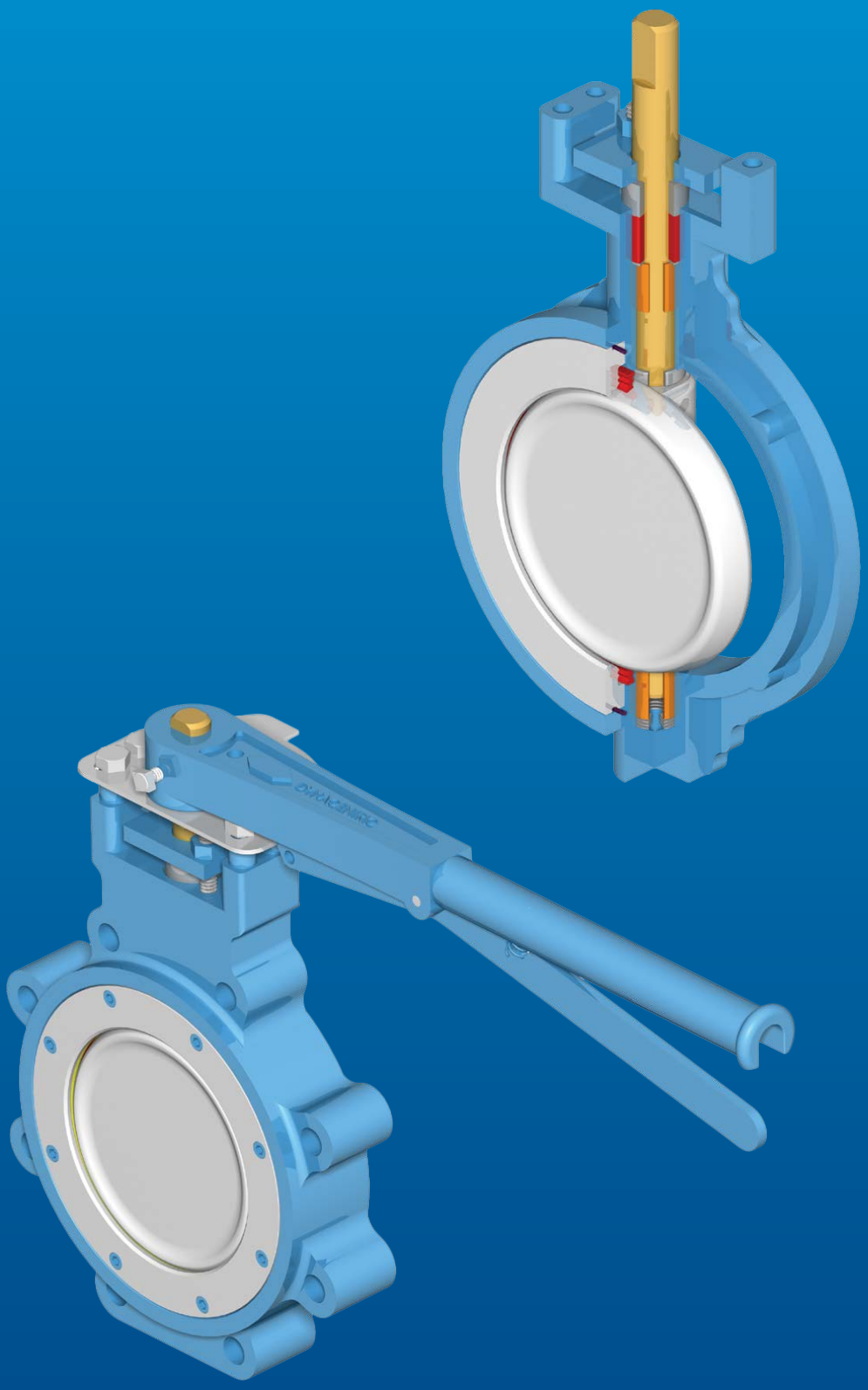
CAMERON
A Schlumberger Company

High-Performance Butterfly WKM Valves

Low-cost, lightweight, reliable valves for high-pressure applications



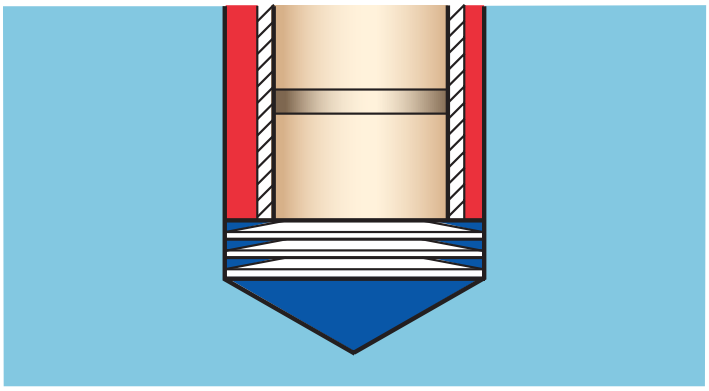
Contents

High-Performance Butterfly WKM Valves

The high-performance butterfly valves of the WKM* valve line bring 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. These WKM valves provide 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 high-performance butterfly valve is most commonly selected for the following applications:

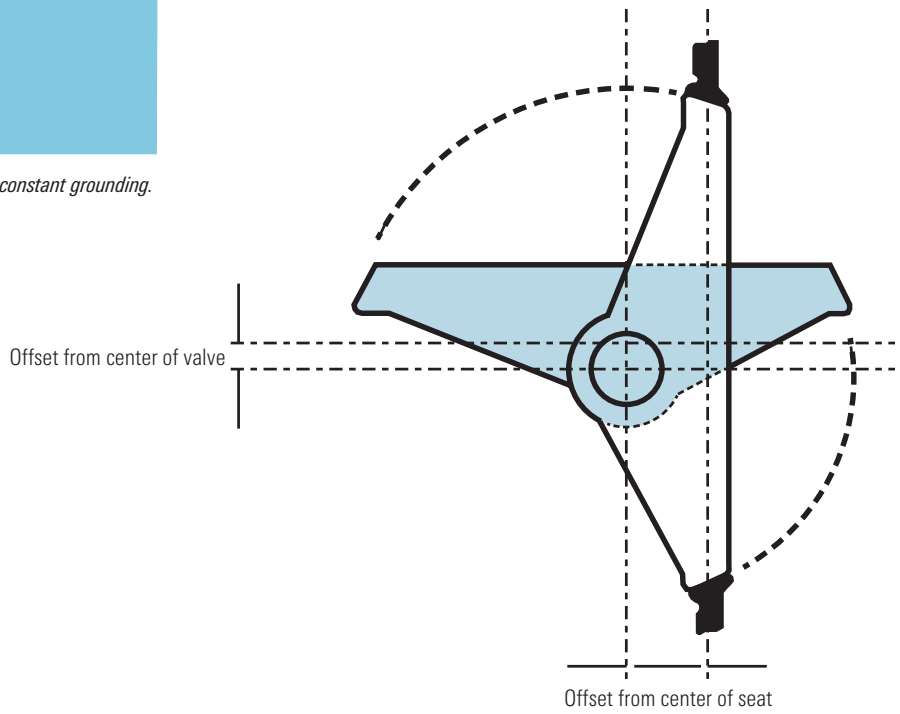
- chemical and petrochemical processing
- utilities
- pulp and paper
- oil and gas production
- fuel handling systems
- air conditioning and refrigeration
- marine.



Lower stem disc springs allowing for thermal expansion and providing constant grounding.

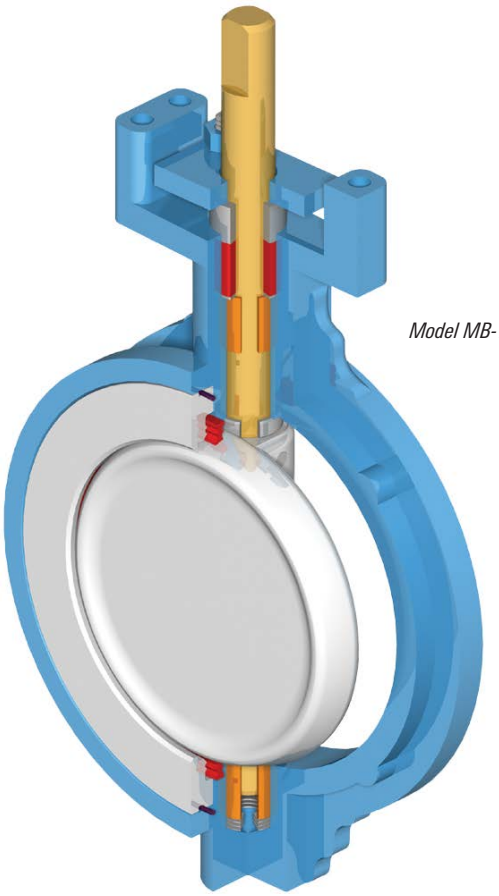
Disc design reduces seat wear

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 enables the disc to swing free of the seat in the open position, reducing operating torque and wear.

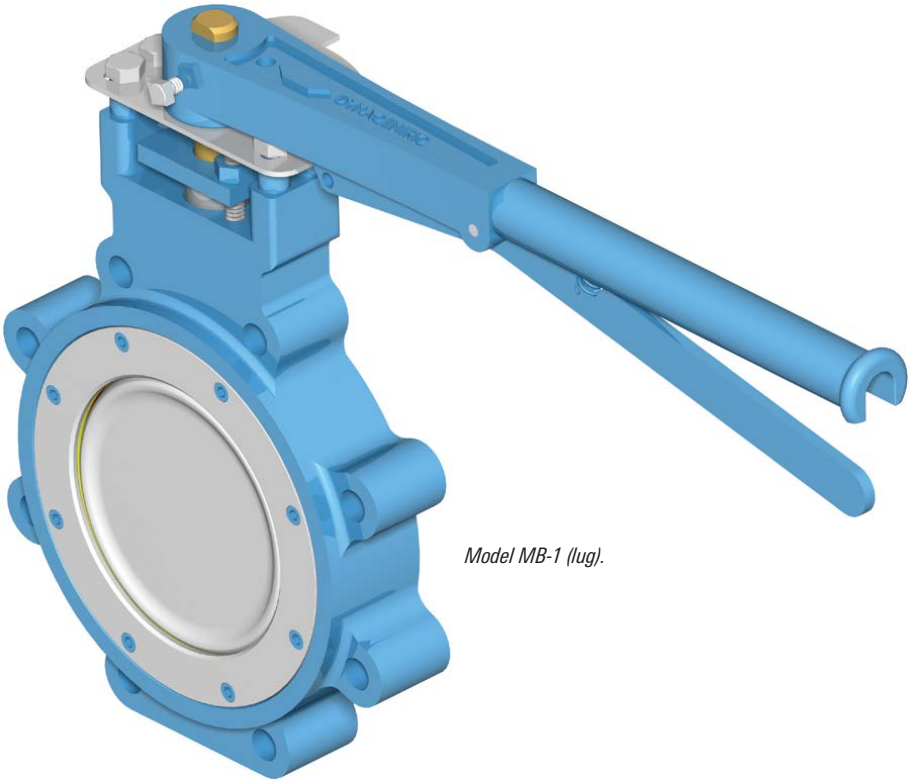


Double offset design.

Body Styles

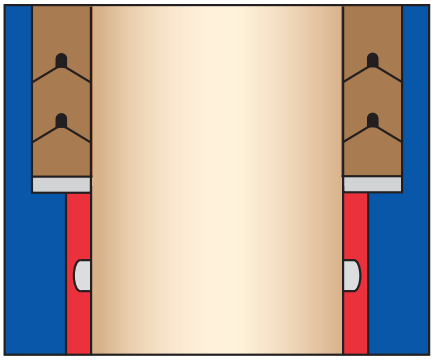


Model MB-1 (wafer).

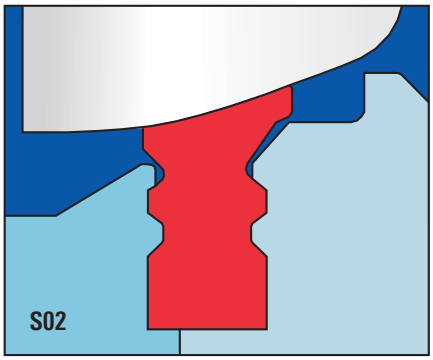


Model MB-1 (lug).

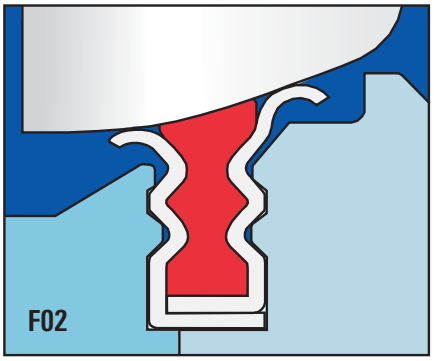
Features and Benefits



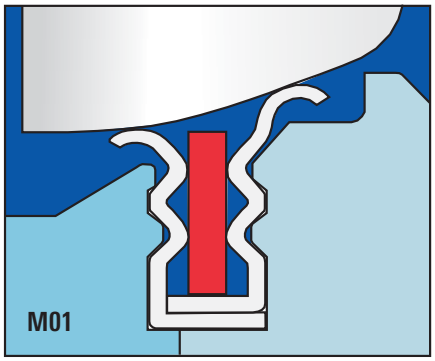
Positively retained stem.



Standard bidirectional TFM seat.



Fire-tested bidirectional metallic seat with TFM seal insert.



Metal seat.

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

Internal stop
The internal stop prevents seat damage caused by disc overtravel. It also ensures proper disc alignment in the closed position.

Deep stuffing box
The deep stuffing box design includes stainless steel fasteners as standard and is available with tetrafluoroethylene (TFE) chevron or high-temperature compression packing for long life and positive stem seal. Live-loaded packing assemblies are available on request.

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

Positively retained stem prevents blowouts

The tamperproof design 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.

Multiple seat designs provide versatility

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

The patented fire-tested bidirectional metallic seats with TFM seat insert (F02) provide a metal-to-metal pressure-responsive triple seal. 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 Standard 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 1,480 psi.

Metal seats of 316 stainless steel (M01) are suitable for temperatures to 750 degF [399 degC].

Readily Automated

Butterfly WKM valve with bracket and actuator.

Specifications **(See page 7 for technical specifications.)**

Sizes

- 2½–36 in [65–900 mm]
- ASME Class 150, 2½–36 in [65–900 mm]
- ASME Class 300, 2½–24 in [65–600 mm]

Operating temperatures

- Up to 750 degF [399 degC]

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—Metal seat

Optional materials

- Additional trim materials are listed on page 7

Special Service Valves

High-temperature service

Butterfly WKM 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 and seal combination is rated up to 750 degF [399 degC] in carbon steel bodies and is certified to API Specification 641 for low emissions. Leakage rates for metal-seated valves can be provided within the service limits of ANSI/FCI 70-2.

The 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.

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

Inverted packing configuration is available on request.

Sour oil and gas service

High-performance butterfly WKM valves with sour gas trims are available for H_2S service in accordance with NACE MR0175.

Low-temperature service

High-performance butterfly WKM valves for temperatures to –50 degF [–46 degC] are available in both 316 stainless steel construction and low-temperature carbon steel.

Steam service

High-performance butterfly WKM valves are also suitable 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 cooldown, 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

High-performance butterfly WKM 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 Standard 607 qualified valves
- API Standard 609 (dimensions)

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

- API Standard 609, API Standard 598 (valve inspection and testing)
- API Standard 607 4th Edition (fire-test specifications)
- CE PED (pressure equipment directive) 97/23/EC
- API Standard 641 (low emissions)

Model and size availability

Model A

- 30-in [750-mm] Class 150 lug
- Other materials of construction and valve options are available.

