
▲ 800	80	–	80	410	–	420	825	–	845
▲ 850	–	–	65	–	–	420	–	–	835
▲ 900	–	–	50	–	–	415	–	–	830
▲ 950	–	–	35	–	–	385	–	–	775
▲ 1000	–	–	20	–	–	350	–	–	700

* In accordance with ASME B16.34.

Ratings shown above are maximum working pressure ratings for the valve body at various temperatures.

Partial pressure limitations according to actual service conditions are determined by seat, trim and packing ratings.

Recommended Temperature Limits for Standard Materials Available

SEAL GROUP	
S01-TFE	350° F (177° C) [400° F (204° C) intermittent]
S02-TFM	450° F (177° C) [500° F (260° C) intermittent]
F02-SS/TFM	450° F (177° C) [500° F (260° C) intermittent]
F03-Ni-Cr/TFM	450° F (177° C) [500° F (260° C) intermittent]
M01-316 SS	750° F (399° C)
M03-Ni-Cr	1000° F (538° C)

TRIM GROUP*	
01-Cs Disc/17-4 Stem	650° F (343° C)
02-SS Disc/17-4 Stem	650° F (343° C)
03-SS Disc/Ni-Cr Stem	700° F (371° C)
04-Ni-Cu Disc/Ni-Cu Stem	750° F (399° C)
05-SS Disc/316 Stem	700° F (371° C)
06-SS Disc HF-6/17-4 Stem	650° F (343° C)
07-SS Disc HF-6/Ni-Cr Stem	1000° F (538° C)

* For trim group 08 through 13, consult Cameron for temperature limitations.

PACKING GROUP	
11 - TFE "V"	450° F (232° C)
13 - High-Temp. Graphitized	700° F (371° C)
14- Grafoil	1000° F (538° C)

STEM MATERIALS

- ASTM A564 Type 630, H1150 + H1150, Ni-Cr Alloy UNS 7718, or Ni-Cu Alloy UNS 5500
- ▲ Ni-Cr Alloy UNS 7718 or Ni-Cu Alloy UNS 5500

NOTE: Valves with 17-4 PH stems are only recommended up to a maximum temperature of 650° F (343° C).

Ni-Cr alloy UNS 7718 stems are required for temperatures above 650° F (343° C).

Ni-Cu alloy UNS 5500 stems can be furnished for applications requiring high corrosion resistance and full ASME ratings.

BODY MATERIALS

Carbon Steel – ASTM A516 Gr. 70, ASTM A216 Gr. WCC

Low-temperature CS – ASTM A352 Gr. LCC
Stainless Steel – ASTM A351 Gr. CF8M

NOTE: Carbon steel listed is not recommended for prolonged usage above 800° F (427° C).

Maximum Shut-off Pressures for Valves with 316 SS Stems (CWP)

Size in.	ΔP MAX – 316 SS STEMS		
	Class 150	Class 300	Class 600
2-1/2	285	740	–
3	285	740	650
4	285	285	650
5	285	720	–
6	285	400	650
8	285	450	650
10	180	500	650
12	250	740	650
14	200	740	–
16	285	740	–
18	285	740	–
20	285	740	–
24	285	740	–
30	285	–	–
36	285	–	–

NOTE: Cold working pressures for DynaCentric butterfly valves with 316 SS stems are derated per table above. These derated pressures are based on torque with FO/MO seats downstream. Ni-Cr stems are available for those applications requiring higher working pressure with maximum corrosion resistance.

VALVE SIZING FORMULAS

Proper valve selection is dependent upon several factors for both liquid and gas flow, as well as the physical limitations of the valve, as established by the manufacturer.

The following information is presented for handy and quick reference. The flow coefficient (C_v) is the most universally accepted measure of a valve's capacity to handle flow.

For Liquid Service:

$$C_v = Q_L \sqrt{\frac{S_G}{\Delta P}}$$

$$Q_L = C_v \sqrt{\frac{\Delta P}{S_G}}$$

$$\Delta P = S_G \left(\frac{Q_L}{C_v} \right)^2$$

For Steam Service (Superheated):

$$C_v = \frac{W (1 + 0.0007 T_s)}{2.1 \sqrt{\Delta P (P_1 + P_2)}}$$

$$W = \frac{2.1 C_v \sqrt{\Delta P (P_1 + P_2)}}{(1 + 0.0007 T_s)}$$

Cavitation

Because of their inherently high flow capacities, DynaCentric high-performance butterfly valves have a greater tendency to cavitate at high pressure drops.

Cavitation occurs in liquids if the static pressure of the flowing liquid decreases to a value less than the fluid under pressure. This phenomenon can create accelerated wear and deterioration of valves and piping, as well noise and vibration problems.

To avoid cavitation in piping, the following formula should be employed:

$$\Delta P_{\max} = 0.33 (P_1 - P_v)$$

This formula also can be used safely where reducers are employed.

For Gas Service:

$$C_v = \frac{Q_G}{1360} \sqrt{\frac{S_G T_R}{\Delta P \times P_1}}$$

$$Q_G = 1360 C_v \sqrt{\frac{\Delta P \times P_1}{S_G T_R}}$$

$$\Delta P = \frac{S_G T_R}{P_1} \left(\frac{Q_G}{1360 C_v} \right)^2$$

For Steam Service (Saturated):

$$C_v = \frac{W}{2.1 \sqrt{\Delta P (P_1 + P_2)}}$$

$$W = 2.1 C_v \sqrt{\Delta P (P_1 + P_2)}$$

A dimensionless entity, C_v is defined as the number of gallons per minute of water at standard conditions (60° F, or 16° C, and 14.7 psia), which will flow through a given flow restriction with a pressure drop of 1 psi.

Once determined, the C_v of a valve provides a capacity index by which one is able to readily estimate the required size of a flow restriction for controlling the fluid flow of any system.

Where:

C_v	=	valve flow coefficient
P_1	=	upstream pressure, psia
P_2	=	downstream pressure, psia
ΔP	=	pressure drop $P_1 - P_2$, psi
Q_G	=	gas flow rate, scf/h
Q_L	=	liquid flow rate, US gpm
S_G	=	specific gravity of fluid
T_R	=	temperature, ° R (460 + ° F)
T_s	=	steam superheat, ° F
W	=	flow rate, lb/hr
P_v	=	vapor pressure, psia

These formulas generally are accurate for gas flow where $\Delta P \leq 0.1P_1$.

For $\Delta P > 0.1P_1$, consult Cameron for assistance in sizing.

Reducers

When valves are mounted between pipe reducers, a loss in valve capacity occurs with an additional pressure drop across the system due to contractions and sudden enlargements. This arrangement often is employed with DynaCentric high-performance butterfly valves where the desired C_v for the control valve results in a valve size that is smaller than the line size.

Use the following equation to obtain the corrected flow coefficients for the DynaCentric high-performance butterfly valve when installed in combination with reducers.

$$R = \frac{1}{\sqrt{1 + \frac{1.5 \left(1 - \frac{d^2}{D^2}\right)^2}{890} \left(\frac{C_v}{d^2}\right)^2}} C_{VR} = C_v R$$

Where:

C_v	=	sizing coefficient determined by standard calculations
d	=	nominal valve size, inches
D	=	line size, inches
C_{VR}	=	corrected flow coefficient for valve between reducers

FLOW CHARACTERISTICS (C_v)

The practical control range of this type of valve occurs where continuous throttling can be effected without significant loss of accuracy or valve life.

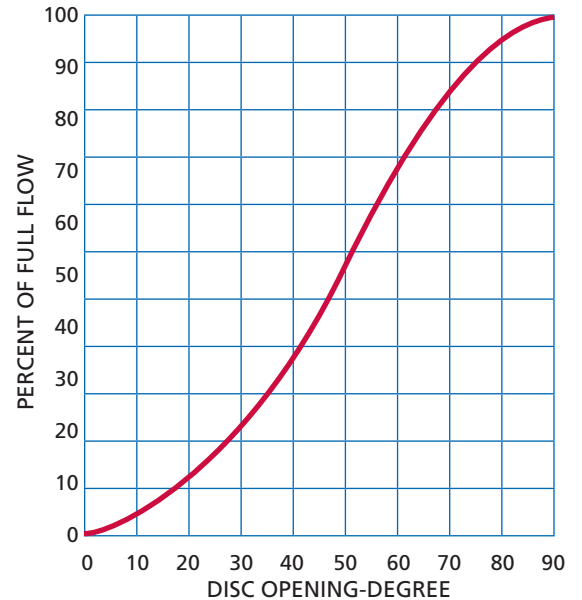
The usable range for DynaCentric high-performance butterfly valves is between 20 and 70 degrees opening, resulting in a ratio of 10:1.

In sizing the DynaCentric high-performance butterfly valve for throttling applications, a full open C_v should be selected that is approximately 1.8 times the C_v determined from calculations.

Under normal flow conditions, this selection will provide a valve opening of 50 to 60 degrees.

C_v values equal the flow of water in US gallons per minute per 1 psi pressure drop.

TYPICAL CHARACTERISTICS CURVE



Series 5100 Class 150

VALVE SIZE		DISC ANGLE, DEGREES OPEN							
in.	(mm)	20	30	40	50	60	70	80	90
2-1/2	(65)	8	17	31	46	66	82	97	103
3	(80)	14	31	54	81	115	144	169	180
4	(100)	31	66	117	176	250	312	367	400
5	(125)	54	114	201	302	429	536	630	670
6	(150)	85	180	317	476	677	846	995	1058
8	(200)	174	371	654	981	1395	1744	2049	2180
10	(250)	300	638	1125	1688	2401	3001	3526	3751
12	(300)	440	936	1651	2477	3523	4403	5174	5504
14	(350)	523	1110	1959	2939	4180	5225	6139	6531
16	(400)	659	1401	2473	3709	5276	6594	7748	8243
18	(450)	886	1883	3323	4985	7089	8862	10,412	11,077
20	(500)	1066	2266	3998	5998	8530	10,662	12,528	13,328
24	(600)	1554	3302	5828	8741	12,432	15,540	18,260	19,425
30	(750)	2752	5848	10,320	15,480	22,016	27,520	32,336	34,400
36	(900)	3963	8421	14,861	22,291	31,703	39,629	46,564	49,536

Series 5300 Class 300

VALVE SIZE		DISC ANGLE, DEGREES OPEN							
in.	(mm)	20	30	40	50	60	70	80	90
2-1/2	(65)	8	17	31	46	66	82	97	103
3	(80)	14	31	54	81	115	144	169	180
4	(100)	31	66	117	176	250	312	367	400
5	(125)	54	114	201	302	429	536	630	670
6	(150)	85	180	317	476	677	846	995	1058
8	(200)	174	371	654	981	1395	1744	2049	2180
10	(250)	268	570	1005	1508	2145	2681	3150	3351
12	(300)	399	849	1498	2247	3196	3995	4693	4993
14	(350)	428	910	1606	2409	3426	4282	5032	5353
16	(400)	609	1295	2285	3428	4876	6094	7161	7618
18	(450)	848	1730	2983	4504	6303	7594	8379	8855
20	(500)	906	1926	3378	5098	7250	9062	10,648	11,328
24	(600)	1290	2629	4534	6847	9580	11,542	12,738	15,520

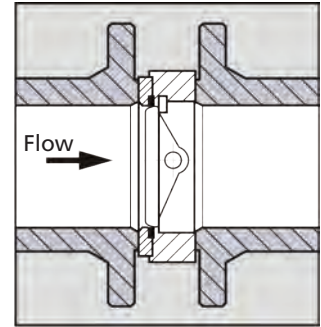
Series 5600 Class 600

VALVE SIZE		DISC ANGLE, DEGREES OPEN							
in.	(mm)	20	30	40	50	60	70	80	90
3	(80)	14	31	54	81	115	144	169	180
4	(100)	23	50	88	132	188	234	275	293
6	(150)	67	141	249	374	532	665	781	831
8	(200)	155	330	583	874	1243	1554	1826	1942
10	(250)	241	512	904	1356	1929	2411	2833	3014
12	(300)	336	714	1260	1890	2688	3360	3948	4200

TORQUE VALUES

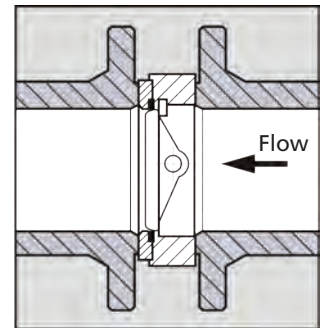
The torque values shown in these tables are net required operating torques for actuator sizing.