Model numbers

- MA-1 and MB-1 standard high-performance butterfly valve assembly
- MA-2 and MB-2 standard high-performance butterfly valve assembly with MTRs
- MA-3 and MB-3 CE-compliant high-performance butterfly valve assembly

Model B

- 2½-in and 5-in [65-mm and 125-mm] Class 150 and Class 300 lug
- 4-in and 6-in [100-mm and 150-mm] through 24-in [600-mm] Class 150 and Class 300 lug and wafer
- 3-in [80-mm] Class 150 and Class 300 lug and wafer and 36-in [900-mm] Class 150 lug

How to order

03-B5 310-03-S02-15/00

Size, in [mm]	
2½ [65]	2½
3 [80]	03
4 [100]	04
5 [125]	05
6 [150]	06
8 [200]	08
10 [250]	10
12 [300]	12
14 [350]	14
16 [400]	16
18 [450]	18
20 [500]	20
24 [600]	24
30 [750]	30
36 [900]	36

B5 Body Group		
Class	**Material**	**Style**
1 = 150	1 = CS†	0 = Wafer‡ 2½-in to 12-in slip-in seat retainer
3 = 300	2 = SS	
	5 = LCC	
		2 = Wafer 14-in to 24-in bolted seat retainer
		3 = Lug Model B bolted seat retainer

Trim Group	
SS disc 17-4 stem	02
SS disc Ni-Cr§ stem	03
Ni-Cu†† disc and stem	04
SS disc 316 stem	05
CS QPQ disc 17-4 stem	08
SS QPQ disc 17-4 stem	09
CS QPQ disc Ni-Cr§ stem	10
SS QPQ disc Ni-Cr§ stem	11
CS QPQ disc 17-4 QPQ stem	12
SS QPQ disc 17-4 QPQ stem	13

Seal Group	
TFM	S02
SS and TFM	F02
316 SS	M01

Packing Group	
Low-E graphite‡‡	15
Low-E Teflon®§§	16

Actuation	
Bare stem	00
Handle	HL
Handwheel worm gear	WG
Less gear with flange	FG

Note: CS = carbon steel, LCC = low-temperature carbon steel, SS = stainless steel.

† Controlled hardness carbon steel (H_2S service).

‡ Wafer valves 2½ to 12 in [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.

§ Reference INCONEL®.

Stainless steel packing adjustment studs and nuts are standard.

†† Reference MONEL®.

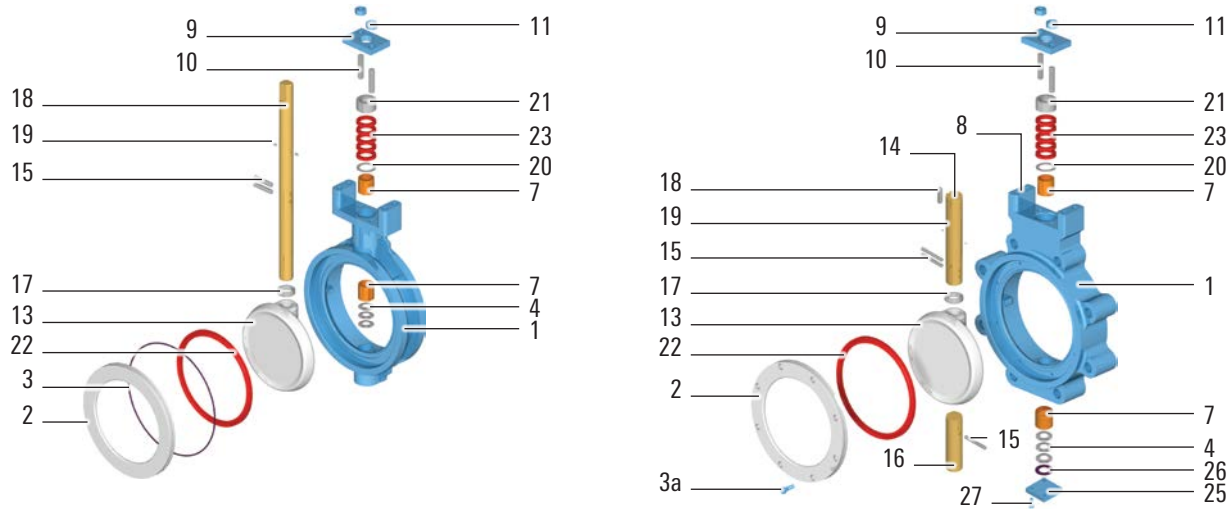
‡‡ Requires F02 seal group.

§§ Requires S02 seal group.

Standard Materials List

MB-1 high-performance butterfly WKM valves

2½- through 24-in [65- through 600-mm] ASME Classes 150 and 300
36-in [900-mm] ASME Class 150



MB-1 High-Performance Butterfly WKM Valves			
No.	**Part**	**Carbon Steel (H_2S)**	**Stainless Steel**
Body group trim number			
1	Body	A216 Grade WCC	A351 Grade CF8M
2	Seat retainer	A516 Grade 70	A276 Type 316
3	Seat retainer O-ring	Nitrile	Nitrile
3a	Seat retainer screw	A193 Grade B7	18-8 SS
4	Stem and disc spring	18-8 SS	18-8 SS
7	Stem bearing	TFE and steel	Teflon and 316 SS
8	Nameplate	18-8 SS	18-8 SS
9	Gland retainer	Carbon steel	Stainless steel
10	Gland retainer stud	A193 Grade B7	18-8 SS
11	Gland retainer nut	A193 Grade B7	18-8 SS
25	Bottom cover	Carbon steel	Stainless steel
26	Bottom cover gasket	Composite fiber	Composite fiber
27	Bottom cover screw	A193 Grade B7	18-8 SS
Internal group trim number			
13	Disc	A351 Grade CF8M†	A351 Grade CF8M†
14	Upper stem	A564 Type 630, H1150 + H1150	A564 Type 630, H1150 + H1150
15	Stem pins	A564 Type 630, H1150 + H1150	A564 Type 630, H1150 + H1150
16	Lower stem	A564 Type 630, H1150 + H1150	A564 Type 630, H1150 + H1150
17	Disc spacer	Nitronic® 60	Nitronic® 60
18	Stem key (8 in [200 mm] and larger)	Carbon steel	Carbon steel
19	Stem retainer pins	316 SS	316 SS
20	Packing spacer	316 SS	316 SS
21	Gland ring	316 SS	316 SS
Seal group trim code			
22	Seat	See Note (1)	See Note (1)
23	Packing set	Teflon or graphite	Teflon or graphite

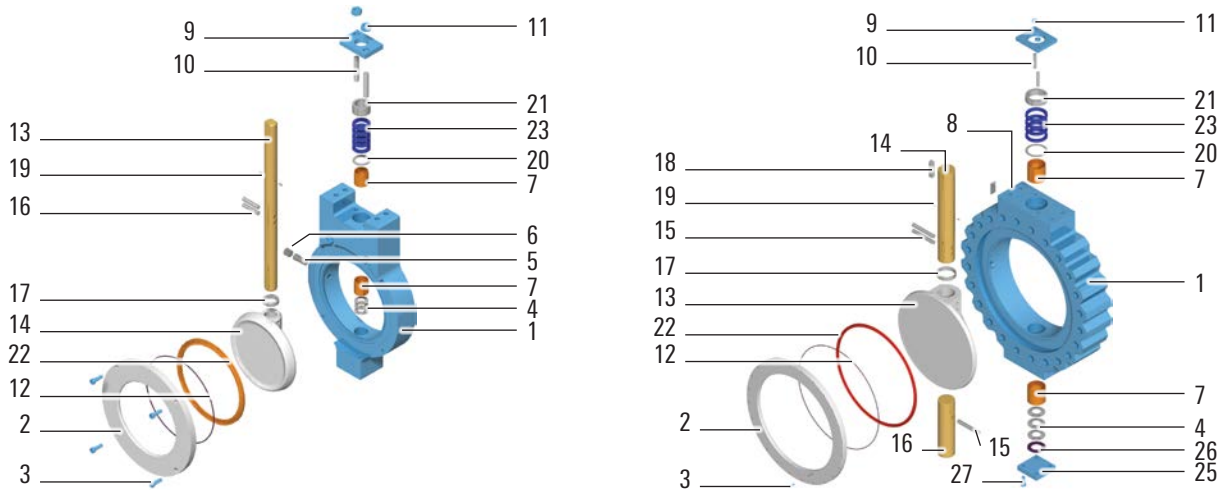
Typical valve construction shown—some sizes may vary.

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 and 300—Stainless steel with TFM insert
Type M—Metal, high-temperature, Class 150 and 300—316 stainless steel with 316 stainless steel insert

† Hard chrome plated on F02 and M01.
One-piece stem 2½-in [65-mm] through 12-in [300-mm] Class 300.

MA-1 high-performance butterfly WKM valves

30-in [750-mm] ASME Class 150



MA-1 High-Performance Butterfly WKM Valves			
No.	**Part**	**Carbon Steel (H_2S)**	**Stainless Steel**
Body group trim number			
1	Body	A216 Grade WCC	A351 Grade CF8M
2	Seat retainer	A516 Grade 70	A276 Type 316
3	Seat retainer screw	A193 Grade B7	18-8 SS
4	Stem and disc spring	18-8 SS	18-8 SS
5	Stop pin (4- to 10-in only)	316 SS	316 SS
6	Stop pin plug (4- to 10-in only)	Carbon steel	316 SS
7	Stem bearing	TFE and steel	Teflon and 316 SS
8	Nameplate	18-8 SS	18-8 SS
9	Gland retainer	Carbon steel	Stainless steel
10	Gland retainer stud	A193 Grade B7	18-8 SS
11	Gland retainer nut	A193 Grade B7	18-8 SS
12	Body gasket	See Note (1)	See Note (1)
25	Bottom cover plate	Carbon steel	Stainless steel
26	Bottom cover gasket	Composite fiber	Composite fiber
27	Bottom cover screw	A193 Grade B7	18-8 SS
Internal group trim number			
13	Upper stem	A564 Type 630, H1150 + H1150	A564 Type 630, H1150 + H1150
14	Disc	A216 Grade WCC A351 Grade CF8M†	A351 Grade CF8M†
15	Lower stem	A564 Type 630, H1150 + H1150	A564 Type 630, H1150 + H1150
16	Stem pins	A564 Type 630, H1150 + H1150	A564 Type 630, H1150 + H1150
17	Disc spacer	Nitronic 60	Nitronic 60
18	Stem key (6 in [150 mm] and larger)	Carbon steel	Carbon steel
19	Stem retainer pins	316 SS	316 SS
20	Packing spacer	316 SS	316 SS
21	Gland ring	316 SS	316 SS
Seal group trim code			
22	Seat	See Note (2)	See Note (2)
23	Packing set	Teflon or graphite	Teflon or graphite

Typical valve construction shown—some sizes may vary.

† Electroless nickel plated

Note (1): Standard valves do not require body gaskets. F02 fire-tested and high-temperature M01 valves are equipped with composite fiber body gaskets.

Note (2): 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 and 300—Stainless steel with TFM insert

Type M—Metal, high-temperature, Class 150 and 300—316 stainless steel with 316 stainless steel insert

Seat and Seal Material Codes and Ratings

Material codes

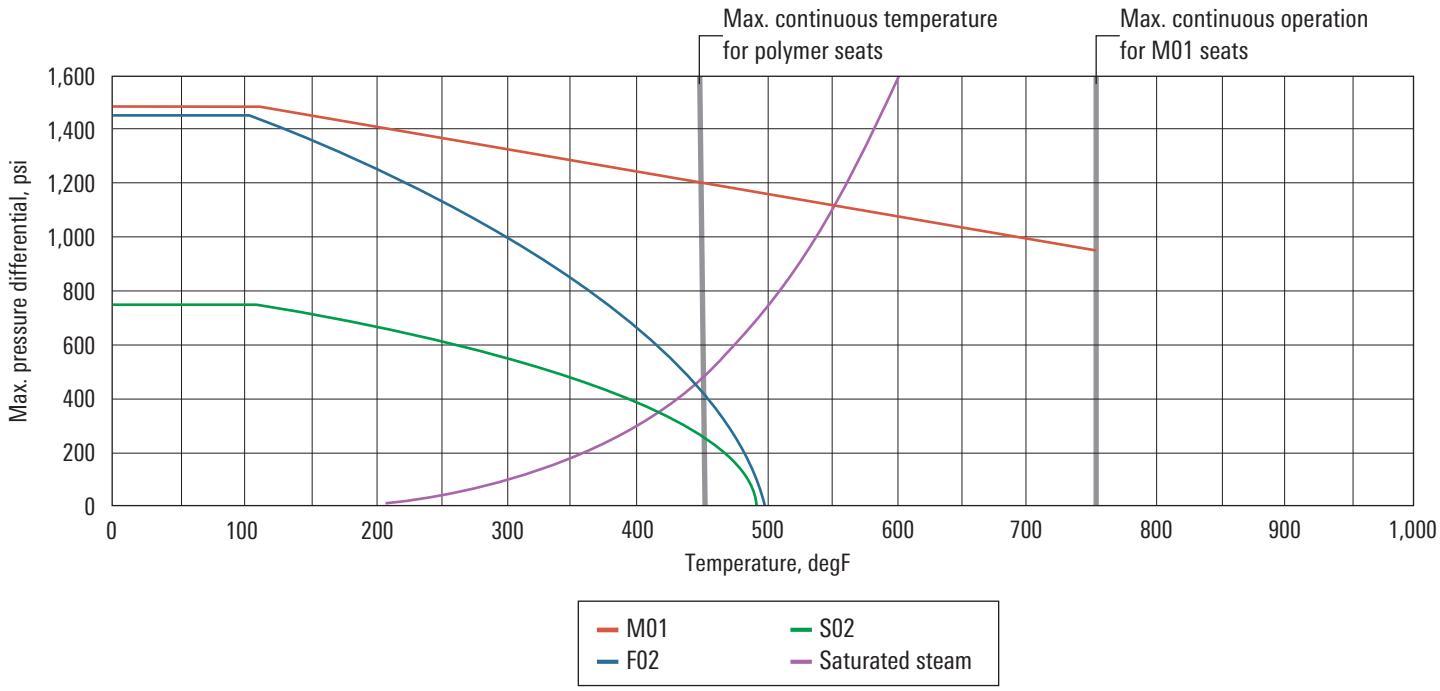
This chart is an abbreviated guide to the chemical resistance and pressure temperature limitations of seat seal materials used in high-performance butterfly WKM valves. Complete ratings curves are also shown. For additional information, please consult your Cameron representative.

Seal Code	Seat Material	ASME/FCI 70-2 Shutoff Class	Service Application
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 psi gauge.[†] Temperature range is –50 to 500 degF [–46 to 260 degC]. Drop tight.
F02	SS and 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 to 500 degF [–46 to 260 degC]. Drop tight.
M01	316 SS	4 (IV)	Recommended trim for superheated steam above 250 psi, hot oils and gases, and temperatures to 750 degF [399 degC]. Pressure and temperature range is same as body rating. Meets ASME/FCI 70-2.

[†] Consult Cameron for steam applications with higher pressure.

Seat pressure and temperature limitations

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



Valve Body Pressure Ratings

Pressure and temperature ratings for high-performance butterfly valve bodies†

All pressures are gauge psi.

Temp, degF	Class 150			Class 300	
	CS	LCC	316 SS	CS	LCC
■ –20 to 100	285	290	275	740	750
■ 200	260	260	235	675	750
■ 300	230	230	215	655	730
■ 400	200	200	195	635	705
■ 500	170	170	170	600	665
■ 600	140	140	140	550	605
■ 650	125	125	125	535	590
▲ 700	110	–	110	535	–
▲ 750	95	–	95	505	–

† In accordance with ASME B16.34

■ 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

Recommended Temperature Limits for Standard Materials Available

Seal Group	Material	Max. Temperature, degF [degC]
S02	TFM	450 [177] (500 [260] intermittent)
F02	SS and TFM	450 [177] (500 [260] intermittent)
M01	316 SS	750 [399]

Trim Group†	Material	Max. Temperature, degF [degC]
02	SS disc and 17-4 stem	650 [343]
03	SS disc and Ni-Cr stem	700 [371]
04	Ni-Cu disc and Ni-Cu stem	750 [399]
05	SS disc and 316 stem	700 [371]

† For trim groups 08 through 13, consult Cameron for temperature limitations.

Ratings shown left 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.

Stem materials

Note: Valves with 17-4 PH stems are recommended only up to a maximum temperature of 650 degF [343 degC].

- Ni-Cr alloy UNS 7718 stems are required for temperatures above 650 degF [343 degC].
- Ni-Cu alloy UNS 5500 stems can be furnished for applications requiring high corrosion resistance and full ASME ratings.

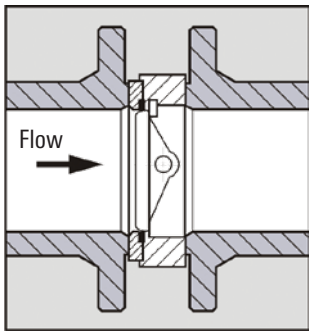
Body materials

- Carbon steel—ASTM A516 Grade 70, ASTM A216 Grade WCC
- Low-temperature CS—ASTM A352 Grade LCC
- Stainless steel—ASTM A351 Grade CF8M

Torque Values

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

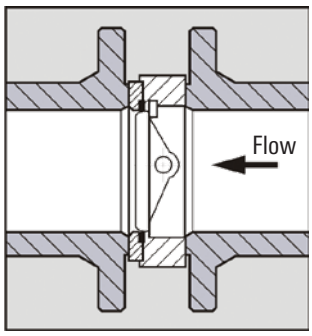
An appropriate safety factor is included for normal wet operating torque.



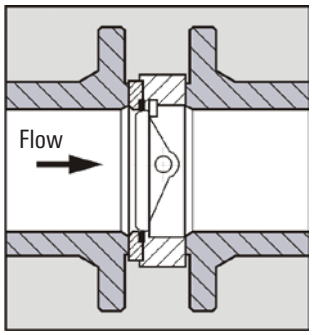
Seat alignment in upstream flow.

Torque Values															
Size, in [mm]	**2½ [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]**
S0 seats upstream—valve torque, lbf.in															
0 to 50 psi	111	155	348	503	728	1,125	2,154	3,291	4,277	6,334	8,129	11,685	15,770	23,040	36,030
100 psi	136	190	395	583	860	1,290	2,430	3,790	5,050	7,469	9,533	13,556	18,540	26,980	44,450
200 psi	179	250	490	737	1,110	1,600	2,990	4,790	6,610	9,740	12,340	17,297	24,080	35,390	61,520
285 psi	214	300	570	871	1,330	1,900	3,460	5,640	7,930	11,670	14,276	20,477	28,790	43,200	75,000
300 psi	225	315	590	899	1,370	1,950	3,550	5,790	8,160	12,010	15,147	21,038	29,620	–	–
400 psi	271	380	680	1,053	1,630	2,280	4,100	6,800	9,720	14,281	17,955	24,780	35,160	–	–
500 psi	318	445	780	1,205	1,880	2,610	4,660	7,800	11,270	16,551	20,762	28,521	40,700	–	–
600 psi	364	510	875	1,368	2,140	2,940	5,220	8,800	12,820	18,821	23,570	32,262	46,240	–	–
700 psi	411	575	970	1,526	2,400	3,270	5,780	9,800	14,380	21,092	26,377	36,003	51,780	–	–
740 psi	429	600	1,020	1,597	2,500	3,400	6,000	10,200	15,000	22,000	27,500	37,500	54,000	–	–
S0 seats downstream—valve torque, lbf.in															
0–50 psi	111	155	348	503	728	1,125	2,154	3,291	4,277	6,334	8,129	11,685	15,770	23,040	36,030
100 psi	143	200	419	618	911	1,364	2,563	4,013	5,380	7,947	10,131	14,371	19,714	30,000	46,580
200 psi	208	291	561	846	1,276	1,841	3,381	5,458	7,586	11,174	14,134	19,743	27,603	43,820	70,000
285 psi	263	368	681	1,040	1,587	2,247	4,077	6,686	9,462	13,917	17,536	24,309	34,308	55,980	90,000
300 psi	272	381	702	1,074	1,642	2,319	4,200	6,903	9,793	14,401	18,137	25,114	35,491	–	–
400 psi	337	472	844	1,302	2,007	2,796	5,018	8,348	11,999	17,628	22,140	30,486	43,379	–	–
500 psi	402	563	986	1,530	2,373	3,274	5,836	9,793	14,205	20,855	26,143	35,858	51,268	–	–
600 psi	466	653	1,128	1,757	2,738	3,751	6,654	11,237	16,411	24,082	30,146	41,230	59,156	–	–
700 psi	531	744	1,269	1,985	3,104	4,229	7,473	12,682	18,618	27,309	34,149	46,601	67,045	–	–
740 psi	557	780	1,326	2,076	3,250	4,420	7,800	13,260	19,500	28,800	35,750	48,750	70,200	–	–

For severe service, an additional safety factor should be added:
Dry gas or slurry: 1.25
Low temperature: 1.20
Emergency shutdown: 1.60



Seat alignment in downstream flow.

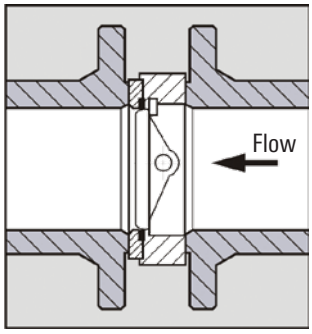


Seat alignment in upstream flow.

Torque Values

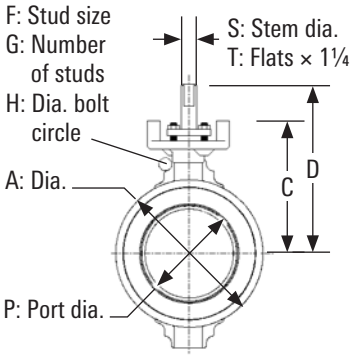
Size, in [mm]	2½ [65]	3 [80]	4 [100]	5 [125]	6 [150]	8 [200]	10 [250]	12 [300]	14 [350]	16 [400]	18 [450]	20 [500]	24 [600]	30 [750]	36 [900]
F0 and M0 seats upstream—valve torque, lbf.in															
0–50 psi	238	333	609	920	1,389	2,710	4,422	6,547	7,728	9,709	13,116	18,395	25,623	36,600	53,610
100 psi	261	366	694	1,046	1,578	3,050	5,043	7,595	8,956	11,218	15,432	21,289	29,746	42,805	62,660
200 psi	308	431	863	1,300	1,957	3,729	6,286	9,689	11,412	14,235	20,063	27,079	37,991	55,130	78,620
285 psi	348	487	1,006	1,514	2,278	4,307	7,343	11,470	13,500	16,800	24,000	32,000	45,000	64,980	90,000
300 psi	355	497	1,032	1,552	2,335	4,409	7,531	11,784	13,868	17,253	24,695	32,868	46,237	–	–
400 psi	401	562	1,201	1,805	2,714	5,089	8,773	13,878	16,325	20,270	29,326	38,658	54,482	–	–
500 psi	449	628	1,370	2,058	3,092	5,769	10,016	15,973	18,781	23,288	33,958	44,447	62,728	–	–
600 psi	495	693	1,539	2,311	3,470	6,448	11,259	18,068	21,237	26,305	38,589	50,237	70,974	–	–
700 psi	542	759	1,707	2,563	3,849	7,128	12,503	20,162	23,693	29,323	43,221	56,026	79,219	–	–
740 psi	561	785	1,775	2,665	4,000	7,400	13,000	21,000	24,675	30,530	48,074	58,342	82,518	–	–
F0 and M0 seats downstream—valve torque, lbf.in															
0 to 50 psi	238	333	609	920	1,389	2,710	4,422	6,547	7,728	9,709	13,116	18,395	25,623	36,600	53,610
100 psi	274	383	733	1,105	1,665	3,211	5,326	8,051	9,314	11,660	16,085	22,135	30,942	45,080	66,020
200 psi	344	482	979	1,474	2,218	4,212	7,134	11,059	12,485	15,562	22,023	29,616	41,579	61,750	91,710
285 psi	405	567	1,188	1,787	2,687	5,063	8,672	13,615	15,181	18,880	27,070	35,974	50,621	75,000	115,000
300 psi	416	582	1,225	1,842	2,770	5,214	8,943	14,066	15,656	19,465	27,961	37,096	52,216	–	–
400 psi	487	682	1,471	2,211	3,322	6,215	10,751	17,074	18,828	23,367	33,899	44,577	62,854	–	–
500 psi	558	781	1,717	2,579	3,875	7,216	12,560	20,082	21,999	27,270	39,837	52,057	73,491	–	–
600 psi	629	881	1,963	2,948	4,427	8,218	14,368	23,089	25,171	31,172	45,775	59,538	84,129	–	–
700 psi	701	981	2,209	3,316	4,979	9,219	16,177	26,097	28,342	35,075	51,713	67,018	94,766	–	–
740 psi	729	1,021	2,308	3,464	5,200	9,620	16,900	27,300	29,611	36,636	54,088	70,011	99,021	–	–

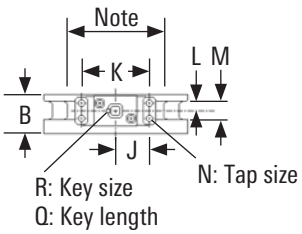
For severe service, an additional safety factor should be added:
Dry gas or slurry: 1.25
Emergency shutdown: 1.60
Low temperature: 1.20
High temperature between 600 and 700 degF [316 and 371 degC]: 1.30



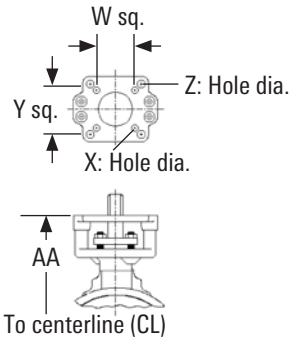
Seat alignment in downstream flow.

Dimensional Data

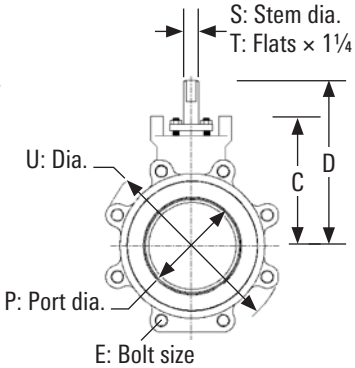




Note: Minimum pipe ID required for disc swing clearance. See (BB) for applicable pipe schedule.



Optional flange mounting bracket (actuator code—FG)



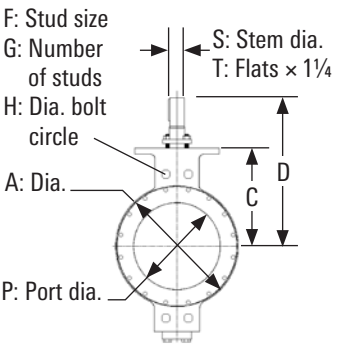
Series B5100, Class 150, 285-psi Cold Working Pressure (CWP)†

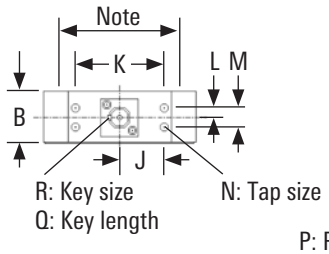
in [mm]	A	B	C	D	E	F	G‡	H	J	K	L	M	N	P
2½ [65]	–	1.87 [48]	5.81 [148]	7.94 [202]	⅝–11	–	4	5.50 [140]	2.00 [51]	4.00 [102]	0.44 [11]	0.88 [22]	⅜–16	2.09 [53]
3 [80]	5.00 [127]	2.00 [51]	5.50 [140]	7.63 [194]	⅝–11	⅝	4	6.00 [152]	2.00 [51]	4.00 [102]	0.44 [11]	0.88 [22]	⅜–16	2.62 [67]
4 [100]	6.19 [157]	2.12 [54]	6.38 [162]	8.50 [216]	⅝–11	⅝	8	7.50 [191]	2.00 [51]	4.00 [102]	0.44 [11]	0.88 [22]	⅜–16	3.63 [92]
5 [125]	–	2.25 [57]	7.50 [191]	9.63 [245]	¾–10	–	8	8.50 [216]	2.00 [51]	4.00 [102]	0.44 [11]	0.88 [22]	⅜–16	4.50 [114]
6 [150]	8.50 [216]	2.28 [58]	7.63 [194]	9.75 [248]	¾–10	¾	8	9.50 [241]	2.00 [51]	4.00 [102]	0.44 [11]	0.88 [22]	⅜–16	5.62 [143]
8 [200]	10.62 [270]	2.50 [64]	8.88 [226]	11.58 [294]	¾–10	¾	8	11.75 [298]	2.13 [54]	4.25 [108]	0.63 [16]	1.25 [32]	⅜–16	7.61 [193]
10 [250]	12.75 [324]	2.81 [71]	9.88 [251]	12.62 [321]	⅞–9	⅞	12	14.25 [362]	2.13 [54]	4.25 [108]	0.63 [16]	1.25 [32]	⅜–16	9.50 [241]
12 [300]	15.00 [381]	3.19 [81]	11.25 [286]	14.81 [376]	⅞–9	⅞	12	17.00 [432]	2.75 [70]	5.50 [140]	0.81 [21]	1.62 [41]	½–13	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]	½–13	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]	½–13	14.37 [365]
18 [450]	21.00 [533]	4.50 [114]	14.50 [368]	20.84 [529]	1⅛–8	1⅛	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]	1⅛–8	1⅛	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]	1¼–8	1¼	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]	1½–8	–	32	42.75 [1,086]	7.50 [191]	15.00 [381]	2.19 [56]	4.38 [111]	1–8	33.88 [861]

												Weight	
in [mm]	Q	R	S	T	U	W	X	Y	Z	AA	BB	Lug Body, lbm [kg]	Wafer Body, lbm [kg]
2½ [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 × 6.94 [73 × 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 × 6.94 [73 × 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 × 6.94 [73 × 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 [1,162]	10.25 [260]	0.81 [21]	–	–	29.00 [737]	Sch 40	2,185 [991]	–

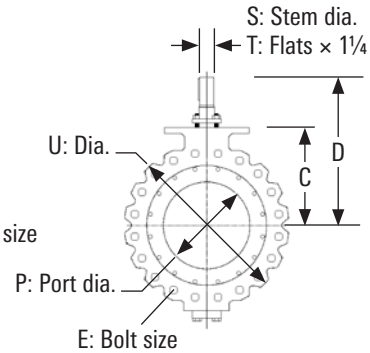
† Pressure ratings are in accordance with ASME B16.34 for Group 1.1 carbon steel valves. Pressure ratings vary with different body materials.

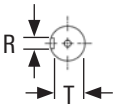
‡ Installation manual is available with complete flange bolt and stud information.



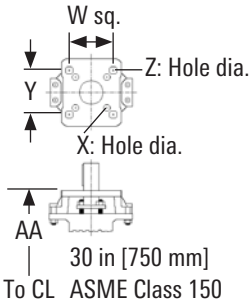


Note: Minimum pipe ID required for disc swing clearance. See (BB) for applicable pipe schedule.





Optional flange mounting bracket (actuator code—FG)



Series A5100, Class 150, 285-psi CWP†

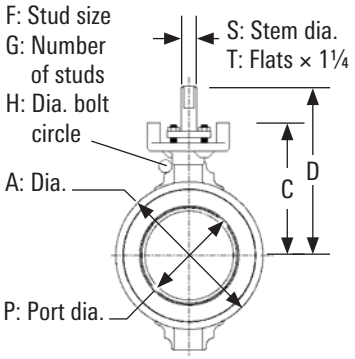
in [mm]	A	B	C	D	E	F	G‡	H	J	K	L	M	N	P
30 [750]	34.50 [876]	7.63 [194]	22.88 [581]	30.94 [786]	1¼–8	1¼–8	28	36.00 [914]	6.00 [152]	12.00 [3050]	1.50 [38]	3.00 [76]	¾–10	27.90 [709]

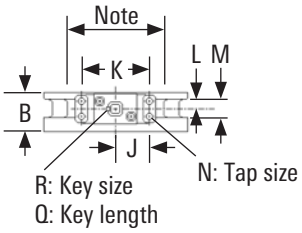
												Weight	
in [mm]	Q	R	S	T	U	W	X	Y	Z	AA	BB	Lug Body, lbm [kg]	Wafer Body, lbm [kg]
30 [750]	4.00 [102]	0.875 × 0.625 [22 × 16]	3.500 [89]	3.156	38.75 [984]	9.47	0.81	3.92	0.81 [21]	26.88 [683]	Sch XH	1,800 [816]	1,300 [590]

† Pressure ratings are in accordance with ASME B16.34 for Group 1.1 carbon steel valves. Pressure ratings vary with different body materials.

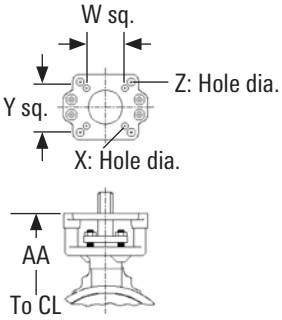
‡ Installation manual is available with complete flange bolt and stud information.

Dimensional Data

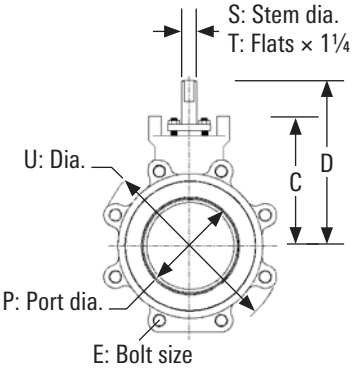




Note: Minimum pipe ID required for disc swing clearance. See (BB) for applicable pipe schedule.