An appropriate safety factor is included for normal wet operating torque.



50 Seats Upstream – Valve Torque (in-lb)

Size in. (mm)	2-1/2 (65)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)	24 (600)	30 (750)	36 (900)
0 to 50 psi	111	155	348	503	728	1125	2154	3291	4277	6334	8129	11,685	15,770	23,040	36,030
100 psi	136	190	395	583	860	1290	2430	3790	5050	7469	9533	13,556	18,540	26,980	44,450
200 psi	179	250	490	737	1110	1600	2990	4790	6610	9740	12,340	17,297	24,080	35,390	61,520
285 psi	214	300	570	871	1330	1900	3460	5640	7930	11,670	14,276	20,477	28,790	43,200	75,000
300 psi	225	315	590	899	1370	1950	3550	5790	8160	12,010	15,147	21,038	29,620	-	-
400 psi	271	380	680	1053	1630	2280	4100	6800	9720	14,281	17,955	24,780	35,160	-	-
500 psi	318	445	780	1205	1880	2610	4660	7800	11,270	16,551	20,762	28,521	40,700	-	-
600 psi	364	510	875	1368	2140	2940	5220	8800	12,820	18,821	23,570	32,262	46,240	-	-
700 psi	411	575	970	1526	2400	3270	5780	9800	14,380	21,092	26,377	36,003	51,780	-	-
740 psi	429	600	1020	1597	2500	3400	6000	10,200	15,000	22,000	27,500	37,500	54,000	-	-



50 Seats Downstream – Valve Torque (in-lb)

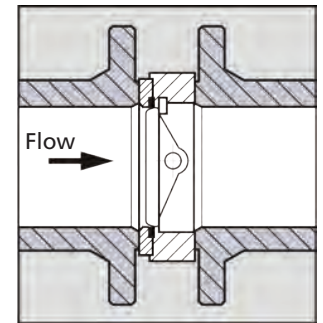
Size in. (mm)	2-1/2 (65)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)	24 (600)	30 (750)	36 (900)
0 to 50 psi	111	155	348	503	728	1125	2154	3291	4277	6334	8129	11,685	15,770	23,040	36,030
100 psi	143	200	419	618	911	1364	2563	4013	5380	7947	10,131	14,371	19,714	30,000	46,580
200 psi	208	291	561	846	1276	1841	3381	5458	7586	11,174	14,134	19,743	27,603	43,820	70,000
285 psi	263	368	681	1040	1587	2247	4077	6686	9462	13,917	17,536	24,309	34,308	55,980	90,000
300 psi	272	381	702	1074	1642	2319	4200	6903	9793	14,401	18,137	25,114	35,491	-	-
400 psi	337	472	844	1302	2007	2796	5018	8348	11,999	17,628	22,140	30,486	43,379	-	-
500 psi	402	563	986	1530	2373	3274	5836	9793	14,205	20,855	26,143	35,858	51,268	-	-
600 psi	466	653	1128	1757	2738	3751	6654	11,237	16,411	24,082	30,146	41,230	59,156	-	-
700 psi	531	744	1269	1985	3104	4229	7473	12,682	18,618	27,309	34,149	46,601	67,045	-	-
740 psi	557	780	1326	2076	3250	4420	7800	13,260	19,500	28,800	35,750	48,750	70,200	-	-

For severe service, additional safety factor should be added:

Dry gas or slurry..... 1.25 Low temperature.....1.20
 Emergency shutdown..... 1.60

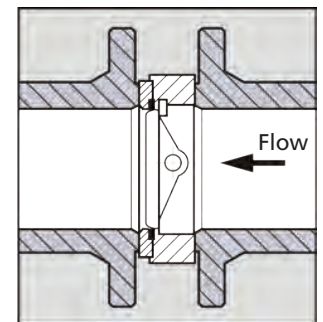
F0 / M0 Seats Upstream – Valve Torque (in-lb)

Size in. (mm)	2-1/2 (65)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)	24 (600)	30 (750)	36 (900)
0 to 50 psi	238	333	609	920	1389	2710	4422	6547	7728	9709	13,116	18,395	25,623	36,600	53,610
100 psi	261	366	694	1046	1578	3050	5043	7595	8956	11,218	15,432	21,289	29,746	42,805	62,660
200 psi	308	431	863	1300	1957	3729	6286	9689	11,412	14,235	20,063	27,079	37,991	55,130	78,620
285 psi	348	487	1006	1514	2278	4307	7343	11,470	13,500	16,800	24,000	32,000	45,000	64,980	90,000
300 psi	355	497	1032	1552	2335	4409	7531	11,784	13,868	17,253	24,695	32,868	46,237		
400 psi	401	562	1201	1805	2714	5089	8773	13,878	16,325	20,270	29,326	38,658	54,482		
500 psi	449	628	1370	2058	3092	5769	10,016	15,973	18,781	23,288	33,958	44,447	62,728		
600 psi	495	693	1539	2311	3470	6448	11,259	18,068	21,237	26,305	38,589	50,237	70,974		
700 psi	542	759	1707	2563	3849	7128	12,503	20,162	23,693	29,323	43,221	56,026	79,219		
740 psi	561	785	1775	2665	4000	7400	13,000	21,000	24,675	30,530	48,074	58,342	82,518		
800 psi	589	824	1876	2816	4227	7808	13,746	22,257							
900 psi	636	890	2045	3069	4605	8488	14,989	24,351							
1000 psi	682	955	2214	3322	4984	9167	16,232	26,446							
1100 psi	729	1021	2383	3575	5382	9847	17,476	28,541							
1200 psi	776	1086	2552	3828	5741	10,527	18,719	30,635							
1300 psi	823	1152	2721	4080	6119	11,206	19,962	32,730							
1400 psi	870	1218	2890	4333	6497	11,886	21,205	34,824							
1480 psi	907	1270	3025	4535	6800	12,430	22,200	36,500							



F0 / M0 Seats Downstream – Valve Torque (in-lb)

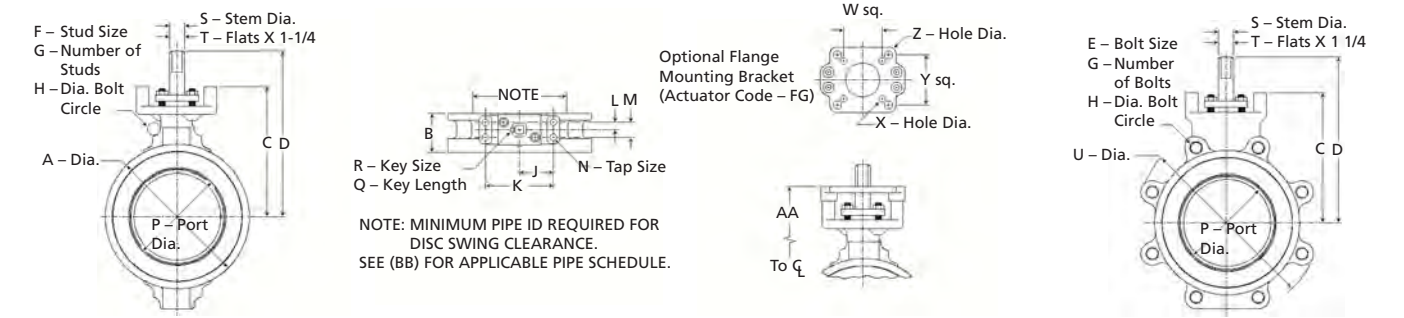
Size in. (mm)	2-1/2 (65)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)	24 (600)	30 (750)	36 (900)
0 to 50 psi	238	333	609	920	1389	2710	4422	6547	7728	9709	13,116	18,395	25,623	36,600	53,610
100 psi	274	383	733	1105	1665	3211	5326	8051	9314	11,660	16,085	22,135	30,942	45,080	66,020
200 psi	344	482	979	1474	2218	4212	7134	11,059	12,485	15,562	22,023	29,616	41,579	61,750	91,710
285 psi	405	567	1188	1787	2687	5063	8672	13,615	15,181	18,880	27,070	35,974	50,621	75,000	115,000
300 psi	416	582	1225	1842	2770	5214	8943	14,066	15,656	19,465	27,961	37,096	52,216		
400 psi	487	682	1471	2211	3322	6215	10,751	17,074	18,828	23,367	33,899	44,577	62,854		
500 psi	558	781	1717	2579	3875	7216	12,560	20,082	21,999	27,270	39,837	52,057	73,491		
600 psi	629	881	1963	2948	4427	8218	14,368	23,089	25,171	31,172	45,775	59,538	84,129		
700 psi	701	981	2209	3316	4979	9219	16,177	26,097	28,342	35,075	51,713	67,018	94,766		
740 psi	729	1021	2308	3464	5200	9620	16,900	27,300	29,611	36,636	54,088	70,011	99,021		
800 psi	771	1080	2455	3685	5531	10,221	17,985	29,105							
900 psi	843	1180	2701	4054	6084	11,222	19,794	32,112							
1000 psi	914	1280	2947	4422	6636	12,224	21,602	35,120							
1100 psi	985	1379	3193	4791	7188	13,225	23,410	38,127							
1200 psi	1056	1479	3440	5160	7741	14,227	25,219	41,135							
1300 psi	1128	1579	3686	5529	8293	15,228	27,027	44,143							
1400 psi	1199	1678	3932	5897	8845	16,230	28,836	47,150							
1480 psi	1256	1758	4129	6192	9287	17,031	30,283	49,557							



For severe service, additional safety factor should be added:

- Dry gas or slurry 1.25
- Emergency shutdown 1.60
- Low temperature 1.20
- High temperature between 600° F and 700° F (316° C and 371° C)..... 1.30
- Extended high temperature between 750° F and 1000° F (399° C and 538° C)..... 1.50

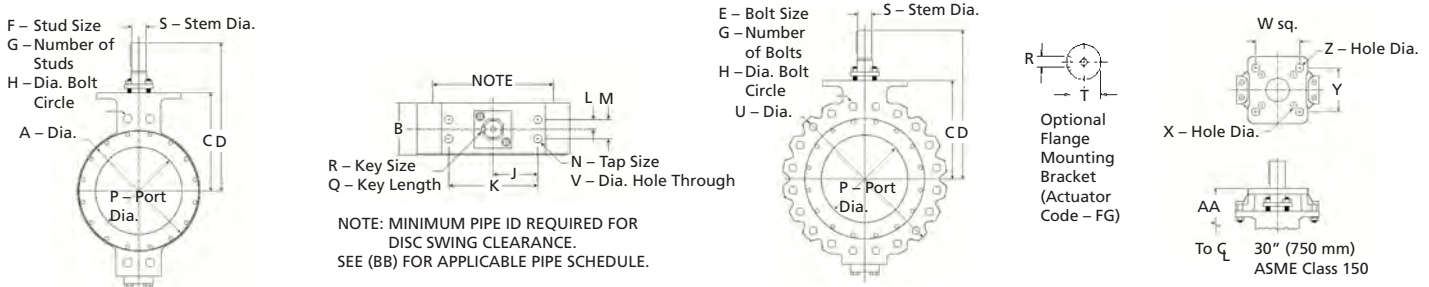
DIMENSIONAL DATA



Series B5100, Class 150, 285 psi CWP*

in. (mm)	A	B	C	D	E	F	G**	H	J	K	L	M	N	P
2-1/2 (65)	–	1.87 (48)	5.81 (148)	7.94 (202)	5/8-11	–	4	5.50 (140)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	2.09 (53)
3 (80)	5.00 (127)	2.00 (51)	5.50 (140)	7.63 (194)	5/8-11	5/8	4	6.00 (152)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	2.62 (67)
4 (100)	6.19 (157)	2.12 (54)	6.38 (162)	8.50 (216)	5/8-11	5/8	8	7.50 (191)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	3.63 (92)
5 (125)	–	2.25 (57)	7.50 (191)	9.63 (245)	3/4-10	–	8	8.50 (216)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	4.50 (114)
6 (150)	8.50 (216)	2.28 (58)	7.63 (194)	9.75 (248)	3/4-10	3/4	8	9.50 (241)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	5.62 (143)
8 (200)	10.62 (270)	2.50 (64)	8.88 (226)	11.58 (294)	3/4-10	3/4	8	11.75 (298)	2.13 (54)	4.25 (108)	0.63 (16)	1.25 (32)	3/8-16	7.61 (193)
10 (250)	12.75 (324)	2.81 (71)	9.88 (251)	12.62 (321)	7/8-9	7/8	12	14.25 (362)	2.13 (54)	4.25 (108)	0.63 (16)	1.25 (32)	3/8-16	9.50 (241)
12 (300)	15.00 (381)	3.19 (81)	11.25 (286)	14.81 (376)	7/8-9	7/8	12	17.00 (432)	2.75 (70)	5.50 (140)	0.81 (21)	1.62 (41)	1/2-13	11.50 (292)
14 (350)	16.25 (413)	3.62 (92)	10.75 (274)	15.58 (396)	1-8	1	12	18.75 (476)	3.44 (87)	6.88 (175)	0.88 (22)	1.75 (44)	1/2-13	12.50 (318)
16 (400)	18.50 (470)	4.00 (102)	12.28 (312)	17.83 (453)	1-8	1	16	21.25 (540)	3.44 (87)	6.88 (175)	0.88 (22)	1.75 (44)	1/2-13	14.37 (365)
18 (450)	21.00 (533)	4.50 (114)	14.50 (368)	20.84 (529)	1-1/8-8	1-1/8	16	22.75 (578)	4.75 (121)	9.50 (241)	1.00 (25)	2.00 (51)	0.69 through	16.25 (413)
20 (500)	23.00 (584)	5.00 (127)	15.81 (402)	22.44 (570)	1-1/8-8	1-1/8	20	25.00 (635)	4.75 (121)	9.50 (241)	1.00 (25)	2.00 (51)	0.69 through	18.03 (458)
24 (600)	27.25 (692)	6.06 (154)	17.75 (451)	24.75 (629)	1-1/4-8	1-1/4	20	29.50 (749)	4.75 (121)	9.50 (241)	1.00 (25)	2.00 (51)	0.69 through	21.45 (545)
36 (900)	–	8.12 (206)	25.00 (635)	33.38 (848)	1-1/2-8	–	32	42.75 (1086)	7.50 (191)	15.00 (381)	2.19 (56)	4.38 (111)	1-8	33.88 (861)

in. (mm)	Q	R	S	T	U	W	X	Y	Z	AA	BB	Weight	
												Lug Body lb (kg)	Wafer Body lb (kg)
2-1/2 (65)	–	–	0.500 (13)	0.375 (10)	6.75 (171)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	6.69 (170)	Sch 160	13 (6)	–
3 (80)	–	–	0.625 (16)	0.437 (11)	7.25 (184)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	6.38 (162)	Sch 160	15 (7)	11 (5)
4 (100)	–	–	0.625 (16)	0.437 (11)	8.75 (222)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	7.26 (184)	Sch 80	21 (10)	15 (7)
5 (125)	–	–	0.875 (22)	0.625 (16)	10.00 (254)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	8.38 (213)	Sch 80	33 (15)	–
6 (150)	–	–	0.875 (22)	0.625 (16)	10.86 (276)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	8.50 (216)	Sch 40	38 (17)	28 (13)
8 (200)	1.56 (40)	0.250 (6.35) sq.	1.125 (29)	–	13.25 (337)	–	–	3.50 (89)	0.56 (14)	10.00 (254)	Sch 40	53 (24)	44 (20)
10 (250)	1.56 (40)	0.250 (6.35) sq.	1.125 (29)	–	16.00 (406)	–	–	3.50 (89)	0.56 (14)	11.00 (279)	Sch 40	88 (40)	63 (29)
12 (300)	2.00 (51)	0.312 (7.92) sq.	1.375 (35)	–	18.75 (476)	3.50 (89)	0.56 (14)	5.31 (135)	0.69 (18)	12.75 (324)	Sch 40	132 (60)	102 (46)
14 (350)	2.00 (51)	0.312 (7.92) sq.	1.375 (35)	–	20.75 (527)	3.50 (89)	0.57 (14)	4.78 (121) sq.	0.81 (21)	13.50 (343)	Sch 40	215 (98)	130 (59)
16 (400)	2.75 (70)	0.375 (9.53) sq.	1.750 (44)	–	23.25 (591)	4.06 (103)	0.81 (21)	5.31 (135) sq.	0.69 (18)	15.03 (382)	Sch 40	280 (127)	185 (84)
18 (450)	3.00 (76)	0.500 (12.70) sq.	2.000 (51)	–	25.00 (635)	4.78 (121)	0.81 (21)	2.88 x 6.94 (73 x 176)	0.94 (24)	17.50 (445)	Sch 40	365 (166)	260 (118)
20 (500)	3.00 (76)	0.500 (12.70) sq.	2.000 (51)	–	27.25 (692)	4.78 (121)	0.81 (21)	2.88 x 6.94 (73 x 176)	0.94 (24)	18.81 (478)	Sch 40	477 (216)	350 (159)
24 (600)	3.75 (95)	0.625 (15.88) sq.	2.500 (64)	–	32.00 (813)	4.78 (121)	0.81 (21)	2.88 x 6.94 (73 x 176)	0.94 (24)	20.75 (527)	Sch 40	670 (304)	540 (245)
36 (900)	6.50 (165)	0.875 (22.23) sq.	3.750 (95)	–	45.75 (1162)	10.25 (260)	0.81 (21)	–	–	29.00 (737)	Sch 40	2185 (991)	–

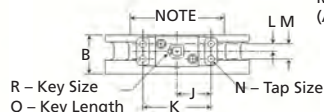
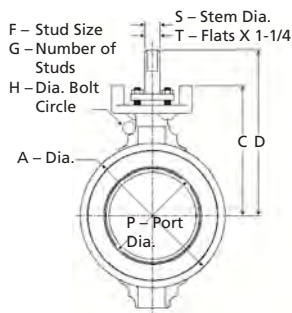


Series A5100, Class 150, 285 psi CWP*

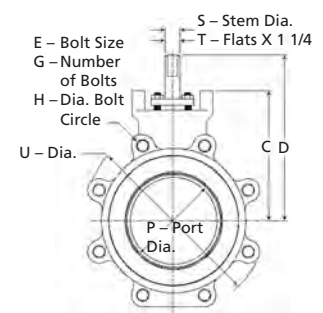
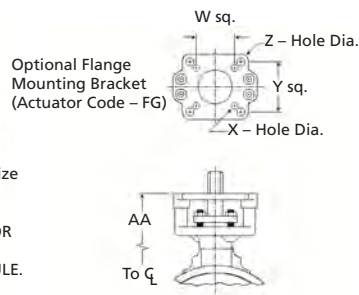
in. (mm)	A	B	C	D	E	F	G**	H	J	K	L	M	N	P
30 (750)	34.50 (876)	7.63 (194)	22.88 (581)	30.94 (786)	1 1/4-8	1 1/4-8	28	36.00 (914)	6.00 (152)	12.00 (3050)	1.50 (38)	3.00 (76)	3/4-10	27.90 (709)

in. (mm)	Q	R	S	T	U	W	X	Y	Z	AA	BB	Weight	
												Lug Body lb (kg)	Wafer Body lb (kg)
30 (750)	4.00 (102)	0.875 x 0.625 (22 x 16)	3.500 (89)	3.156	38.75 (984)	9.47	0.81	3.92	0.81 (21)	26.88 (683)	Sch XH	1800 (816)	1300 (590)

* Pressure ratings are in accordance with ASME B16.34 for group 1.1 carbon steel valves. Pressure ratings will vary with different body materials.
 ** Installation manual is available with complete flange bolt/stud information.



NOTE: MINIMUM PIPE ID REQUIRED FOR DISC SWING CLEARANCE.
SEE (BB) FOR APPLICABLE PIPE SCHEDULE.