Optional flange mounting bracket (actuator code—FG)



E: Bolt size
G: Number of bolts
H: Dia. bolt circle

Series B5300, Class 300, 740-psi CWP†

in [mm]	A	B	C	D	E	F	G‡	H	J	K	L	M	N	P
2½ [65]	4.13 [105]	1.87 [48]	5.81 [148]	7.94 [202]	¾–10	¾	8	5.88 [149]	2.00 [51]	4.00 [102]	0.44 [11]	0.88 [22]	⅜–16	2.09 [53]
3 [80]	5.00 [127]	2.00 [51]	5.50 [140]	7.63 [194]	¾–10	¾	8	6.63 [168]	2.00 [51]	4.00 [102]	0.44 [11]	0.88 [22]	⅜–16	2.62 [53]
4 [100]	6.19 [157]	2.12 [54]	6.38 [162]	8.50 [216]	¾–10	¾	8	7.88 [200]	2.00 [51]	4.00 [102]	0.44 [11]	0.88 [22]	⅜–16	3.63 [92]
5 [125]	7.31 [186]	2.25 [57]	7.50 [191]	9.63 [245]	¾–10	¾	8	9.25 [235]	2.00 [51]	4.00 [102]	0.44 [11]	0.88 [22]	⅜–16	4.50 [114]
6 [150]	8.50 [216]	2.28 [58]	7.63 [194]	9.75 [248]	¾–10	¾	12	10.63 [270]	2.00 [51]	4.00 [102]	0.44 [11]	0.88 [22]	⅜–16	5.62 [143]
8 [200]	10.62 [270]	2.88 [73]	8.88 [226]	11.58 [294]	⅞–9	⅞	12	13.00 [330]	2.13 [54]	4.25 [108]	0.63 [16]	1.25 [32]	⅜–16	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]	½–13	9.50 [241]
12 [300]	15.00 [381]	3.62 [92]	12.25 [311]	16.48 [419]	1⅛–8	1⅛	16	17.75 [451]	2.75 [70]	5.50 [140]	0.81 [21]	1.62 [41]	½–13	11.50 [292]
14 [350]	16.25 [413]	4.62 [117]	13.62 [346]	19.98 [507]	1⅛–8	1⅛	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]	1¼–8	1¼	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]	1¼–8	1¼	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]	1¼–8	1¼	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]	1½–8	1½	24	32.00 [813]	6.00 [152]	12.00 [305]	1.50 [38]	3.00 [76]	¾–10	21.40 [544]

												Weight	
in [mm]	Q	R	S	T	U	W	X	Y	Z	AA	BB	Lug Body, lbm [kg]	Wafer Body, lbm [kg]
2½ [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 × 6.94 [73.15 × 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 × 6.94 [73.15 × 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 × 6.94 [73.15 × 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 × 6.94 [73.15 × 176.28]	0.94 [24]	20.14 [512]	Sch 80	775 [352]	480 [218]
24 [600]	3.62 [92]	0.625 × 0.875	3.500 [89]	–	35.00 [889]	–	–	3.92 × 9.47 [99.57 × 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 vary with different body materials.

‡ Installation manual is available with complete flange bolt and stud information.

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.

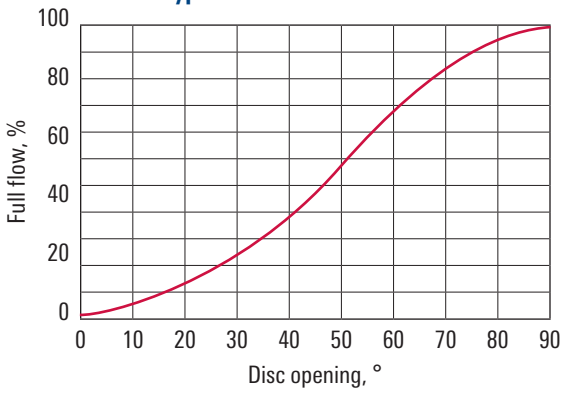
The usable range for high-performance butterfly valves is between 20° and 70° opening, resulting in a ratio of 10:1.

In sizing the high-performance butterfly valve for throttling applications, a fully open flow coefficient (C_v) should be selected that is approximately 1.8 times the C_v determined from calculations.

Under normal flow conditions, this selection provides a valve opening of 50° to 60°.

C_v values equal the flow of water in galUS per minute per 1-psi pressure drop.

Typical Characteristics Curve



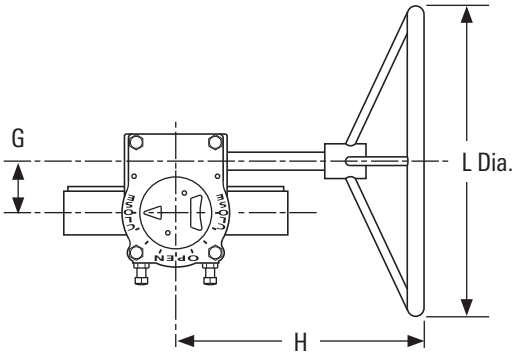
Valve Size	Disc Angle, Degrees Open							
in [mm]	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
Series 5100 Class 150								
2½ [65]	8	17	31	46	66	82	97	103
3 [80]	14	31	54	81	115	144	169	180
4 [100]	31	66	117	176	250	312	367	400
5 [125]	54	114	201	302	429	536	630	670
6 [150]	85	180	317	476	677	846	995	1,058
8 [200]	174	371	654	981	1,395	1,744	2,049	2,180
10 [250]	300	638	1,125	1,688	2,401	3,001	3,526	3,751
12 [300]	440	936	1,651	2,477	3,523	4,403	5,174	5,504
14 [350]	523	1,110	1,959	2,939	4,180	5,225	6,139	6,531
16 [400]	659	1,401	2,473	3,709	5,276	6,594	7,748	8,243
18 [450]	886	1,883	3,323	4,985	7,089	8,862	10,412	11,077
20 [500]	1,066	2,266	3,998	5,998	8,530	10,662	12,528	13,328
24 [600]	1,554	3,302	5,828	8,741	12,432	15,540	18,260	19,425
30 [750]	2,752	5,848	10,320	15,480	22,016	27,520	32,336	34,400
36 [900]	3,963	8,421	14,861	22,291	31,703	39,629	46,564	49,536
Series 5300 Class 300								
2½ [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	1,058
8 [200]	174	371	654	981	1,395	1,744	2,049	2,180
10 [250]	268	570	1,005	1,508	2,145	2,681	3,150	3,351
12 [300]	399	849	1,498	2,247	3,196	3,995	4,693	4,993
14 [350]	428	910	1,606	2,409	3,426	4,282	5,032	5,353
16 [400]	609	1,295	2,285	3,428	4,876	6,094	7,161	7,618
18 [450]	848	1,730	2,983	4,504	6,303	7,594	8,379	8,855
20 [500]	906	1,926	3,378	5,098	7,250	9,062	10,648	11,328
24 [600]	1,290	2,629	4,534	6,847	9,580	11,542	12,738	15,520

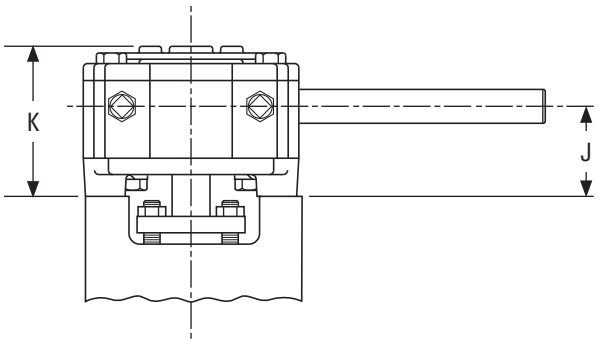
Manual Actuators

Worm gear actuators

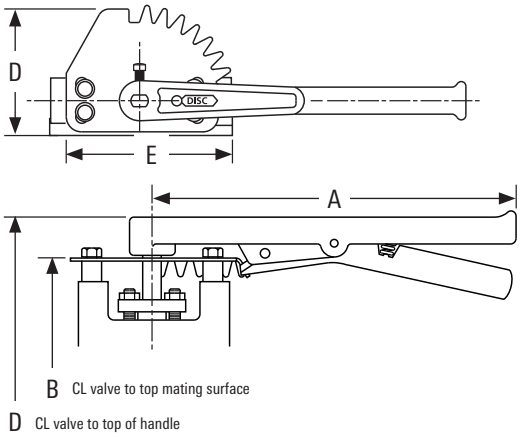
Worm gear actuators are available as optional equipment for high-performance butterfly WKM valves sizes 2½ through 8 in [65 through 200 mm]. All larger size valves require worm gear actuators or power actuation.

Handle-operated valves, sizes 2½ through 8 in [65 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, in [mm]	ASME Class	G	H	J	K	L Dia.	Weight, lbm [kg]
2½ [65]	150, 300	1.75 [44]	7.25 [184]	1.75 [44]	3.5 [89]	8.00 [203]	11 [5]
3 [80]	150, 300	1.75 [44]	7.25 [184]	1.98 [50]	3.45 [87]	8.00 [203]	15 [7]
4 [100]	150, 300	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]
8 [200]	150, 300	2.51 [64]	10.28 [261]	2.49 [63]	4.29 [109]	12.00 [305]	23 [10]
10 [250]	150	2.51 [64]	10.28 [261]	2.49 [63]	4.29 [109]	12.00 [305]	23 [10]
	300	3.00 [76]	14.02 [356]	3.73 [95]	4.68 [118]	18.00 [457]	39 [18]
12 [300]	150	3.00 [76]	14.02 [356]	3.00 [76]	4.68 [118]	18.00 [457]	39 [18]
	300	3.63 [92]	16.38 [416]	3.73 [95]	6.01 [153]	24.00 [610]	49 [22]
14 [350]	150	3.00 [76]	14.02 [356]	4.25 [108]	5.93 [150]	18.00 [457]	39 [18]
	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]
	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]
	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]
	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]
	300	7.30 [185]	20.56 [522]	9.19 [233]	10.57 [268]	30.00 [762]	160 [48]
30 [750]	150	7.30 [185]	20.56 [522]	9.19 [233]	10.57 [268]	30.00 [762]	160 [48]
36 [750]	150	5.93 [151]	20.56 [522]	9.00 [228]	10.57 [268]	30.00 [762]	163 [74]



Handle Actuators

Valve Size, in [mm]	ASME Class	Handle Number	A	B	C	D	E	Weight, lbm [kg]
2½ [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	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]
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]
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 be used only up to the following differential pressures:

2½-in valves to 450 psi
3-in valves to 400 psi
4-in valves to 300 psi
5-in valves to 200 psi
6-in valves to 150 psi
8-in valves to 50 psi

High-performance butterfly WKM valves

slb.com/valves

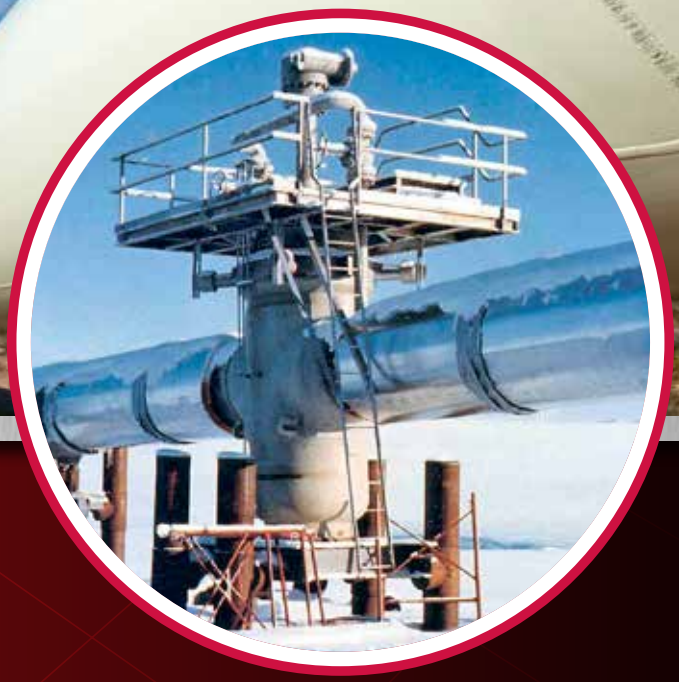
CAMERON
A Schlumberger Company

CAMERON

WKM Saf-T-Seal Gate Valves

Through-conduit, double block-and-bleed slab gate valves with fully protected seat faces for long-lasting, drop-tight shutoff in liquid pipelines

TECHNOLOGY



CAMERON

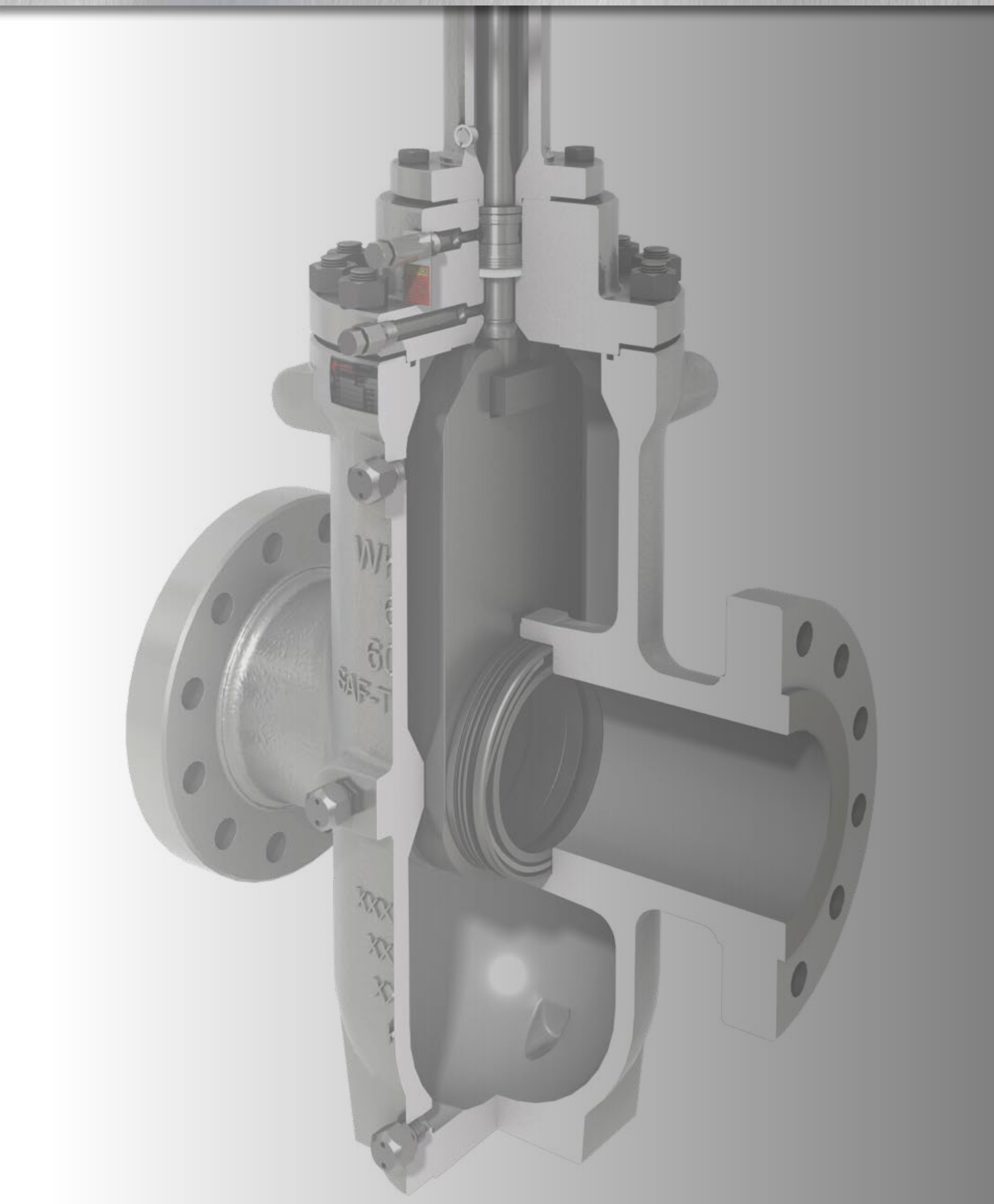


Table of Contents

WKM SAF-T-SEAL GATE VALVES

Table of Contents

WKM Saf-T-Seal Gate Valves

Ville Platte, La., USA

Cameron is a leading provider of valves and measurement systems to the oil and gas industry. Our products are primarily used to control, direct and measure the flow of oil and gas as it is moved from individual wellheads through flowlines, gathering lines and transmission systems to refineries, petrochemical plants and industrial centers for processing.