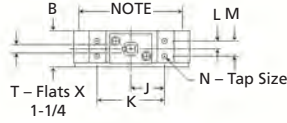
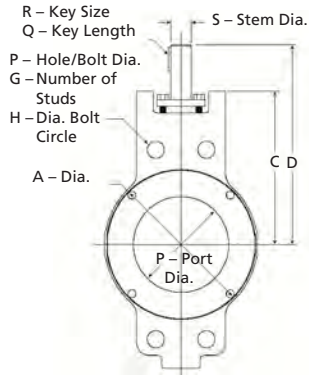
Series B5300, Class 300, 740 psi CWP*

in.	(mm)	A	B	C	D	E	F	G**	H	J	K	L	M	N	P
2-1/2	(65)	4.13 (105)	1.87 (48)	5.81 (148)	7.94 (202)	3/4-10	3/4	8	5.88 (149)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	2.09 (53)
3	(80)	5.00 (127)	2.00 (51)	5.50 (140)	7.63 (194)	3/4-10	3/4	8	6.63 (168)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	2.62 (53)
4	(100)	6.19 (157)	2.12 (54)	6.38 (162)	8.50 (216)	3/4-10	3/4	8	7.88 (200)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	3.63 (92)
5	(125)	7.31 (186)	2.25 (57)	7.50 (191)	9.63 (245)	3/4-10	3/4	8	9.25 (235)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	4.50 (114)
6	(150)	8.50 (216)	2.28 (58)	7.63 (194)	9.75 (248)	3/4-10	3/4	12	10.63 (270)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	5.62 (143)
8	(200)	10.62 (270)	2.88 (73)	8.88 (226)	11.58 (294)	7/8-9	7/8	12	13.00 (330)	2.13 (54)	4.25 (108)	0.63 (16)	1.25 (32)	3/8-16	7.61 (193)
10	(250)	12.75 (324)	3.25 (83)	10.88 (276)	14.41 (366)	1-8	1	16	15.25 (387)	2.75 (70)	5.50 (140)	0.81 (21)	1.62 (41)	1/2-13	9.50 (241)
12	(300)	15.00 (381)	3.62 (92)	12.25 (311)	16.48 (419)	1-1/8-8	1-1/8	16	17.75 (451)	2.75 (70)	5.50 (140)	0.81 (21)	1.62 (41)	1/2-13	11.50 (292)
14	(350)	16.25 (413)	4.62 (117)	13.62 (346)	19.98 (507)	1-1/8-8	1-1/8	20	20.25 (514)	4.75 (121)	9.50 (241)	1.00 (25)	2.00 (51)	0.69 through 12.50	318
16	(400)	18.50 (470)	5.25 (133)	14.62 (371)	21.00 (533)	1-1/4-8	1-1/4	20	22.50 (572)	4.75 (121)	9.50 (241)	1.00 (25)	2.00 (51)	0.69 through 14.37	365
18	(450)	21.00 (533)	5.88 (149)	16.16 (410)	23.16 (588)	1-1/4-8	1-1/4	24	24.75 (629)	4.75 (121)	9.50 (241)	1.00 (25)	2.00 (51)	0.69 through 16.25	413
20	(500)	23.00 (584)	6.25 (159)	17.14 (435)	24.15 (613)	1-1/4-8	1-1/4	24	27.00 (686)	4.75 (121)	9.50 (241)	1.00 (25)	2.00 (51)	0.69 through 18.03	458
24	(600)	27.25 (692)	7.25 (184)	19.62 (498)	27.69 (703)	1-1/2-8	1-1/2	24	32.00 (813)	6.00 (152)	12.00 (305)	1.50 (38)	3.00 (76)	3/4-10	21.40 (544)

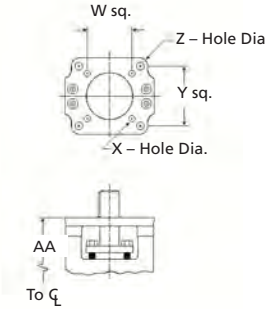
in.	(mm)	Q	R	S	T	U	W	X	Y	Z	AA	BB	Weight	
													Lug Body	Wafer Body
													lb (kg)	lb (kg)
2-1/2	(65)	-	-	0.500 (13)	0.375 (10)	7.38 (187)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	6.69 (170)	Sch 160	17 (8)	-
3	(80)	-	-	0.625 (16)	0.437 (11)	8.12 (206)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	6.38 (162)	Sch 160	20 (9)	11 (5)
4	(100)	-	-	0.625 (16)	0.437 (11)	9.38 (238)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	7.26 (184)	Sch 80	24 (11)	15 (7)
5	(125)	-	-	0.875 (22)	0.625 (16)	10.75 (273)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	8.38 (213)	Sch 80	35 (16)	23 (10)
6	(150)	-	-	0.875 (22)	0.625 (16)	12.12 (308)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	8.50 (216)	Sch 40	47 (21)	28 (13)
8	(200)	1.56 (40)	0.250 (6.35) sq.	1.125 (29)	-	14.75 (375)	-	-	3.50 (89)	0.56 (14)	10.00 (254)	Sch 40	75 (34)	46 (21)
10	(250)	2.00 (51)	0.312 (7.92) sq.	1.375 (35)	-	17.25 (438)	3.50 (89)	0.56 (14)	5.31 (135)	0.69 (18)	12.38 (314)	Sch 40	132 (60)	87 (39)
12	(300)	2.75 (70)	0.375 (9.53) sq.	1.750 (44)	-	20.00 (508)	3.50 (89)	0.56 (14)	5.31 (135)	0.69 (18)	13.75 (349)	Sch 40	197 (89)	135 (61)
14	(350)	3.00 (76)	0.500 (12.70) sq.	2.000 (51)	-	22.50 (572)	4.78 (121)	0.81 (21)	2.88 x 6.94 (73.15 x 176.28)	0.94 (24)	16.62 (422)	Sch 80	390 (177)	235 (107)
16	(400)	3.00 (76)	0.500 (12.70) sq.	2.000 (51)	-	25.00 (635)	4.78 (121)	0.81 (21)	2.88 x 6.94 (73.15 x 176.28)	0.94 (24)	17.62 (448)	Sch 80	495 (225)	310 (141)
18	(450)	3.75 (95)	0.625 (15.88) sq.	2.500 (64)	-	27.25 (692)	4.78 (121)	0.81 (21)	2.88 x 6.94 (73.15 x 176.28)	0.94 (24)	19.16 (487)	Sch 80	675 (306)	430 (195)
20	(500)	3.75 (95)	0.625 (15.88) sq.	2.500 (64)	-	29.50 (749)	4.78 (121)	0.81 (21)	2.88 x 6.94 (73.15 x 176.28)	0.94 (24)	20.14 (512)	Sch 80	775 (352)	480 (218)
24	(600)	3.62 (92)	0.625 x 0.875	3.500 (89)	-	35.00 (889)	-	-	3.92 x 9.47 (99.57 x 240.54)	0.81 (21)	23.62 (600)	Sch 80	1325 (601)	815 (370)

* Pressure ratings are in accordance with ASME B16.34 for group 1.1 carbon steel valves. Pressure ratings will vary with different body materials.
** Installation manual is available with complete flange bolt/stud information.

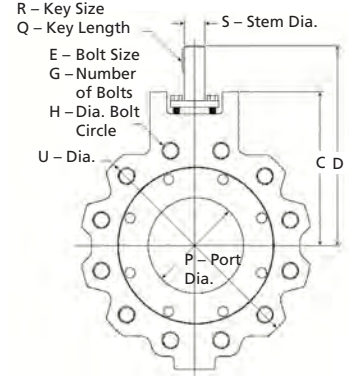
DIMENSIONAL DATA (continued)



NOTE: MINIMUM PIPE ID REQUIRED FOR DISC SWING CLEARANCE. SEE (BB) FOR APPLICABLE PIPE SCHEDULE.



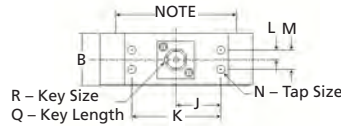
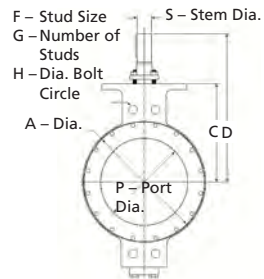
Optional Flange Mounting Bracket (Actuator Code - FG)



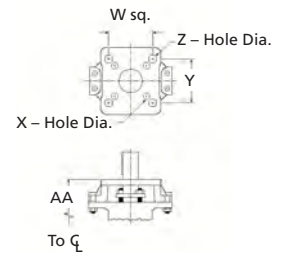
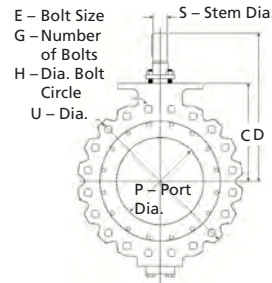
Series A5600, Class 600, 1480 psi CWP*

in.	(mm)	A	B	C	D	E	F	G**	H	J	K	L	M	N	P
3	(80)	5.38 (137)	1.93 (49)	5.50 (140)	7.63 (194)	3/4-10	3/4	8	6.63 (168)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	2.62 (67)
4	(100)	6.88 (175)	2.37 (60)	6.75 (171)	8.88 (226)	7/8-9	7/8	8	8.50 (216)	2.00 (51)	4.00 (102)	0.44 (11)	0.88 (22)	3/8-16	3.63 (92)
6	(150)	9.00 (229)	2.91 (74)	9.00 (229)	11.68 (297)	1-8	1	12	11.50 (292)	2.13 (54)	4.25 (108)	0.63 (16)	1.25 (32)	3/8-16	5.62 (143)
8	(200)	11.50 (292)	3.65 (93)	9.88 (251)	13.36 (339)	1-1/8-8	1-1/8	12	13.75 (349)	2.75 (70)	5.50 (140)	0.81 (21)	1.62 (41)	1/2-13	7.61 (193)
10	(250)	13.50 (343)	4.65 (118)	12.00 (305)	16.18 (411)	1-1/4-8	1-1/4-8	12	17.00 (432)	2.75 (70)	5.50 (140)	0.81 (21)	1.62 (41)	1/2-13	9.50 (241)

in.	(mm)												Weight	
		Q	R	S	T	U	W	X	Y	Z	AA	BB	Lug Body	Wafer Body
		lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)
3	(80)	-	-	0.625 (16)	0.437 (11)	8.25 (210)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	6.38 (162)	Sch 160	25 (11)	11 (5)
4	(100)	-	-	0.875 (22)	0.625 (16)	10.50 (267)	2.25 (57)	0.34 (9)	3.00 (76)	0.41 (10)	7.63 (194)	Sch 120	53 (24)	30 (14)
6	(150)	1.56 (40)	0.250 (6.35) sq.	1.125 (29)	-	13.63 (346)	-	-	3.50 (89)	0.56 (14)	10.12 (257)	Sch 120	85 (39)	52 (24)
8	(200)	2.00 (51)	0.312 (7.92) sq.	1.375 (35)	-	16.12 (409)	3.50 (89)	0.56 (14)	5.31 (135)	0.69 (18)	11.38 (289)	Sch 80	165 (75)	105 (48)
10	(250)	2.75 (70)	0.375 (9.53) sq.	1.750 (44)	-	19.50 (495)	3.50 (89)	0.56 (14)	5.31 (135)	0.69 (18)	13.50 (343)	Sch 120	329 (149)	225 (102)



NOTE: MINIMUM PIPE ID REQUIRED FOR DISC SWING CLEARANCE. SEE (BB) FOR APPLICABLE PIPE SCHEDULE.



Series A5600, Class 600, 1480 psi CWP

in.	(mm)	A	B	C	D	E	F	G**	H	J	K	L	M	N	P
12	(300)	16.25 (413)	5.53 (140)	12.94 (329)	19.58 (497)	1 1/4-8	1 1/4-8	20	19.25 (489)	4.75 (121)	9.50 (241)	1.00 (25)	2.00 (51)	-	11.50 (292)

in.	(mm)												Weight	
		Q	R	S	U	W	X	Y	Z	AA	BB	Lug Body	Wafer Body	
		lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	lb (kg)	
12	(300)	3.00 (76)	0.500 (12.7) sq.	2.00 (51)	21.75 (552)	4.78 (121)	0.81 (21)	2.88 x 6.94	0.94 (24)	15.94 (405)	Sch 80	520 (236)	360 (163)	

* Pressure ratings are in accordance with ASME B16.34 for group 1.1 carbon steel valves. Pressure ratings will vary with different body materials.

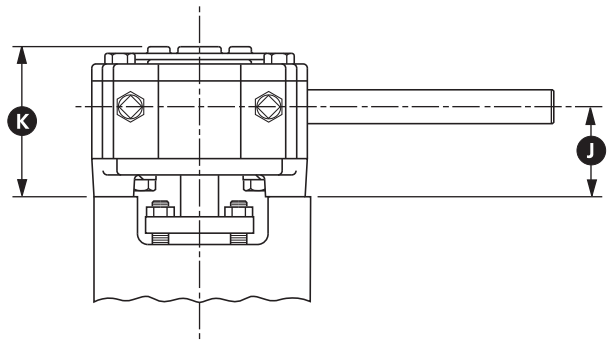
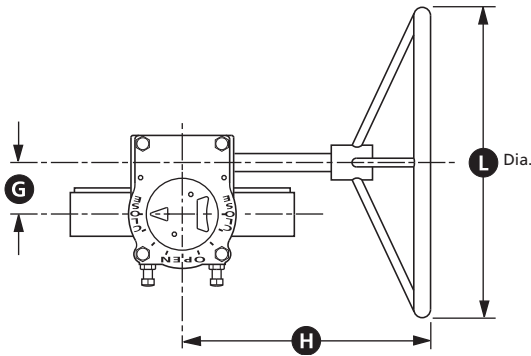
** Installation manual is available with complete flange bolt/stud information.

MANUAL ACTUATORS

Worm Gear Actuators

Worm gear actuators are available as optional equipment for DynaCentric high-performance butterfly valves sizes 2-1/2" through 8" (65 mm through 200 mm). All larger size valves require worm gear actuators or power actuation.

Handle-operated valves, sizes 2-1/2" through 8" (65 mm through 200 mm), can be converted in the field to worm gear operation. No modification is required to accommodate the addition of the worm gear unit.

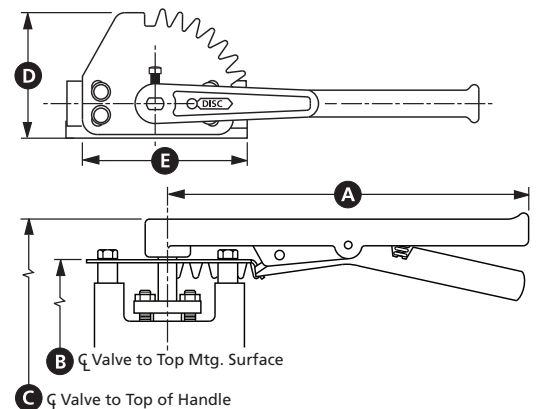


Valve Size		ASME Class	G	H	J	K	L Dia.	Weight	
in.	(mm)							lb	(kg)
2-1/2	(65)	150/300	1.75 (44)	7.25 (184)	1.75 (44)	3.5 (89)	8.00 (203)	11	(5)
3	(80)	150/300/600	1.75 (44)	7.25 (184)	1.98 (50)	3.45 (87)	8.00 (203)	15	(7)
4	(100)	150/300/600	1.75 (44)	7.25 (184)	1.98 (50)	3.45 (87)	8.00 (203)	15	(7)
5	(125)	150/300	1.75 (44)	7.25 (184)	1.98 (50)	3.45 (87)	8.00 (203)	15	(7)
6	(150)	150/300	1.75 (44)	7.25 (184)	1.98 (50)	3.45 (87)	8.00 (203)	15	(7)
6	(150)	600	2.51 (64)	10.28 (261)	2.49 (63)	4.29 (109)	12.00 (305)	23	(10)
8	(200)	150/300	2.51 (64)	10.28 (261)	2.49 (63)	4.29 (109)	12.00 (305)	23	(10)
8	(200)	600	3.00 (76)	14.02 (356)	3.00 (76)	4.68 (118)	18.00 (457)	39	(18)
10	(250)	150	2.51 (64)	10.28 (261)	2.49 (63)	4.29 (109)	12.00 (305)	23	(10)
10	(250)	300	3.00 (76)	14.02 (356)	3.73 (95)	4.68 (118)	18.00 (457)	39	(18)
10	(250)	600	3.63 (92)	16.38 (416)	3.73 (95)	6.01 (153)	24.00 (610)	49	(22)
12	(300)	150	3.00 (76)	14.02 (356)	3.00 (76)	4.68 (118)	18.00 (457)	39	(18)
12	(300)	300	3.63 (92)	16.38 (416)	3.73 (95)	6.01 (153)	24.00 (610)	49	(22)
12	(300)	600	3.63 (92)	18.95 (481)	5.23 (133)	7.14 (181)	30.00 (762)	51	(23)
14	(350)	150	3.00 (76)	14.02 (356)	4.25 (108)	5.93 (150)	18.00 (457)	39	(18)
14	(350)	300	4.63 (118)	18.95 (481)	5.25 (133)	7.83 (198)	30.00 (762)	51	(23)
16	(400)	150	3.63 (92)	16.38 (416)	4.98 (126)	7.26 (184)	24.00 (610)	49	(22)
16	(400)	300	4.63 (118)	18.95 (481)	5.25 (133)	7.83 (198)	30.00 (762)	51	(23)
18	(450)	150	3.63 (92)	18.95 (481)	5.23 (133)	7.14 (181)	30.00 (762)	51	(23)
18	(450)	300	4.63 (118)	19.90 (505)	5.25 (133)	8.33 (212)	30.00 (762)	106	(48)
20	(500)	150	4.63 (118)	18.95 (481)	5.25 (133)	7.83 (199)	30.00 (762)	51	(23)
20	(500)	300	4.63 (118)	18.95 (481)	5.25 (133)	8.33 (212)	30.00 (762)	51	(23)
24	(600)	150	4.63 (118)	19.90 (505)	5.25 (133)	8.33 (212)	30.00 (762)	106	(48)
24	(600)	300	7.30 (185)	20.56 (522)	9.19 (233)	10.57 (268)	30.00 (762)	160	(73)
30	(750)	150	7.30 (185)	20.56 (522)	9.19 (233)	10.57 (268)	30.00 (762)	160	(73)
36	(900)	150	5.93 (151)	20.56 (522)	9.00 (228)	10.57 (268)	30.00 (762)	163	(74)

Handle Actuators

Valve Size		ASME Class	Handle Number	A	B	C	D	E	Weight
in.	(mm)								
2-1/2	(65)	150/300	H-06	12 (305)	6.69 (170)	7.94 (202)	4.5 (114)	5.56 (141)	5 (2.3)
3	(80)	150/300/600	H-16	12 (305)	6.38 (162)	7.62 (194)	4.5 (114)	5.56 (141)	5 (2.3)
4	(100)	150/300	H-16	12 (305)	7.25 (184)	8.50 (216)	4.5 (114)	5.56 (141)	5 (2.3)
4	(100)	600	H-36	18 (457)	7.63 (194)	8.88 (226)	4.5 (114)	5.56 (141)	9 (4.1)
5	(125)	150/300	H-36	18 (457)	8.37 (213)	9.62 (244)	4.5 (114)	5.56 (141)	9 (4.1)
6	(150)	150/300	H-36	18 (457)	8.50 (216)	9.75 (248)	4.5 (114)	5.56 (141)	9 (4.1)
6	(150)	600	H-46	18 (457)	10.13 (257)	11.75 (298)	4.5 (114)	5.56 (141)	9 (4.1)
8	(200)	150	H-46	18 (457)	10.00 (254)	11.50 (292)	4.5 (114)	5.56 (141)	9 (4.1)

CAUTION: Handle should only be used up to the following differential pressures:
 2-1/2" valves to 450 psi 5" valves to 200 psi
 3" valves to 400 psi 6" valves to 150 psi
 4" valves to 300 psi 8" valves to 50 psi



MATERIAL SELECTION GUIDE

A selection of body, disc, stem and seat/seal materials for DynaCentric high-performance butterfly valves is available. The following list is intended as a guide in the selection of materials for corrosive service.

No material can be expected to resist the corrosive action of all the many ladings found in modern industry. Experience has shown, however, that certain materials can perform satisfactorily within certain limits.

The physical properties of a material are affected differently by each corrosive medium. The user must decide which property is of prime importance for his application.

Internal moving parts, in contact with the lading, should always carry an "A" rating. Body materials with exposure to corrosive ladings can sometimes carry a "B" rating because metal loss due to corrosion is not as critical.

The following information is designed for use by technically qualified individuals at their own discretion and risk. We strongly recommend that tests be run under actual operating conditions to obtain a material's performance ability in any one corrosive medium.

RATING INTERPRETATION:

"A" – Excellent

"B" – Good (slightly attacked)

"C" – Fair (moderately attacked, probably unsuitable)

"D" – Not recommended

LADINGS	MATERIALS OF CONSTRUCTION												
	BODY GROUPS			TRIM GROUPS					SEAL GROUPS				
	1	2	3	01*	02	03	04	05	S01	S02	F02	M01	
Acetaldehyde	C	A	C	C	A	A	A	A	A	A	A	A	
Acetate Solvents	A	A	A	A	A	A	A	A	A	A	A	A	
Acetic Acid	D	A	D	D	B	A	A	B	A	A	A	A	
Acetic Acid, Crude	C	A	C	C	B	A	A	B	A	A	A	A	
Acetic Anhydride	D	B	D	D	B	B	A	B	A	A	B	B	
Acetone	A	A	A	A	A	A	A	A	A	A	A	A	
Acetylene, Dry Only	A	A	A	A	A	A	A	A	A	A	A	A	
Acrylonitrile	A	A	A	A	A	A	A	A	A	A	A	A	
Alcohols – Methyl, Ethyl	B	A	B	B	A	A	A	A	A	A	A	A	
Alcohols – Amyl, Butyl	B	A	B	B	B	A	A	B	A	A	A	A	
Aluminum Chloride, Dry	B	A	B	B	D	A	A	D	A	A	A	A	
Aluminum Sulfate, Alums	C	A	C	C	C	A	A	C	A	A	A	A	
Amines	A	A	A	A	A	A	A	A	A	A	A	A	
Ammonia	A	A	A	A	A	A	B	A	A	A	A	A	
Ammonia Solutions	B	A	B	B	A	A	B	A	A	A	A	A	
Ammonium Bicarbonate	C	B	C	C	B	B	B	B	A	A	B	B	
Ammonium Carbonate	B	B	B	B	B	B	B	D	A	A	B	B	
Ammonium Chloride	D	C	D	D	D	C	B	D	A	A	C	C	
Ammonium Hydroxide	C	B	C	C	B	B	D	B	A	C	C	B	
Ammonium Monophosphate	D	B	D	D	B	B	C	B	A	A	B	B	
Ammonium Nitrate	D	A	D	C	A	A	D	A	A	A	A	A	
Ammonium Phosphate	D	B	D	D	B	B	C	B	A	A	B	B	
Ammonium Sulfate	C	B	C	B	B	B	C	B	A	A	B	B	
Amyl Acetate	C	B	C	B	B	B	B	B	A	A	B	B	
Aniline	A	B	A	C	B	B	B	B	A	A	B	B	
Aniline Dyes	C	A	C	C	A	A	A	A	A	A	A	A	
Antimony Trichloride	D	D	D	D	D	D	B	D	A	A	D	D	
Arsenic Acid	D	B	D	D	B	B	D	B	A	A	B	B	
Asphalt, Emulsion/Liquid	A	A	A	A	A	A	A	A	A	A	A	A	
Barium Carbonate	B	B	B	B	B	B	B	B	A	A	B	B	
Barium Chloride	C	C	C	D	C	C	B	C	A	A	C	C	
Barium Hydroxide	C	B	C	C	B	B	B	B	A	A	B	B	
Barium Sulfate	B	B	B	C	B	B	A	B	A	A	B	B	
Barium Sulfide	B	B	B	C	B	B	B	B	A	A	B	B	
Beer	C	A	C	B	A	A	A	A	A	A	A	A	
Beet Sugar Liquors	B	A	B	B	A	A	A	A	A	A	A	A	