Cameron provides a wide range of valves for use in natural gas, LNG, crude oil and refined products transmission lines. The traditional CAMERON® fully welded ball valve product line has been combined with the GROVE®, RING-O®, TOM WHEATLEY®, ENTECH™ and TK® product lines. This broad offering has strengthened Cameron's ability to serve as a single source for customer requirements. Cameron also provides critical service valves for refinery, chemical and petrochemical processing businesses, and for associated storage terminal applications, particularly through the ORBIT® and GENERAL VALVE® lines. These brands are complemented by WKM®, TBV™ and TEXSTEAM™ valve products and considerably expand the scope of our product offerings.

Cameron's WKM Saf-T-Seal™ gate valve's smooth continuous bore reduces turbulence. Additionally, the seat faces are outside the flow stream and are protected from contact with the lading whether the valve is in the open or closed position. The WKM Saf-T-Seal gate valve's full bore makes it possible to run pigs, scrapers or hot tap cutters through the valves without danger of damaging the valve, lodging the scraper, or jamming it with metal cuttings.

DESIGN

Cameron's WKM Saf-T-Seal valve's through-conduit design provides the following specific advantages that result in reliable performance and long life:

Protection of Seat Faces

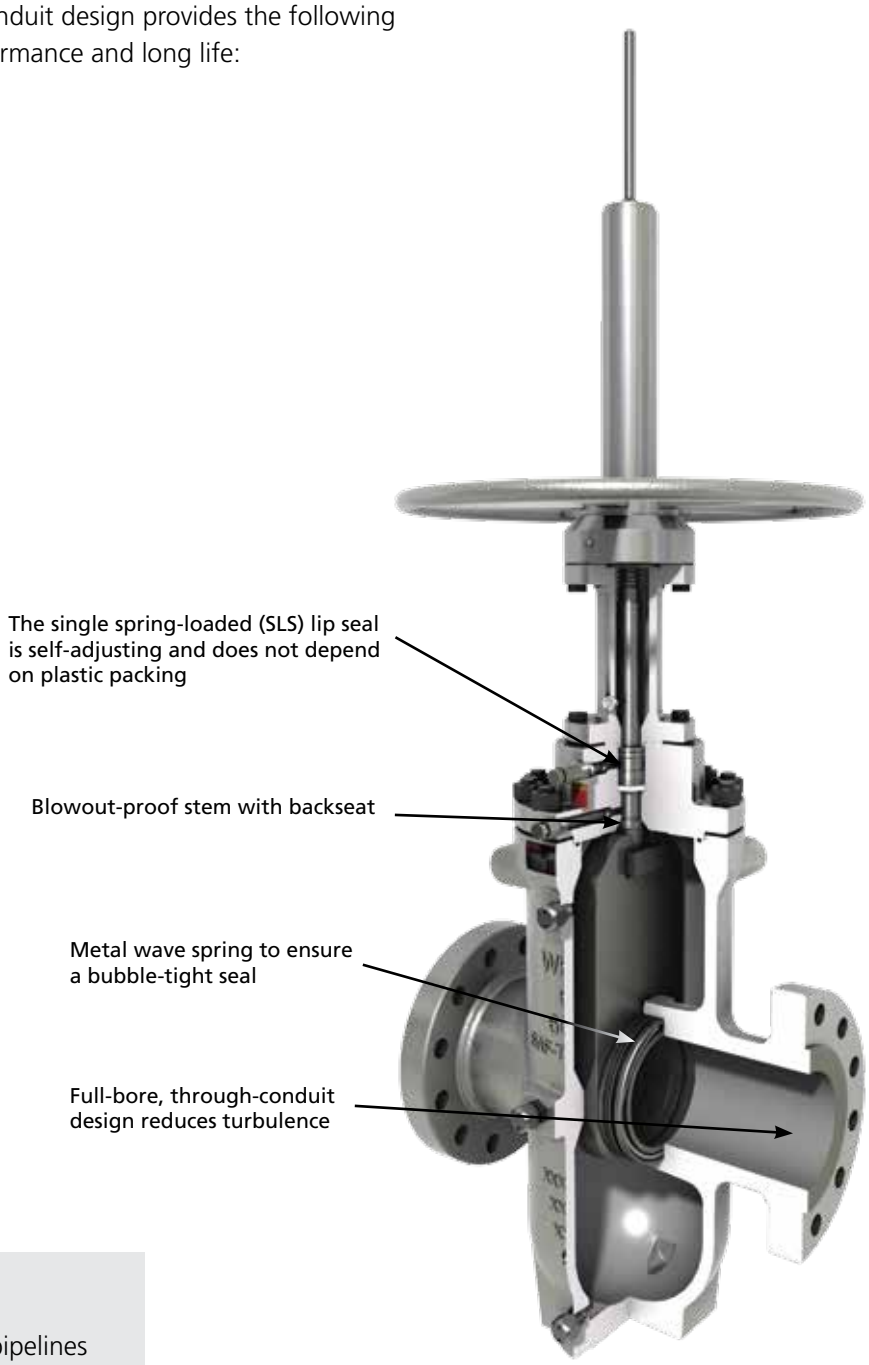
- Seat faces are outside the flow stream and in full contact with the gate, in both open and closed positions, greatly extending the seat life.

Smooth, Continuous Conduit for Flow

- Destructive turbulence is reduced. In a full-bore valve, pressure drop through the valve is no greater than that through an equal length of equal diameter pipe.

Block-and-Bleed Capability

- In the closed position, the valve forms a tight seal on both seats simultaneously. This allows the body cavity to be bled.



Commonly Used Applications

- Mainline and manifold valves in liquids pipelines
- Storage wells (salt domes, etc.)
- Water flood
- Safety valves (emergency shutdown valves (ESDVs) pipelines, wellheads and salt domes

FEATURES

1. Through-Conduit Slab Gate Valve

- Provides a tight pressure-activated seal
- Full-bore design reduces pressure drop and allows passage of all types of scrapers (pigs)
- Nickel-plated internals

2. Cameron's SLS Stem Seal System or Vee Packing with Injectable Plastic Packing

3. Double-Sealing, Replaceable, Floating Seats

- Block-and-bleed per API 6D
- Simple one-piece design is resistant to dirty service
- Insert initiates the seal and helps clean the gate
- Excess body pressure is automatically vented upstream
- Seats may be lubricated to promote long life, reduce operating torques, or effect a seal in an emergency situation
- Easily removed and replaced while the valve is in-line
- Double seal established by initial plastic-to-metal seal in addition to metal-to-metal seal, both upstream and downstream

4. Bolted Bonnet Valve is In-Line Repairable

- Seal is made by an O-ring or flat metal gasket for standard applications (spiral-wound metal gasket with a non-asbestos filler for high-temperature applications)

5. Singe-Piece Cast Body Center Section

- Provides the necessary strength to resist pipeline bending moments
- Smooth shape reduces stress concentrations
- Made from pressure vessel quality steel

6. Valve Stroke is Established by Manufacturing Tolerances

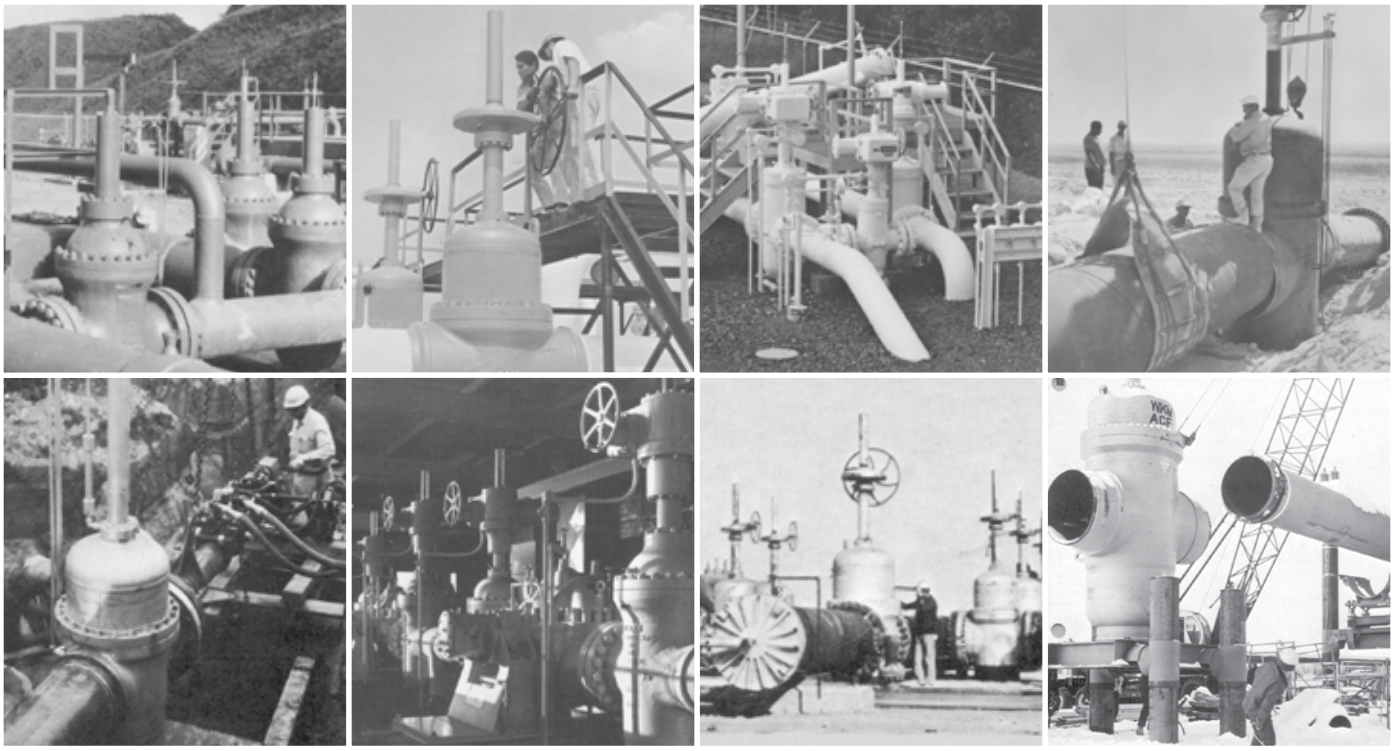
- Cannot get out of adjustment

7. Upgrades

- Stem backseat with test port
- SLS stem seal contained entirely in the bonnet, reducing a potential leak path
- Seat with wave spring to seal on low-pressure air
- Complies to API 6D and B16.34

OPTIONS

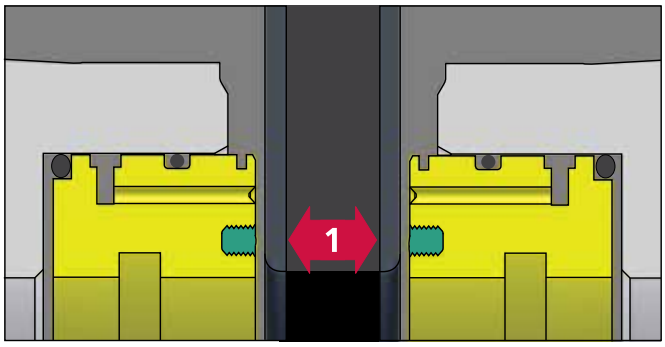
- Position indicator rods standard on handwheel- and bevel gear-operated valves
- Handwheel operators, bevel gear operators, or less gearing (bare stem)
- Saf-T-Gard hydraulic actuators or piston or diaphragm pneumatic actuators for surface safety applications
- Lubrication/packing/drain extensions
- Stem/yoke tube extensions
- Variety of coatings (coal tar epoxy for buried service, two- to three-part coating systems for marine environments, inorganic zinc-rich epoxy, etc.)
- Retrofits available for stem and body fitting extensions on buried service or difficult-to-reach valves, 6" (150 mm) increments
- HF-6 overlay available for gate and seal sealing surfaces



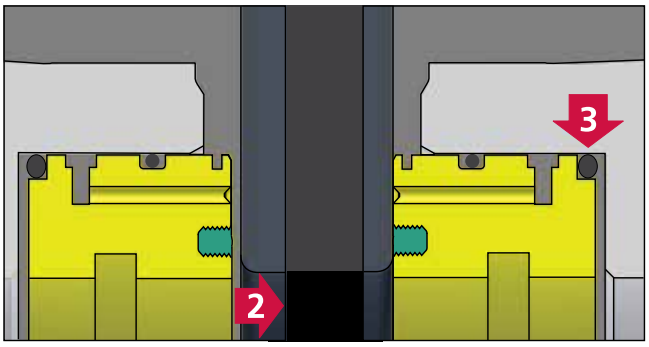
WKM Saf-T-Seal valves have a legacy of solid, innovative solutions around the globe.

C6, C2B and C2C Models

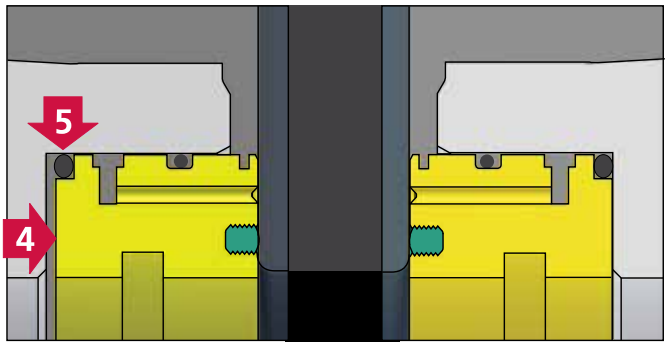
AUTOMATIC RELIEF OF EXCESS BODY PRESSURE



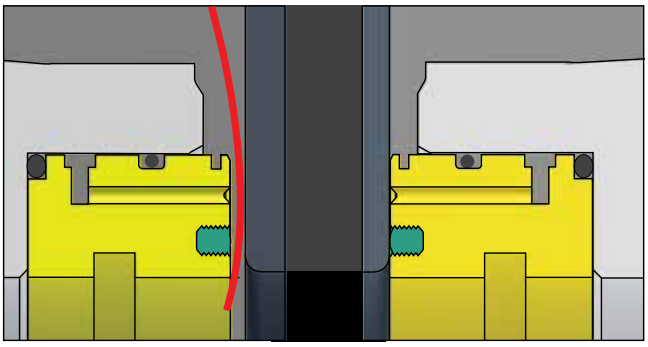
1. When the gate is in the closed position and there is an equal pressure through the valve, an initial seal (1) is formed by the raised plastic ring on the faces of the seats. The seat inserts clean both sides of the gate each time the valve is opened or closed.



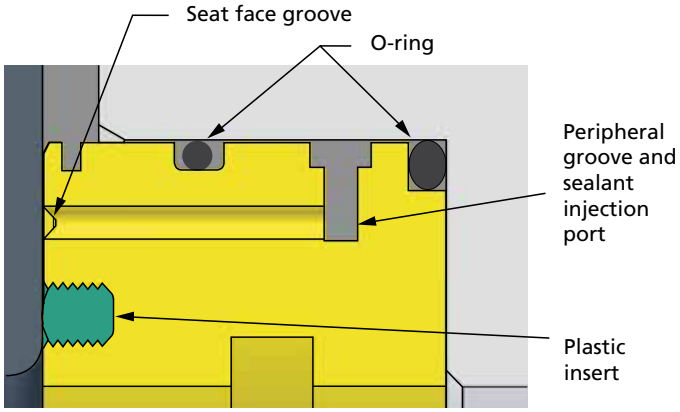
2. As line pressure (2) is applied to the valve, it acts on the gate, forcing it against the plastic ring on the downstream seat and compressing it until the gate rests against the steel seat. Thus, a double seal is formed; first, a plastic-to-metal seal then metal-to-metal. The seal also is forced firmly into its recess. The O-ring (3) prevents any downstream flow around the seat.



3. An upstream seal is provided by the force of line pressure acting against the upstream seat (4), moving the seat against the gate and providing a tight plastic-to-metal seal. At the same time, the O-ring (5) forms a tight seal with the seat recess.



4. The valve automatically relieves itself of excessive body pressure. When body pressure exceeds line pressure, from causes such as thermal expansion, the upstream seat is forced back into its recess and the excess pressure in the body is bled between the seat and the gate into the line.



Emergency Sealant Injection

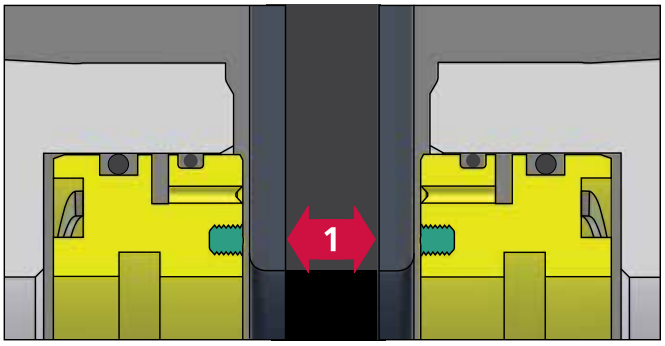
In valves 6" (150 mm) and larger, the sealant can be pumped through body fittings directly into a groove on the face of the seat. In smaller valves, the sealant is injected through fittings into the valve body.

Repacking Under Pressure

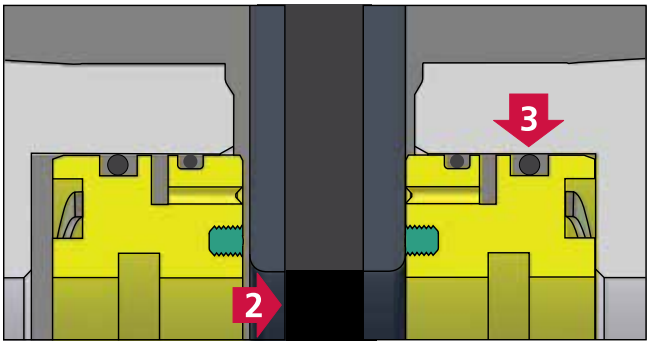
The WKM Saf-T-Seal gate valve is equipped with Cameron's SLS stem packing in an enclosed packing box. Plastic packing is not required. Plastic stem packing can be added while the valve is under pressure in case of an emergency.

C6B Model

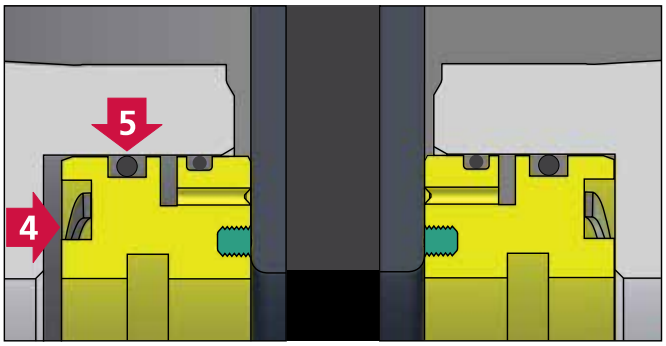
AUTOMATIC RELIEF OF EXCESS BODY PRESSURE



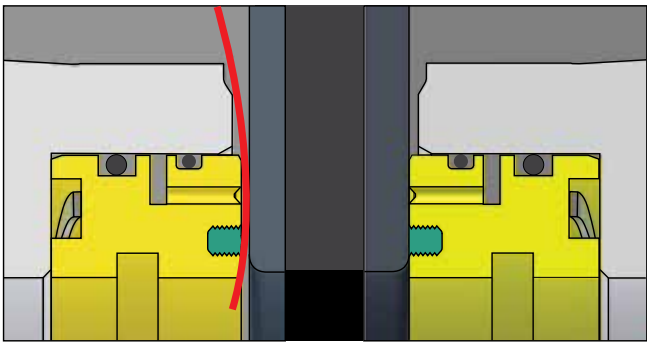
1. When the gate is in the closed position and there is an equal pressure through the valve, an initial seal (1) is formed by the raised plastic ring on the faces of the seats. The seat inserts clean both sides of the gate each time the valve is opened or closed.



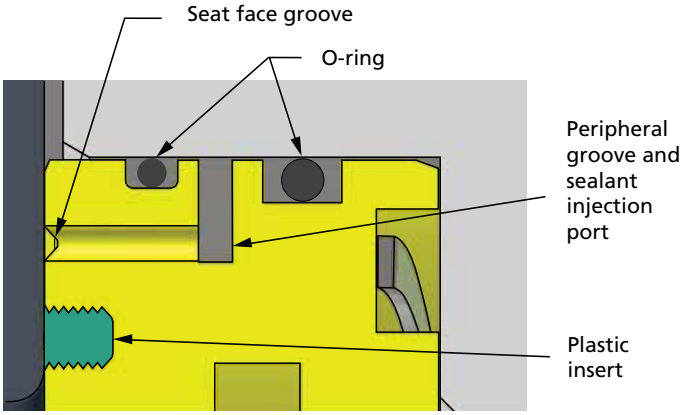
2. As line pressure (2) is applied to the valve, it acts on the gate, forcing it against the plastic ring on the downstream seat and compressing it until the gate rests against the steel seat. Thus, a double seal is formed; first, a plastic-to-metal seal then metal-to-metal. The seal is also forced firmly into its recess. The O-ring (3) prevents any downstream flow around the seat.



3. An upstream seal is provided by the force of line pressure acting against the upstream seat (4), moving the seat against the gate and providing a tight plastic-to-metal seal. At the same time, the O-ring (5) forms a tight seal with the seat recess.



4. The valve automatically relieves itself of excessive body pressure. When body pressure exceeds line pressure from causes such as thermal expansion, the upstream seat is forced back into its recess and the excess pressure in the body is bled between the seat and the gate into the line.



Emergency Sealant Injection

In valves 6" (150 mm) and larger, the sealant can be pumped through body fittings directly into a groove on the face of the seat. In smaller valves, the sealant is injected through fittings into the valve body.

Repacking Under Pressure

The WKM Saf-T-Seal gate valve is equipped with Cameron's SLS stem packing in an enclosed packing box. Plastic packing is not required. Plastic stem packing can be added while the valve is under pressure in case of an emergency.

Single Spring-Loaded (SLS) Seal

FEATURES AND BENEFITS

The SLS stem seal system is designed to provide optimum performance while requiring reduced maintenance. This seal is hydrocarbon fugitive emissions-tested and has demonstrated seal ability up to 500 ppm leakage.

Testing and Certifications

- Fire tests per API 6FA, BS 6755 Part 11
- ISO 10497

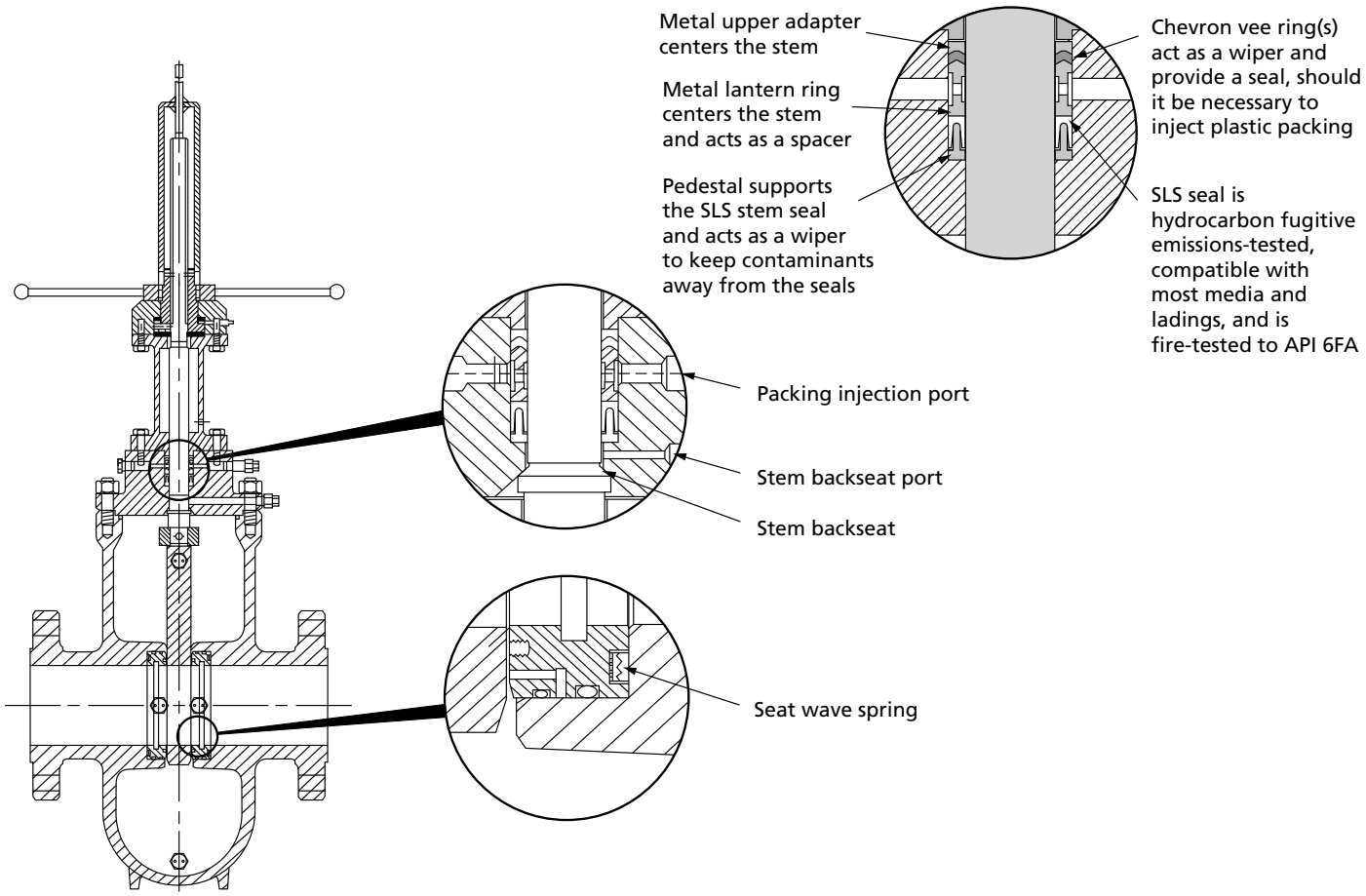
Design

- Single spring-loaded lip seal
- Lantern ring
- Chevron ring(s)
- Lower pedestal
- Upper adapter

Features

- Self-adjusting seal designed to reduce maintenance
- No plastic packing required to establish an effective seal*
- Four separate sealing bands to promote reliability
- Filled PTFE shell backed with a corrosion-resistant alloy spring (making it suitable for virtually all line media)
- Metal spring provides an initial seal and uniform loading over a wide temperature range
- Lantern ring acts as a spacer in conjunction with the upper adapter as a bearing to center the stem
- Lower pedestal support seal acts as a stem scraper to keep contaminants away from sealing members
- Chevron ring(s) act as an emergency seal, should it be necessary to inject plastic packing, and keeps foreign matter away from the seal

Model C6B Details

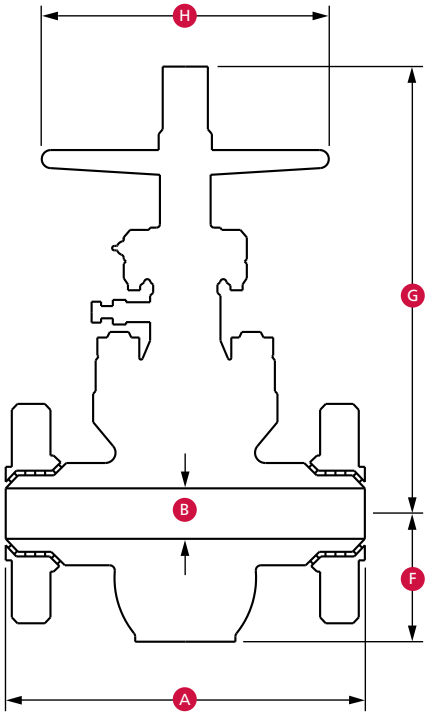


Standard on C6B model. Can be retrofitted or requested for C6, C2B and C2C models.
* Plastic packing can be injected into packing box to affect a temporary seal while the valve is under pressure.

2” to 4” (50 mm to 100 mm) Classes 600, 900 and 1500

MODEL M (HANDWHEEL OPERATED)

Max. WP at 100˚ F (38˚ C)	
Class 600:	1500 psi CWP 2250 psi Test
Class 900:	2250 psi CWP 3375 psi Test
Class 1500:	3750 psi CWP 5625 psi Test



PRINCIPAL DIMENSIONS

N = Number of turns to fully open or close valve
SN = Stem nut
BGO = Bevel gear operator

Class 600

Size in. (mm)	A	B	F	G	* H	N	Weight lb (kg) FE	WE	F x W
2 (50)	11-1/2 (292)	2-1/16 (52)	4-13/16 (122)	17-3/4 (451)	12 (305)	15-3/4	90 (41)	72 (33)	84 (38)
3 (80)	14 (356)	3-3/16 (81)	6-15/16 (176)	24-3/8 (619)	12 (305)	20-1/4	180 (82)	144 (65)	155 (70)
4 (100)	17 (432)	4-1/8 (105)	8-5/8 (219)	29 (737)	14 (356)	19-1/2	345 (156)	259 (117)	245 (111)

Class 900

2 (50)	14-1/2 (368)	2-1/16 (52)	5-1/16 (129)	17-3/4 (451)	12 (305)	15-3/4	150 (68)	72 (33)	105 (48)
3 (80)	15 (381)	3-3/16 (81)	7-5/16 (186)	24-3/8 (619)	12 (305)	20-1/4	265 (120)	193 (88)	247 (112)
4 (100)	18 (457)	4-1/8 (105)	9-1/16 (230)	29 (737)	18 (457)	19-1/2	515 (234)	390 (177)	417 (189)

Class 1500

2 (50)	14-1/2 (368)	2-1/16 (52)	5-1/16 (129)	17-3/4 (451)	12 (305)	15-3/4	220 (100)	150 (68)	154 (70)
3 (80)	18-1/2 (470)	3-3/16 3(81)	7-5/16 (186)	24-3/8 (619)	12 (305)	20-1/4	450 (204)	328 (149)	370 (168)
4 (100)	21-1/2 (546)	4-1/8 (105)	9-1/16 (230)	29 (737)	18 (457)	19-1/2	720 (327)	547 (248)	583 (264)

* Some valves may require a gear operator to meet API 6D.