LADINGS	MATERIALS OF CONSTRUCTION												
	BODY GROUPS			TRIM GROUPS					SEAL GROUPS				
	1	2	3	01*	02	03	04	05	S01	S02	F02	M01	
Benzene, Benzol	B	A	B	B	A	A	A	A	A	A	A	A	
Benzaldehyde	A	A	A	A	A	A	A	A	A	A	A	A	
Benzoic Acid	D	B	D	D	B	B	B	B	A	A	B	B	
Borax Liquors	C	B	C	C	B	B	A	B	A	A	B	B	
Boric Acid	D	B	D	C	B	B	A	B	A	A	B	B	
Brines	C	B	C	C	C	B	A	C	A	A	B	B	
Bromine, Dry	D	D	D	D	D	D	A	D	A	A	D	D	
Bromine, Wet	D	D	D	D	D	D	B	D	A	A	D	D	
Butadiene	B	A	B	B	A	A	C	A	B	B	A	A	
Butane	A	A	A	A	A	A	A	A	A	A	A	A	
Butylene	A	A	A	A	A	A	A	A	A	A	A	A	
Buttermilk	D	A	D	B	A	A	D	A	A	A	A	A	
Butyric Acid	D	B	D	D	B	B	B	B	A	A	B	B	
Calcium Bisulfide	D	B	D	D	B	B	B	B	A	A	B	B	
Calcium Carbonate	D	B	D	B	A	B	B	A	A	A	B	B	
Calcium Chloride	C	B	C	B	B	B	A	B	A	A	B	B	
Calcium Hydroxide, 20%	B	B	B	C	B	B	A	B	A	A	B	B	
Calcium Hypochlorite	D	C	D	D	C	C	C	C	A	A	C	C	
Calcium Sulfate	C	B	C	C	B	B	B	B	A	A	B	B	
Carbolic Acid	D	B	D	B	B	B	B	B	A	A	B	B	
Carbon Bisulfide	B	–	B	B	B	–	A	B	B	A	A	–	
Carbon Dioxide, Dry	A	A	A	A	A	A	A	A	A	A	A	A	
Carbonic Acid	D	B	D	C	B	B	A	B	A	A	B	B	
Carbon Tetrachloride, Dry	B	A	B	A	A	A	A	A	A	A	A	A	
Carbon Tetrachloride, Wet	D	B	D	B	B	B	B	B	A	A	B	B	
Carbonated Water	B	A	B	B	A	A	A	A	A	A	A	A	
China Wood Oil, Tung Oil	C	A	C	C	A	A	A	A	A	A	A	A	
Chlorinated Solvents, Dry	C	B	C	C	B	B	B	B	A	A	B	B	
Chlorine Gas, Dry	B	B	B	C	B	B	C	A	A	A	B	B	
Chlorine, Wet	D	D	D	D	D	D	C	D	A	A	D	D	
Chloroacetic Acid	D	C	D	D	C	C	B	C	A	A	C	C	
Chlorobenzene, Dry	B	A	B	B	B	A	A	B	A	A	A	A	
Chloroform, Dry	B	A	B	B	A	A	A	A	A	A	A	A	
Chlorosulphonic Acid, Dry	B	B	B	B	B	B	A	B	A	A	B	B	
Chlorosulphonic Acid, Wet	D	D	D	D	D	D	C	D	A	A	A	A	
Chrome Alum	B	A	B	B	A	A	B	A	A	A	A	A	

NOTE: All ladings at ambient temperatures except as noted.

* Size 14" (350 mm) and larger, Class 150/300 valves are available with CS trim.

For trim group 08 through 13, consult Cameron for material compatibility.

LADINGS	MATERIALS OF CONSTRUCTION												
	BODY GROUPS			TRIM GROUPS					SEAL GROUPS				
	1	2	3	01*	02	03	04	05	S01	S02	F02	M01	
Chromic Acid	D	C	D	D	C	C	B	C	A	A	C	C	
Citrus Juices	D	B	D	C	B	B	A	B	A	A	B	B	
Coconut Oil	C	B	C	B	B	B	B	B	A	A	B	B	
Coffee Extracts, Hot	C	A	C	B	A	A	A	A	A	A	A	A	
Coke Oven Gas	B	A	B	B	A	A	B	A	A	A	A	A	
Cooking Oil	B	A	B	B	A	A	A	A	A	A	A	A	
Copper Acetate, 10%	C	B	C	C	B	B	B	B	A	A	B	B	
Copper Chloride	D	D	D	D	D	D	C	D	A	A	D	D	
Copper Nitrate	D	B	D	D	B	C	B	C	A	A	B	B	
Copper Sulfate	D	C	D	D	C	C	B	C	A	A	C	C	
Corn Oil	C	B	C	B	B	B	B	B	A	A	B	B	
Cottonseed Oil	C	B	C	B	B	B	B	B	A	A	B	B	
Creosote Oil	B	B	B	B	B	B	A	B	A	A	B	B	
Cresylic Acid	B	B	B	B	B	B	B	B	A	A	B	B	
Crude Oil	B	A	B	A	A	A	A	A	A	A	A	A	
Cutting Oils, Water Emulsion	B	A	B	B	A	A	-	A	A	A	A	A	
Cyclohexane	A	A	A	A	A	A	A	A	A	A	A	A	
Diacetone Alcohol	A	A	A	A	A	A	A	A	A	A	A	A	
Diesel Fuels	A	A	A	A	A	A	A	A	A	A	A	A	
Diethylamine	A	A	A	A	A	A	A	A	A	A	A	A	
Dowtherms	B	A	B	B	A	A	A	A	A	A	A	A	
Drilling Mud	B	A	B	A	A	A	A	A	A	A	A	A	
Drip Cocks, Gas	B	A	B	B	A	A	A	A	A	A	A	A	
Dry Cleaning Fluids	B	A	B	B	A	A	B	A	A	A	A	A	
Drying Oil	C	B	C	C	B	B	B	B	A	A	B	B	
Epsom Salt	C	B	C	C	B	B	B	B	A	A	B	B	
Ethane	A	A	A	A	A	A	A	A	A	A	A	A	
Ethers	B	A	B	B	A	A	B	A	A	A	A	A	
Ethyl Diethyl Acetate	B	B	B	B	B	B	B	B	A	A	B	B	
Ethylene, Liquid or Gas	A	A	A	A	A	A	A	A	A	A	A	A	
Ethyl Acrylate	A	A	A	A	A	A	A	A	A	A	A	A	
Ethyl Chloride, Dry	B	A	B	B	A	A	B	A	A	A	A	A	
Ethyl Chloride, Wet	D	B	D	D	B	B	B	B	A	A	B	B	
Ethylene Glycol	B	B	B	B	B	B	B	B	A	A	B	B	
Ethylene Oxide	B	B	B	B	B	B	B	B	A	A	B	B	
Fatty Acids	D	B	D	B	B	B	B	B	A	A	B	B	
Ferric Chloride	D	D	D	D	D	D	C	D	A	A	D	D	
Ferric Nitrate	D	C	D	D	C	C	C	C	A	A	C	C	
Ferric Sulfate	D	B	D	D	B	B	B	B	A	A	B	B	
Ferrous Chloride	D	D	D	D	D	D	C	D	A	A	D	D	
Ferrous Sulfate	D	B	D	D	B	B	B	B	A	A	B	B	
Ferrous Sulfate, Saturated	C	A	C	C	A	A	A	A	A	A	A	A	
Fertilizer Solutions	B	B	B	B	B	B	B	B	A	A	B	B	
Fish Oils	B	A	B	B	A	A	A	A	A	A	A	A	
Fluorine, Dry	B	A	B	B	A	A	A	A	C	C	C	A	
Fluorosilicic Acid	D	C	D	D	C	C	C	C	A	-	C	C	
Food Fluids and Pastes	C	A	C	C	A	A	A	A	A	A	A	A	
Formaldehyde, Cold	A	A	A	A	A	A	A	A	A	A	A	A	
Formaldehyde, Hot	D	C	D	D	C	C	B	C	A	A	C	C	
Formic Acid, Cold	D	B	D	C	B	B	B	B	A	A	B	B	
Formic Acid, Hot	D	D	D	D	D	D	B	D	A	A	D	D	
Freon, Dry (12)	B	A	B	A	A	A	A	A	A	A	A	A	
Fruit Juices	D	A	D	D	A	A	A	A	A	A	A	A	
Fuel Oils	B	A	B	A	A	A	A	A	A	A	A	A	
Furfural	A	B	A	A	B	B	A	B	A	A	B	B	
Gallic Acid	D	B	D	D	B	B	B	B	A	A	B	B	