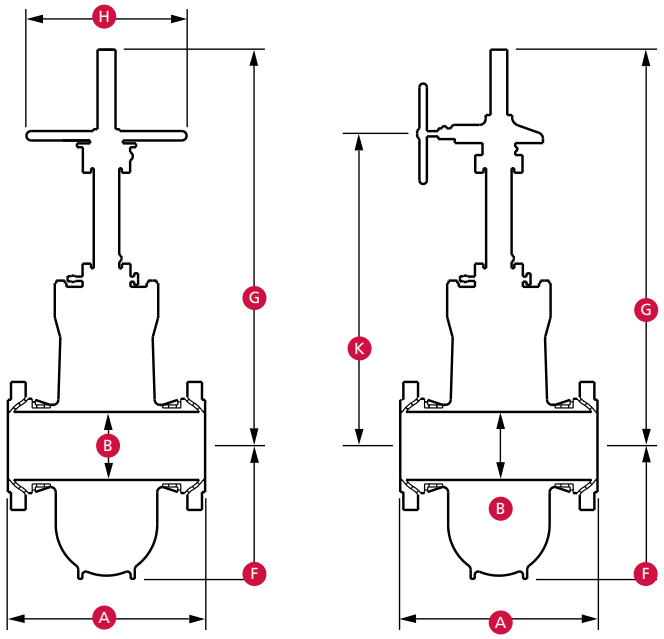
6” to 12” (150 mm to 300 mm) Classes 150, 300, 600 and 900

MODELS C6 AND C6B
(HANDWHEEL AND BEVEL GEAR OPERATED)

Max. WP at 100˚ F (38˚ C)	
Class 150:	290 psi CWP 450 psi Test
Class 300:	750 psi CWP 1125 psi Test
Class 600:	1500 psi CWP 2250 psi Test
Class 900:	2250 psi CWP 3375 psi Test

PRINCIPAL DIMENSIONS

N = Number of turns to fully open or close valve
SN = Stem nut
BGO = Bevel gear operator



Handwheel Operated Bevel Gear Operated

Class 150 (Model C6)

Size in. (mm)	A	B	F	G (HWO)	G (BGO)	* H	K	N (SN)	N (BGO)	Weight lb (kg) FE	WE	WXF
6 (150)	10-1/2 (267)	6 (152)	13-1/2 (343)	45-3/8 (1153)	46-3/8 (1178)	24 (610)	30-3/4 (781)	29	116	245 (111)	215 (98)	230 (104)
8 (200)	11-1/2 (292)	8 (203)	16-1/2 (419)	52-3/8 (1330)	55-3/8 (1407)	24 (610)	35-7/8 (911)	37	148	365 (166)	320 (145)	342 (155)
10 (250)	13 (330)	10 (254)	19-1/2 (495)	59-1/2 (1511)	60-1/2 (1537)	24 (610)	40-7/8 (1038)	45	180	515 (234)	459 (208)	488 (221)
12 (300)	14 (356)	12 (305)	22-3/4 (578)	68-5/8 (1743)	69-5/8 (1768)	24 (610)	46-1/8 (1172)	53	212	677 (307)	594 (269)	635 (288)

Class 300 (Model C6)

6 (150)	15-7/8 (403)	6 (152)	13-1/2 (343)	45-3/8 (1153)	46-3/8 (1178)	24 (610)	30-3/4 (781)	29	116	316 (143)	271 (123)	294 (133)
8 (200)	16-1/2 (419)	8 (203)	16-1/2 (419)	54-3/8 (1381)	55-3/8 (1407)	24 (610)	35-7/8 (911)	37	148	520 (236)	459 (208)	489 (222)
10 (250)	18 (457)	10 (254)	19-1/2 (495)	59-1/2 (1511)	60-1/2 (1537)	24 (610)	40-7/8 (1038)	45	180	773 (351)	695 (315)	731 (332)
12 (300)	19-3/4 (502)	12 (305)	22-5/8 (578)	68-5/8 (1743)	69-5/8 (1768)	24 (610)	46-1/8 (1172)	53	212	1035 (469)	930 (422)	983 (446)

Class 600 (Model C6B)

Size in. (mm)	A	B	F	G (HWO)	G (BGO)	* H	K	N (SN)	N (BGO)	Weight lb (kg) FE	WE	WXF
6 (150)	22 (559)	6 (152)	13-5/8 (346)	45-3/8 (1153)	46-3/8 (1178)	24 (610)	30-3/4 (781)	29	116	600 (272)	439 (199)	650 (295)
8 (200)	26 (660)	8 (203)	16-3/4 (425)	56-3/8 (1432)	57-3/8 (1457)	24 (610)	37-13/16 (960)	37	148	970 (440)	737 (334)	853 (387)
10 (250)	31 (787)	10 (254)	20 (508)	59-1/2 (1511)	61-1/2 (1562)	24 (610)	40-7/8 (1038)	45	180	1736 (787)	1584 (718)	1656 (751)
12 (300)	33 (838)	12 (305)	23-1/4 (591)	68-7/8 (1743)	70-1/2 (1791)	30 (762)	47-1/4 (1200)	53	318	2374 (1077)	2010 (912)	2156 (9143)

Class 900 (Model C6B)

6 (150)	24 (610)	6 (152)	13-7/8 (352)	45-1/8 (1146)	46-1/8 (1222)	24 (610)	30-3/4 (781)	29	116	650 (295)	500 (227)	575 (261)
8 (200)	29 (737)	8 (203)	17-1/8 (435)	56-1/8 (1426)	57-1/8 (1451)	24 (610)	37-13/16 (960)	37	148	1200 (544)	950 (431)	1050 (476)
10 (250)	33 (838)	10 (254)	20-1/2 (521)	59-1/2 (1511)	60-3/4 (1543)	30 (762)	42-1/16 (1068)	45	180	2150 (975)	1830 (830)	1980 (898)
12 (300)	38 (965)	12 (305)	23-3/4 (603)	71-3/4 (1822)	73-1/8 (1857)	30 (762)	48-1/2 (1232)	53	318	3250 (1474)	2500 (1134)	2650 (1202)

Flange dimensions conform to ASME B16.5, 1981. Information on power-actuated and other types of valves available on application.
* Some valves may require a gear operator to meet API 6D.

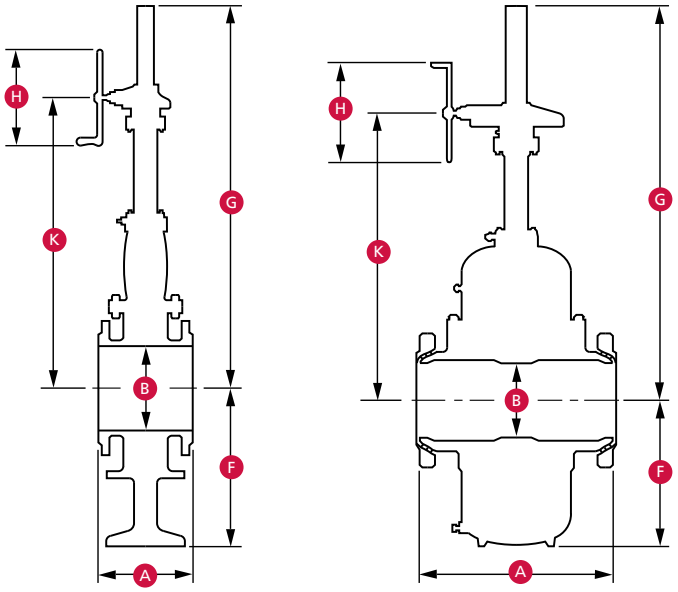
14” to 36” (350 mm to 900 mm) Classes 150 and 300

MODELS C6B AND C2B
(BEVEL GEAR OPERATED)

Max. WP at 100° F (38° C)	
Class 150:	290 psi CWP 450 psi Test
Class 300:	750 psi CWP 1125 psi Test

PRINCIPAL DIMENSIONS

N = Number of turns to fully open or close valve
SN = Stem nut
BGO = Bevel gear operator



150 Class 300 Class

Class 150 (Model C6B)

Size in. (mm)	A	B	F	G	* H	K	N (SN)	N (BGO)	Weight lb (kg) FE	WE	WXF
14 (350)	15 (381)	13-1/4 (337)	25-1/4 (641)	76 (1930)	24 (610)	51-3/4 (1314)	36-3/4	146-7/8	872 (396)	760 (345)	817 (371)
16 (400)	16 (406)	15-1/4 (387)	28-3/8 (721)	82-7/8 (2105)	24 (610)	56-7/8 (1445)	41-3/4	166-7/8	1309 (594)	1163 (528)	1235 (560)
18 (450)	17 (432)	17-1/4 (438)	31-3/8 (797)	90 (2286)	24 (610)	62 (1575)	46-1/16	184-3/8	1781 (808)	1603 (727)	1690 (767)
20 (500)	18 (457)	19-1/4 (489)	34-1/2 (876)	98-1/4 (2496)	24 (610)	67-1/4 (1708)	41-1/2	166	2351 (1066)	2119 (961)	2235 (1014)
24 (600)	20 (508)	23-1/4 (591)	41-1/8 (1045)	113 (2870)	24 (610)	78 (1981)	50-1/4	301-1/2	2892 (1312)	2514 (1140)	2703 (1226)
26 (650)	22 (559)	25 (635)	43-13/16 (1113)	120-1/4 (3054)	24 (610)	84-5/8 (2149)	-	-	3521 (1597)	3172 (1439)	3327 (1509)
28 (700)	24 (610)	27 (686)	46-7/8 (1191)	127-1/4 (3232)	24 (610)	90-1/8 (2289)	57-7/8	347-1/4	4098 (1859)	3506 (1590)	3802 (1725)
30 (750)	26 (660)	29 (737)	50 (1270)	136-1/4 (3461)	24 (610)	95-1/2 (2426)	62-1/2	500	4916 (2230)	4231 (1919)	4573 (2074)
36 (900)	32 (813)	34-1/2 (876)	59 (1499)	157 (3988)	36 (914)	113-3/8 (2880)	46-1/8	368-3/4	5842 (2650)	5264 (2388)	5521 (2504)

Flange dimensions on valves through 24” (600 mm) conform to American National Standards Institute Standard 816.5, 1974.
Larger sizes conform to MSS-SP-44.

Class 300 (Model C2B)

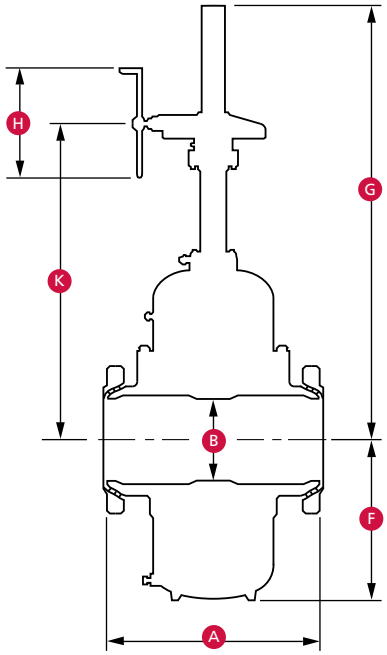
14 (350)	30 (762)	13-1/4 (337)	25-1/2 (648)	75-5/8 (1921)	24 (610)	49-1/2 (1257)	29-3/8	117-1/2	1454 (660)	1266 (574)	1361 (617)
16 (400)	33 (838)	15-1/4 (387)	28-1/8 (714)	80-5/8 (2048)	24 (610)	54-1/2 (1384)	41-3/4	166-7/8	2182 (990)	1939 (880)	2058 (933)
18 (450)	36 (914)	17-1/4 (438)	31 (787)	88 (2235)	24 (610)	60-3/4 (1543)	37-3/8	224-1/4	2969 (1347)	2672 (1212)	2816 (1277)
20 (500)	39 (991)	19-1/4 (489)	34-1/2 (876)	97-3/4 (2483)	24 (610)	67 (1702)	41-1/2	249	3919 (1778)	3532 (1602)	3725 (1690)
24 (600)	45 (1143)	23-1/4 (591)	41-1/8 (1045)	114-1/8 (2899)	24 (610)	78-3/4 (2000)	50-1/4	402	5868 (2662)	5287 (2398)	5545 (2515)
26 (650)	49 (1245)	25 (635)	43-3/4 (1111)	120-1/4 (3054)	24 (610)	83-1/4 (2115)	-	-	6830 (3098)	5844 (2651)	6337 (2874)
28 (700)	53 (1346)	27 (686)	47 (1194)	129-3/4 (3296)	24 (610)	90-1/4 (2292)	-	-	8194 (3717)	7051 (3198)	7623 (3458)
30 (750)	55 (1397)	29 (737)	50-5/8 (1286)	139-1/8 (3534)	36 (914)	96-3/4 (2457)	39-1/16	312-1/2	9736 (4416)	8773 (3979)	9201 (4174)
36 (900)	68 (1727)	34-1/2 (876)	59-1/4 (1505)	161 (4089)	36 (914)	112-3/4 (2864)	46-1/8	368-3/4	15,441 (7004)	13,607 (6172)	14,524 (6588)

Flange dimensions conform to ASME B16.5, 1981.
Information on power-actuated and other types of valves available on application.
* Some valves may require a gear operator to meet API 6D.

14” to 36” (350 mm to 900 mm) Classes 600 and 900

MODELS C6 AND C6B
(HANDWHEEL AND BEVEL GEAR OPERATED)

Max. WP at 100˚ F (38˚ C)	
Class 600:	1500 psi CWP 2250 psi Test
Class 900:	2250 psi CWP 3375 psi Test



PRINCIPAL DIMENSIONS

N = Number of turns to fully open or close valve
SN = Stem nut
BGO = Bevel gear operator

Class 600 (Model C6B)

Size in. (mm)	A	B	F	G	* H	K	N (SN)	N (BGO)	Weight lb (kg) FE	WE	WXF
14 (350)	35 (889)	13-1/4 (337)	26 (660)	75-3/8 (1915)	24 (610)	51-1/2 (1308)	29-3/8	176-1/4	3232 (1466)	2828 (1283)	3030 (1374)
16 (400)	39 (991)	15-1/4 (387)	29-1/8 (740)	83-1/2 (2121)	24 (610)	56-3/4 (1441)	33-3/8	200-1/4	4023 (1825)	3515 (1594)	3767 (1709)
18 (450)	43 (1092)	17-1/4 (438)	32-3/8 (822)	91-1/2 (2324)	24 (610)	62-1/2 (1588)	37-3/8	224-1/4	5617 (2548)	4110 (1864)	5252 (2382)
20 (500)	47 (1194)	19-1/4 (489)	35-7/8 (911)	100-1/2 (2553)	24 (610)	69-3/8 (1762)	26	208	6984 (3168)	6070 (2753)	6449 (2925)
24 (600)	55 (1397)	23-1/4 (591)	42-1/4 (1073)	118 (2997)	36 (914)	83 (2108)	31-3/8	251-1/4	11,447 (5192)	10,014 (4542)	10,730 (4867)
26 (650)	57 (1448)	25 (635)	46 (1168)	124-5/8 (3165)	36 (914)	87-1/2 (2223)	33-9/16	268-3/4	13,124 (5953)	11,494 (5214)	10,024 (4547)
28 (700)	61 (1549)	27 (686)	49-1/4 (1251)	134 (3404)	36 (914)	93-1/2 (2375)	36-3/16	434	14,293 (6483)	12,232 (5548)	12,624 (5726)
30 (750)	65 (1651)	29 (737)	52-3/4 (1340)	142-3/4 (3626)	36 (914)	100-1/2 (2553)	39-1/16	468-3/4	14,457 (6558)	12,724 (5772)	13,591 (6165)
36 (900)	82 (2083)	34-1/2 (876)	61-3/4 (1568)	171-1/4 (4350)	36 (914)	117-1/2 (2985)	46-1/8	553-1/8	26,377 (11964)	23,967 (10871)	25,172 (11418)

Class 900 (Model C2C)

14 (350)	40-1/2 (1029)	12-3/4 (324)	25-9/16 (649)	79-5/8 (2022)	24 (610)	55-13/16 (1418)	20-7/8	166-7/8	- -	- -	- -
16 (400)	44-1/2 (1130)	15-1/4 (387)	30-7/16 (773)	87-3/8 (2219)	24 (610)	60-3/16 (1529)	20-7/8	166-7/8	- -	- -	- -
18 (450)	48 (1219)	17-1/4 (438)	33-7/8 (860)	56-15/16 (1446)	24 (610)	64-11/16 (1643)	23-3/8	187	- -	- -	- -
20 (500)	52 (1321)	19-1/4 (489)	37-1/4 (946)	103-3/8 (2626)	36 (914)	71-1/8 (1807)	26	208	- -	- -	- -
24 (600)	61 (1549)	23-1/4 (591)	46-1/4 (1175)	123-1/8 (3127)	36 (914)	86-3/8 (2194)	-	-	- -	- -	- -

Flange dimensions conform to ASME B16.5, 1981.
Information on power-actuated and other types of valves available on application.

WKM Saf-T-Gard Actuators

Electric and Pneumatic

Cameron's WKM Saf-T-Seal™ gate valves can be equipped with two principal types of actuators: electric actuators and pneumatic or gas-powered motor drives.

Information Required for Sizing Electric Actuators

- Valve type: Saf-T-Seal
- Size: pipe size x bore size
- Pressure class
- Top-mounted or side-mounted
- Closing time in seconds
- Maximum differential pressure (psi)
- Type and make of actuator required
- Voltage:
  - Three-phase, 60-cycle 220 V/440 V
  - Three-phase, 50-cycle 220 V/440 V
  - Control voltage
  - Motor connection voltage
  - Any special requirements
- Enclosure:
  - Weather-proof
  - Explosion-proof, Class 1, Group D, Div. 2
  - ATEX
  - Certification required
- Accessories:
  - Reversing starter
  - Control transformer
  - Push-button station:
    - Three push buttons
  - Two lights
  - Limit switches:
    - Two train-geared limit switches (eight contacts)
    - Four train-geared limit switches (16 contacts)
- Special requirements

Information Required for Sizing Pneumatic Actuators

- Valve type: Saf-T-Seal
- Size: pipe size x bore size
- Pressure class
- Actual working pressure at which valve will be operated (psi)
- Available gas pressure to power motor drive: psi
- Top-mounted or side-mounted
- Closing time in seconds
- Maximum differential pressure (psi)
- Type and make of actuator required
- Accessories
- Special requirements

PNEUMATIC DIAPHRAGM ACTUATOR

MA 12 Series

For use with 2", 3" and 4" (50 mm, 80 mm and 100 mm) nominal gate valves (Family Group Code Y55012).

Design Advantages

Stronger Actuator Mounting Arrangement

Unlike other designs, the mounting bolts on Cameron's actuators are positioned parallel to the centerline of the actuator, which loads the mounting bolts in tension. This design is not subject to bending or shear forces. This means it can withstand greater separation forces than other actuators on the market.