LADINGS	MATERIALS OF CONSTRUCTION												
	BODY GROUPS			TRIM GROUPS					SEAL GROUPS				
	1	2	3	01*	02	03	04	05	S01	S02	F02	M01	
Gas, Manufactured	B	B	B	B	B	B	A	B	A	A	B	B	
Gas, Natural	B	A	B	B	A	A	A	A	A	A	A	A	
Gas Odorizers	B	B	B	B	B	B	B	B	B	A	A	B	
Gasoline	A	A	A	A	A	A	A	A	A	A	A	A	
Gasoline, Sour	B	A	B	B	A	A	A	A	A	A	A	A	
Gelatin	D	A	D	D	A	A	A	A	A	A	A	A	
Glucose	B	A	B	B	A	A	A	A	A	A	A	A	
Glue	A	A	A	A	A	A	A	A	A	A	A	A	
Glycerine, Glycerol	B	A	B	A	A	A	A	A	A	A	A	A	
Glycols	B	B	B	B	B	B	B	B	A	A	B	B	
Grease	A	A	A	A	A	A	B	A	A	A	A	A	
Heptane	A	A	A	A	A	A	A	A	A	A	A	A	
Hexane	A	A	A	A	A	A	A	A	A	A	A	A	
Hexanol, Tertiary	A	A	A	A	A	A	A	A	A	A	A	A	
Hydraulic Oil	A	A	A	A	A	A	A	A	A	A	A	A	
Hydrobromic Acid	D	D	D	D	D	D	C	D	A	A	D	D	
Hydrochloric Acid, Air Free	D	D	D	D	D	D	C	D	A	A	D	D	
Hydrocyanic Acid	D	B	D	D	B	B	B	B	A	-	-	B	
Hydrofluoric Acid	D	D	D	D	D	D	A	D	A	C	D	D	
Hydrogen Gas, Cold	B	A	B	B	A	A	B	A	A	A	A	A	
Hydrogen Peroxide	D	B	D	D	B	B	A	B	A	A	B	B	
Hydrogen Sulfide, Dry	Consult Cameron												
Hydrogen Sulfide, Wet	Consult Cameron												
Hydrofluorosilicic Acid	D	C	D	D	C	C	B	C	A	A	C	C	
Hypo (Sodium Thiosulfate)	D	A	D	D	A	A	B	A	A	A	A	A	
Hypochlorites, Sodium	D	C	D	D	C	C	B	C	A	A	C	C	
Illuminating Gas	A	A	A	A	A	A	A	A	A	A	A	A	
Ink	D	A	D	D	A	A	B	A	A	A	A	A	
Iodine, Wet	D	D	D	D	D	D	D	D	A	A	D	D	
Iodoform, Dry	B	B	B	B	B	B	B	B	A	A	B	B	
Iso-octane	A	A	A	A	A	A	A	A	A	A	A	A	
Isopropyl Alcohol	B	B	B	B	B	B	B	B	A	A	B	B	
Isopropyl Ether	A	A	A	A	A	A	A	A	A	A	A	A	
JP Fuels	A	A	A	A	A	A	A	A	A	A	A	A	
Kerosene	B	A	B	A	A	A	A	A	A	A	A	A	
Ketchup	D	A	D	D	A	A	B	A	A	A	A	A	
Ketones	A	A	A	A	A	A	A	A	A	A	A	A	
Lacquers and Solvents	C	A	C	C	A	A	A	A	A	A	A	A	
Lactic Acid, Dilute Cold	D	A	D	D	B	A	C	B	A	A	A	A	
Lactic Acid, Dilute Hot	D	A	D	D	B	A	D	B	A	A	A	A	
Lactic Acid, Conc. Cold	D	A	D	D	B	A	D	B	A	A	A	A	
Lactic Acid, Conc. Hot	D	B	D	D	B	B	D	B	A	A	B	B	
Lard Oil	C	A	C	B	A	A	B	A	A	A	A	A	
Lead Acetate	D	B	D	D	B	B	B	B	A	A	B	B	
Linoleic Acid	B	A	B	B	B	A	B	B	A	A	A	A	
Linseed Oil	A	A	A	A	A	A	B	A	A	A	A	A	
Liquefied Pet. Gas (LPG)	B	B	B	B	B	B	B	B	A	A	B	B	
Lubricating Oil	A	A	A	A	A	A	B	A	A	A	A	A	
Magnesium Bisulfate, 10%	C	A	C	C	A	A	B	A	A	-	-	A	
Magnesium Chloride	C	D	C	C	D	D	B	D	A	A	D	D	
Magnesium Hydroxide	B	A	B	B	A	A	A	A	A	A	A	A	
Magnesium Hydroxide, Hot	B	A	B	B	A	A	B	A	A	A	A	A	
Magnesium Sulfate	B	B	B	B	B	B	B	B	A	A	B	B	
Maleic Acid	B	C	B	D	C	C	B	C	A	A	C	C	
Malic Acid	D	A	D	D	A	A	B	A	A	A	A	A	
Mayonnaise	D	A	D	D	A	A	B	A	A	A	A	A	

NOTE: All ladings at ambient temperatures except as noted.

* Size 14" (350 mm) and larger, Class 150/300 valves are available with CS trim.

For trim group 08 through 13, consult Cameron for material compatibility.

MATERIAL SELECTION GUIDE (continued)

LADINGS	MATERIALS OF CONSTRUCTION												
	BODY GROUPS				TRIM GROUPS				SEAL GROUPS				
	1	2	3	01*	02	03	04	05	S01	S02	F02	M01	
Mercuric Chloride	D	D	D	D	D	D	D	D	A	A	A	D	
Mercuric Cyanide, 10%	D	B	D	D	B	B	D	B	A	A	B	B	
Mercury	A	A	A	A	A	A	C	A	A	A	A	A	
Mercaptans	A	A	A	A	A	A	D	A	A	A	A	A	
Methane	A	A	A	A	A	A	A	A	A	A	A	A	
Methyl Acetate	A	A	A	A	A	A	A	A	A	A	A	A	
Methyl Acetone	A	A	A	A	A	A	A	A	A	A	A	A	
Methylamine	B	B	B	B	B	B	B	B	A	A	B	B	
Methyl Cellulosolve	B	B	B	B	B	B	B	B	A	A	B	B	
Methyl Chloride, Dry	B	A	B	B	A	A	A	A	A	A	A	A	
Methyl Ethyl Ketone	A	A	A	A	A	A	A	A	A	A	A	A	
Methyl Formate	B	B	B	B	B	B	B	A	A	B	B	B	
Methylene Chloride, Dry	B	B	B	B	B	B	B	B	A	A	B	B	
Milk	D	A	D	B	A	A	A	A	A	A	A	A	
Mine Waters, Acid	D	B	D	D	B	B	B	B	A	A	B	B	
Mineral Oil	B	A	B	A	A	A	A	A	A	A	A	A	
Mineral Spirits	B	B	B	B	B	B	B	B	A	A	B	B	
Mixed Acids, Cold	C	A	C	C	A	A	B	A	A	A	A	A	
Molasses	A	A	A	A	A	A	A	A	A	A	A	A	
Muriatic Acid	D	D	D	D	D	B	D	A	A	D	D	D	
Mustard	B	A	B	B	A	A	A	A	A	A	A	A	
Naphtha	B	A	B	B	A	A	B	A	A	A	A	A	
Naphthalene	A	A	A	A	A	A	B	A	A	A	A	A	
Nickel Ammonium Sulfate, 20%	D	A	D	D	A	A	B	A	A	A	A	A	
Nickel Chloride	D	B	D	D	B	B	B	B	A	A	B	B	
Nickel Nitrate, 30%	D	B	D	D	B	B	B	B	A	A	B	B	
Nickel Sulfate	D	C	D	D	C	C	B	C	A	A	C	C	
Nicotinic Acid	B	A	B	B	A	A	A	A	A	A	-	A	
Nitric Acid, 10% to 80%	D	A	D	D	A	A	D	A	A	A	A	A	
Nitric Acid, 100%	A	A	A	C	C	A	D	C	A	A	A	A	
Nitrobenzene	B	B	B	B	B	B	B	B	A	A	B	B	
Nitrogen	A	A	A	A	A	A	A	A	A	A	A	A	
Nitrous Acid, 10%	D	B	D	D	B	B	D	B	A	A	B	B	
Nitrous Gases	B	A	B	B	A	A	D	A	A	A	A	A	
Nitrous Oxide	A	B	A	A	B	B	D	B	A	A	B	B	
Oils, Petroleum, Refined	A	A	A	A	A	A	A	A	A	A	A	A	
Oil-Water Mixtures	B	A	B	A	A	A	-	A	A	A	A	A	
Oleic Acid	B	A	B	B	B	A	B	B	A	A	A	A	
Oleum	B	B	B	B	B	B	D	B	A	A	B	B	
Olive Oil	B	A	B	B	A	A	A	A	A	A	A	A	
Oxalic Acid	D	D	D	D	D	B	D	A	A	D	D	D	
Oxygen	B	A	B	A	A	A	A	A	A	A	A	A	
Ozone, Wet	C	A	C	C	A	A	A	A	A	A	A	A	
Ozone, Dry	A	A	A	A	A	A	A	A	A	A	A	A	
Paints and Solvents	A	A	A	A	A	A	A	A	A	A	A	A	
Palmitic Acid	C	A	C	C	B	A	B	B	A	A	A	A	
Palm Oil	C	B	C	C	B	B	A	B	A	A	B	B	
Paraffin	B	A	B	A	A	A	A	A	A	A	A	A	
Paraformaldehyde	B	B	B	B	B	B	B	B	A	A	B	B	
Pentane	B	A	B	A	A	A	B	A	A	A	A	A	
Perchloroethylene, Dry	B	B	B	B	B	B	A	B	A	A	B	B	
Petrolatum	C	B	C	C	B	B	A	B	A	A	B	B	
Phenol	B	A	B	B	A	A	A	A	A	A	A	A	
Phosphoric Acid, 10% Cold	D	B	D	D	B	B	B	B	A	A	B	B	
Phosphoric Acid, 10% Hot	D	D	D	D	D	D	C	D	A	A	D	D	
Phosphoric Acid, 50% Cold	D	B	D	D	B	B	C	B	A	A	B	B	

LADINGS	MATERIALS OF CONSTRUCTION												
	BODY GROUPS				TRIM GROUPS				SEAL GROUPS				
	1	2	3	01*	02	03	04	05	S01	S02	F02	M01	
Phosphoric Acid, 50% Hot	D	D	D	D	D	D	C	D	A	A	D	D	
Phosphoric Acid, 85% Cold	B	A	B	B	B	A	A	B	A	A	A	A	
Phosphoric Acid, 85% Hot	C	A	C	C	C	A	A	C	A	A	A	A	
Phthalic Acid	C	B	C	C	B	A	A	B	A	-	B	B	
Phthalic Anhydride	C	B	C	C	B	B	C	B	A	A	B	B	
Picric Acid	C	B	C	C	B	B	A	B	A	A	B	B	
Pine Oil	B	A	B	B	A	A	A	A	A	A	A	A	
Potassium Bisulfite, 10%	D	B	D	D	B	B	D	B	A	A	B	B	
Potassium Bromide	D	B	D	D	B	B	B	B	A	A	B	B	
Potassium Carbonate	C	A	C	B	A	B	A	B	A	A	A	A	
Potassium Chlorate	B	A	B	B	A	A	B	A	A	A	A	A	
Potassium Chloride	C	C	C	C	C	B	C	A	A	C	C	C	
Potassium Cyanide	B	B	B	B	B	B	B	B	A	A	B	B	
Potassium Dichromate	B	A	B	B	A	A	B	A	A	A	A	A	
Potassium Diphosphate	A	A	A	A	A	A	B	A	A	A	A	A	
Potassium Ferricyanide	B	B	B	B	B	B	B	B	A	A	B	B	
Potassium Ferrocyanide	B	B	B	B	B	B	B	B	A	A	B	B	
Potas. Hydrox. Dilute, Cold	B	B	B	B	B	B	A	B	A	A	B	B	
Potas. Hydrox. Dilute, Hot	B	A	B	B	B	A	A	B	A	B	B	A	
Potas. Hydrox. to 70%	A	A	A	A	A	A	A	A	A	B	B	A	
Potassium Iodide	C	B	C	C	B	B	B	B	A	A	B	B	
Potassium Nitrate	B	A	B	B	A	A	A	A	A	A	A	A	
Potassium Permanganate	A	A	A	A	A	B	A	B	A	A	A	A	
Potassium Sulfate	B	B	B	B	B	B	B	B	A	A	B	B	
Potassium Sulfide, 10%	C	B	C	B	B	B	D	B	A	A	B	B	
Potassium Sulfite, 10%	D	B	D	D	B	B	D	B	A	A	B	B	
Producer Gas	B	B	B	B	B	B	A	B	A	A	B	B	
Propane	A	A	A	A	A	A	A	A	A	A	A	A	
Propyl Alcohol	A	A	A	A	A	A	A	A	A	A	A	A	
Propylene Glycol	A	A	A	A	A	A	A	A	A	A	A	A	
Pyrogalic Acid	B	B	B	B	B	B	B	B	A	A	B	B	
Quench Oil, Water Soluble	A	A	A	A	A	A	A	A	A	A	A	A	
Resins and Rosins	C	A	C	B	A	A	A	A	A	A	A	A	
Road Tar	A	A	A	A	A	A	A	A	A	A	A	A	
Road Pitch	A	A	A	A	A	A	A	A	A	A	A	A	
RP-1 Fuel	A	A	A	A	A	A	A	A	A	A	A	A	
Rubber Latex Emulsions	B	A	B	B	A	A	A	A	A	A	A	A	
Rubber Solvent	A	A	A	A	A	A	A	A	A	A	A	A	
Salad Oil	C	B	C	B	B	B	B	B	A	A	B	B	
Salicylic Acid	D	A	D	D	A	A	A	A	A	A	A	A	
Salt	C	B	C	C	B	B	A	B	A	A	B	B	
Seawater	D	A	D	C	A	A	A	A	A	A	A	A	
Shellac	A	A	A	A	A	A	A	A	A	A	A	A	
Silicone Oils	A	A	A	A	A	A	A	A	A	A	A	A	
Silver Nitrate	D	B	D	D	B	B	D	B	A	A	B	B	
Soap Solutions, Stearates	A	A	A	A	A	A	A	A	A	A	A	A	
Sodium Acetate	B	B	B	B	B	B	B	B	A	A	B	B	
Sodium Aluminate	C	A	C	C	A	A	A	A	A	A	A	A	
Sodium Bicarbonate	C	B	C	C	B	B	B	B	A	A	B	B	
Sodium Bisulfate, 10%	D	A	D	D	A	A	B	A	A	A	A	A	
Sodium Bisulfite, 10%	D	D	D	D	D	D	B	D	A	A	D	D	
Sodium Borate	C	D	C	C	D	D	B	D	A	A	D	D	
Sodium Bromide, 10%	C	B	C	C	B	B	B	B	A	A	B	B	
Sodium Carbonate	B	B	B	B	B	B	A	B	A	A	B	B	
Sodium Chlorate	C	B	C	C	B	B	B	B	A	A	B	B	
Sodium Chloride	C	B	C	B	B	B	A	B	A	A	B	B	

NOTE: All ladings at ambient temperatures except as noted.
 * Size 14" (350 mm) and larger, Class 150/300 valves are available with CS trim.
 For trim group 08 through 13, consult Cameron for material compatibility.

LADINGS	MATERIALS OF CONSTRUCTION												
	BODY GROUPS			TRIM GROUPS					SEAL GROUPS				
	1	2	3	01*	02	03	04	05	S01	S02	F02	M01	
Sodium Chromate	B	B	B	B	B	B	B	B	A	A	B	B	
Sodium Cyanide, 10%	A	A	A	C	A	A	B	A	A	A	A	A	
Sodium Fluoride	D	B	D	D	B	B	A	B	A	A	B	B	
Sodium Hydrox., Cold 20%	A	A	A	A	A	A	A	A	A	A	A	A	
Sodium Hydrox., Hot 20%	C	B	C	C	B	B	A	B	A	B	B	B	
Sodium Hydrox. 50%	B	B	B	B	B	B	A	B	A	C	C	B	
Sodium Hydrox., Cold 70%	C	B	C	B	B	B	B	B	A	C	C	B	
Sodium Hydrox., Hot 70%	B	B	B	B	B	B	B	B	A	D	D	B	
Sodium Hypochlorite	D	D	D	D	D	D	D	D	A	A	D	D	
Sodium Metaphosphate	A	B	A	A	B	B	B	B	A	A	B	B	
Sodium Metasilicate, Cold	C	A	C	C	A	A	A	A	A	A	A	A	
Sodium Metasilicate, Hot	D	A	D	D	A	A	A	A	A	A	A	A	
Sodium Nitrate	B	B	B	B	B	B	B	B	A	A	B	B	
Sodium Perborate	B	B	B	B	B	B	B	B	A	A	B	B	
Sodium Peroxide	C	B	C	C	B	B	B	B	A	A	B	B	
Sodium Phosphate	B	B	B	B	B	B	B	B	A	A	B	B	
Sodium Silicate	A	A	A	A	A	A	B	A	A	A	A	A	
Sodium Silicate, Hot	B	B	B	B	B	B	B	B	A	A	B	B	
Sodium Sulfate	B	A	B	B	A	A	A	A	A	A	A	A	
Sodium Sulfide	B	B	B	B	B	B	A	B	A	A	B	B	
Sodium Sulfide, Hot	C	B	C	C	B	B	B	B	A	A	B	B	
Sodium Thiosulfate	D	B	D	D	B	B	B	B	A	A	B	B	
Sour Gas and Oil	Consult Cameron												
Soybean Oil	C	A	C	C	A	A	A	A	A	A	A	A	
Stannic Chloride	D	D	D	D	D	D	C	D	A	A	D	D	
Stannous Chloride	D	C	D	D	C	C	A	C	A	-	-	-	
Starch	A	A	A	A	A	A	A	A	A	A	A	A	
Steam, 212° F (100° C)	A	A	A	A	A	A	A	A	A	A	A	A	
Stearic Acid	C	A	C	B	A	A	B	A	A	A	A	A	
Stoddard Solvent	B	B	B	B	B	B	B	B	A	A	B	B	
Styrene	A	A	A	A	A	A	A	A	A	A	A	A	
Sugar Liquids	B	A	B	B	B	A	A	B	A	A	A	A	
Sulfate, Black or Gr. liq.	C	B	C	C	B	B	B	B	A	A	B	B	
Sulfate, White Liquor	D	B	D	D	D	B	B	D	A	A	B	B	
Sulphur	B	A	B	B	A	A	A	A	A	A	A	A	
Sulphur Dioxide, Dry	B	A	B	D	D	A	A	D	A	A	A	A	
Sulphur Trioxide, Dry	B	B	B	B	B	B	B	B	A	A	B	B	
Sulfuric Acid, 0% to 7%	D	B	D	D	C	B	B	C	A	A	B	B	
Sulfuric Acid, 20% to 50%	D	D	D	D	D	D	B	D	A	A	B	B	
Sulfuric Acid, 100%	B	A	B	D	C	A	A	C	A	A	A	A	
Sulfurous Acid	D	D	D	D	D	D	D	D	A	A	D	D	
Synthesis Gas	B	B	B	B	B	B	A	B	A	A	B	B	
Tall Oil	B	B	B	B	B	B	A	B	A	A	B	B	
Tannic Acid	B	B	B	B	B	B	B	B	A	A	B	B	
Tar and Tar Oil	A	A	A	A	A	A	A	A	A	A	A	A	
Tartaric Acid	D	B	D	D	B	B	B	B	A	A	B	B	
Tetraethyl Lead	C	B	C	C	B	B	A	B	A	A	B	B	
Toluene, Toluol	A	A	A	A	A	A	A	A	A	A	A	A	
Tomato Juice	C	A	C	C	A	A	A	A	A	A	A	A	
Transformer Oil	A	A	A	A	A	A	A	A	A	A	A	A	
Tributyl Phosphate	A	A	A	A	A	A	A	A	A	A	A	A	
Trichloroethylene	B	B	B	B	B	B	A	B	A	A	B	B	
Turpentine	B	A	B	A	A	B	A	B	A	A	A	A	
Urea	C	B	C	C	B	B	A	B	A	A	B	B	
Varnish	C	A	C	C	A	A	A	A	A	A	A	A	
Vegetable Oil	B	A	B	A	A	A	B	A	A	A	A	A	

LADINGS	MATERIALS OF CONSTRUCTION												
	BODY GROUPS			TRIM GROUPS					SEAL GROUPS				
	1	2	3	01*	02	03	04	05	S01	S02	F02	M01	
Vinegar	D	A	D	D	A	A	A	A	A	A	A	A	
Vinyl Chloride	D	B	D	D	C	B	A	C	A	A	A	B	
Water, Distilled (Aerated)	D	A	D	B	A	A	A	A	A	A	A	A	
Water, Fresh	C	A	C	B	A	A	A	A	A	A	A	A	
Waxes	A	A	A	A	A	A	A	A	A	A	A	A	
Whiskey and Wine	D	A	D	B	A	A	A	A	A	A	A	A	
Xylene, Dry	A	A	A	A	A	A	A	A	A	A	A	A	
Zinc Chloride	D	D	D	D	D	D	B	D	A	A	D	D	
Zinc Hydrosulfite	A	A	A	A	A	A	B	A	A	A	A	A	
Zinc Sulfate	D	B	D	D	D	B	B	D	A	A	B	B	

NOTE: All ladings at ambient temperatures except as noted.
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 For trim group 08 through 13, consult Cameron for material compatibility.

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WE BUILD IT. WE BACK IT.

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Cameron is well-positioned to deliver total aftermarket support, quickly and efficiently, with unmatched OEM expertise. Our highly skilled engineers and technicians are available around the clock, seven days a week to respond to customer queries, troubleshoot problems and offer reliable solutions.

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- Handling, storage, packaging and delivery
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- Repair
- Field services
- Preventative maintenance
- Equipment testing and diagnostics
- Remanufacturing
- Asset preservation
- Customer property management
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Customized asset management plans that optimize uptime, availability and dedicated services.

- Engineering consultancy
- Site management
- Flange management
- Startup and commissioning
- Spare parts and asset management
- Operational support



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Monel	INCO Alloys International, Inc.		
Stellite	Stoody Deloro Stellite, Inc.		
Teflon	E.I. DuPont De Nemours & Company	Poly Tetra Fluoro Ethylene	PTFE
17-4PH	Armco Advanced Materials Corp.	17-4PH Stainless Steel Electroless Nickel Plating	Type 630 ENP
TFM	DYNEON L.L.C.	Modified Poly Tetra Fluoro Ethylene	MTFE

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HSE Policy Statement

At Cameron, we are committed ethically, financially and personally to a working environment where no one gets hurt and nothing gets harmed.