Corrosion-Resistant Materials

Cameron's Saf-T-Gard diaphragm actuators are manufactured to NACE MR0175. In addition, all non-stainless components are coated with Xylan to increase corrosion resistance.

Superior Diaphragm Design

Cameron's diaphragm material is stronger than most designs currently on the market, resulting in extended service life and higher operating pressures. Unique sealing grooves provide additional grip and improve the outer seal of the diaphragm housing.

Flexible Actuator Orientation

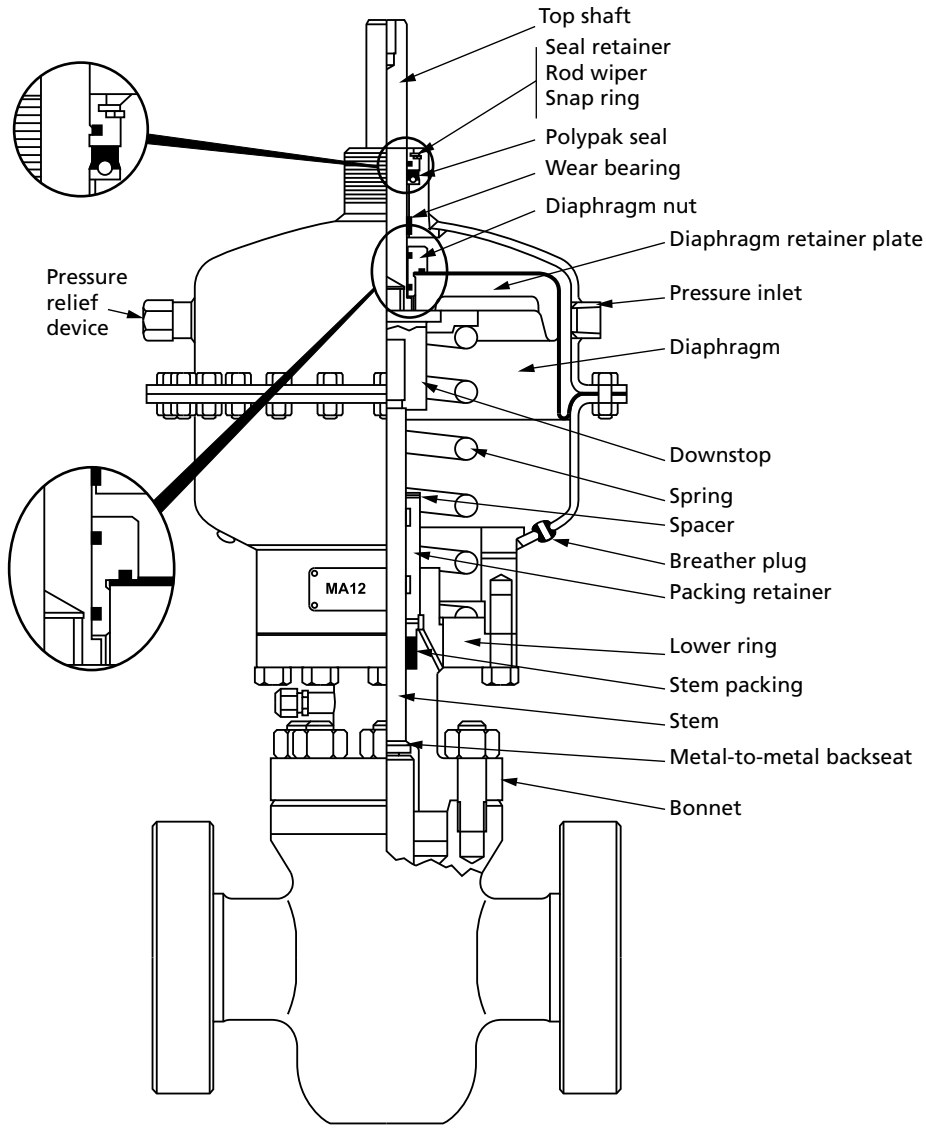
Connecting misaligned components with rigid tubing can be time-consuming and can induce high stress into the tubing connections. The MA lower ring is threaded to the bonnet, thus allowing rotation of the actuator to accommodate precise alignment.

Description

Cameron's Saf-T-Gard diaphragm actuator was developed by using the quality features of field proven products and then combining them with innovative technology. Particular attention has been given to safety, ease of maintenance and cost of manufacturing.

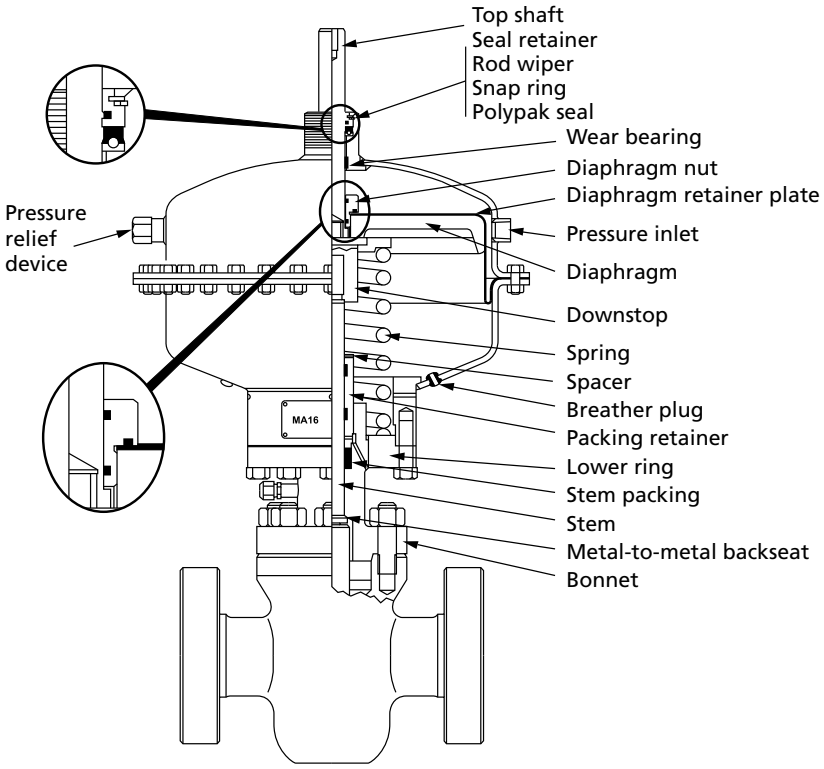
Designed for use with all manufacturers' gate valves in nominal sizes of 2" to 6" (50 mm to 150 mm), its simple design and operating principle helps to avoid most of the problems commonly associated with piston type actuators such as galling, misalignment, distortion and O-ring failures.

The Saf-T-Gard diaphragm actuators are interchangeable with other models in the product line, which reduces the amount of spare parts necessary for maintenance.



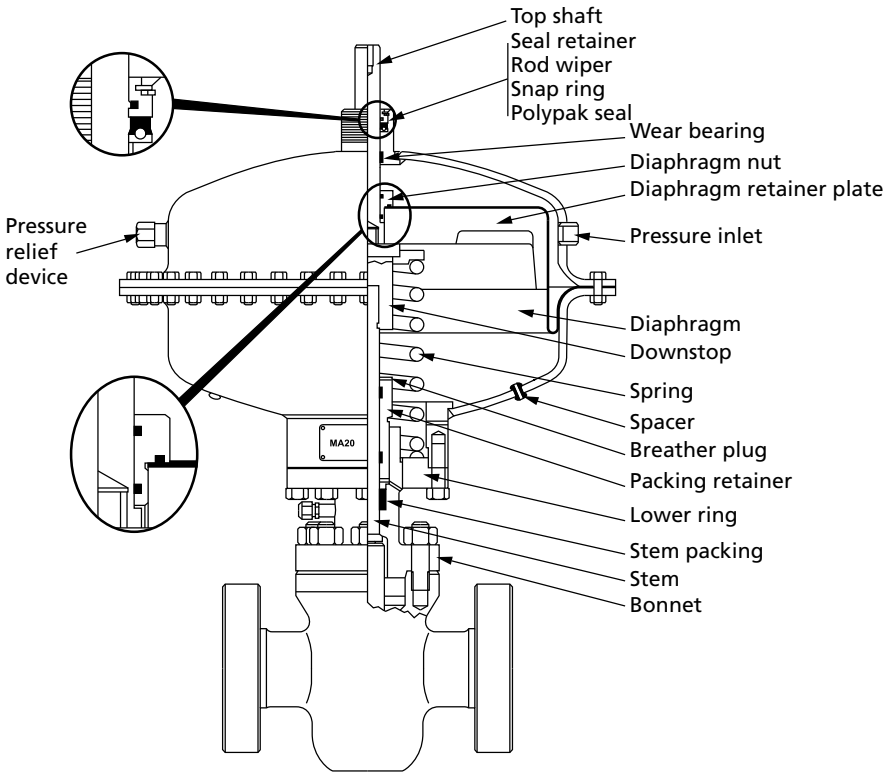
MA 16 Series

For use with 2“, 3“, 4“ and 5“ (50 mm, 80 mm, 100 mm and 125 mm) nominal gate valves (Family Group Code Y55016).



MA 20 Series

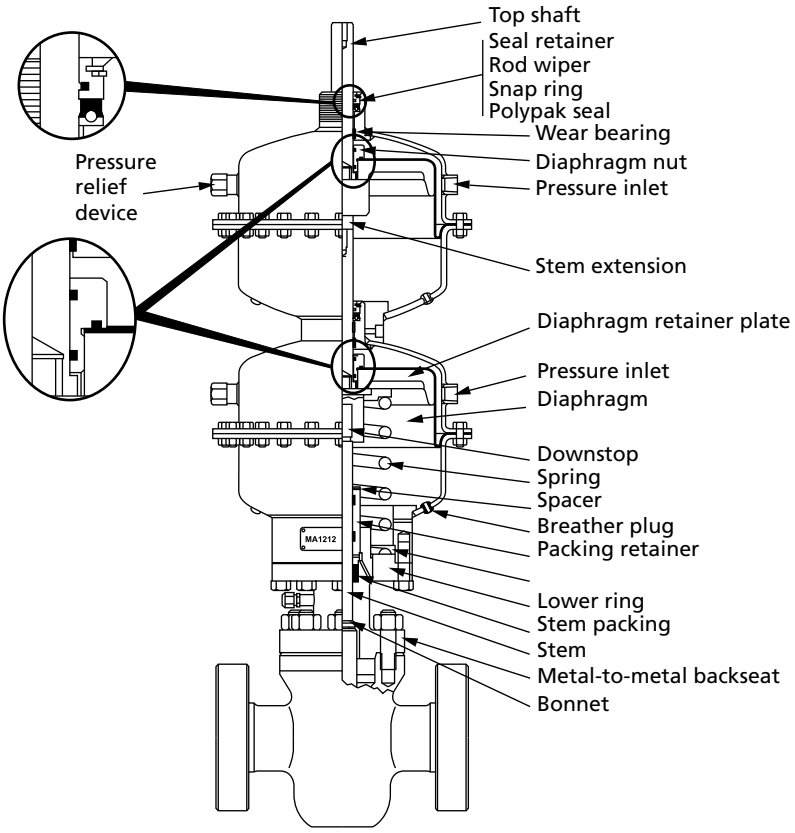
For use with 2“, 3“, 4“, 5“ and 6“ (50 mm, 80 mm, 100 mm, 125 mm and 150 mm) nominal gate valves (Family Group Code Y55020).



MA 1212 Series

For use with 2”, 3” and 4” (50 mm, 80 mm and 100 mm) nominal gate valves (Family Group Code Y55012).

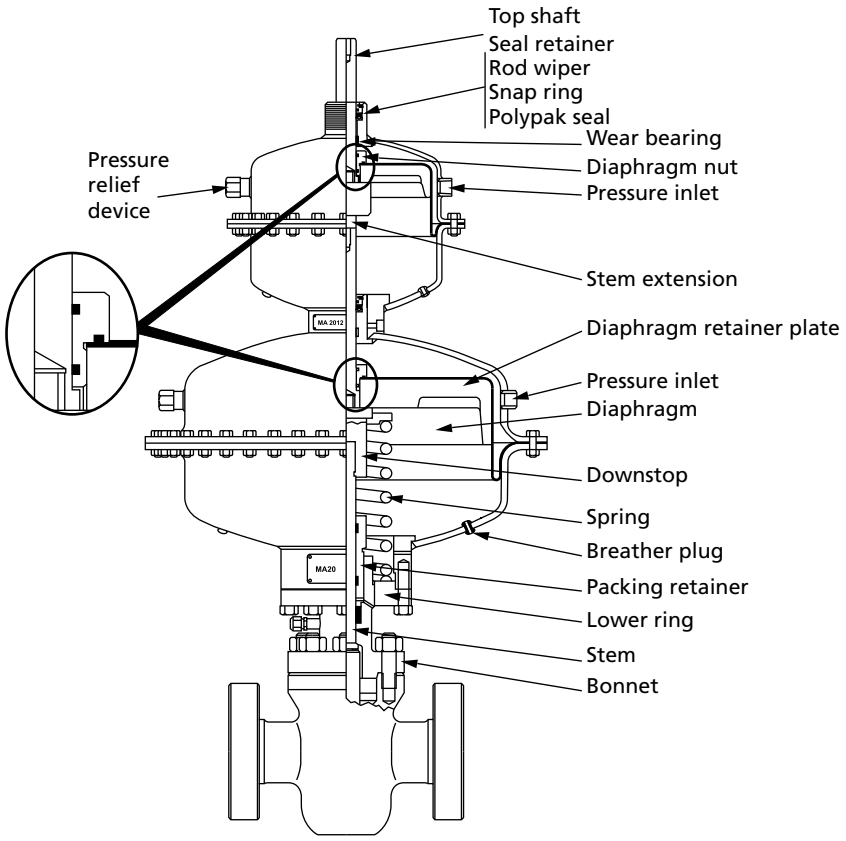
The MA 1212 series doubles the area affected by applied control pressure.



MA 2012 Series

For use with 2”, 3” and 4” (50 mm, 80 mm and 100 mm) nominal gate valves (Family Group Code Y55020).

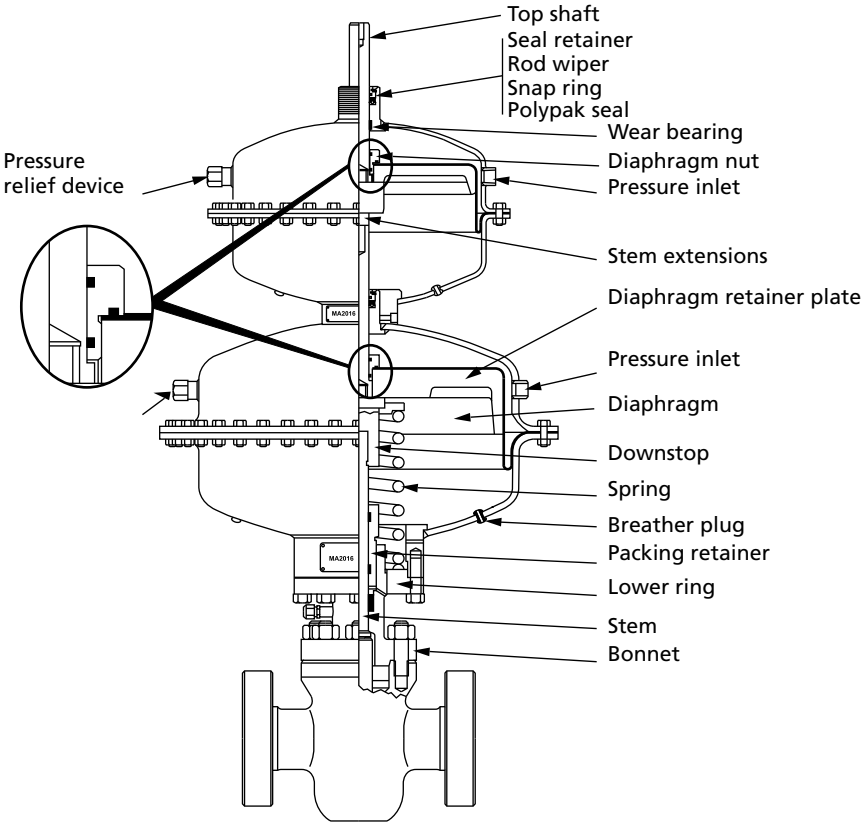
The MA 2012 series increases the area affected by applied control pressure.



MA 2016 Series

For use with 2”, 3”, 4” and 6” (50 mm, 80 mm, 100 mm and 150 mm) nominal gate valves (Family Group Code Y55020).

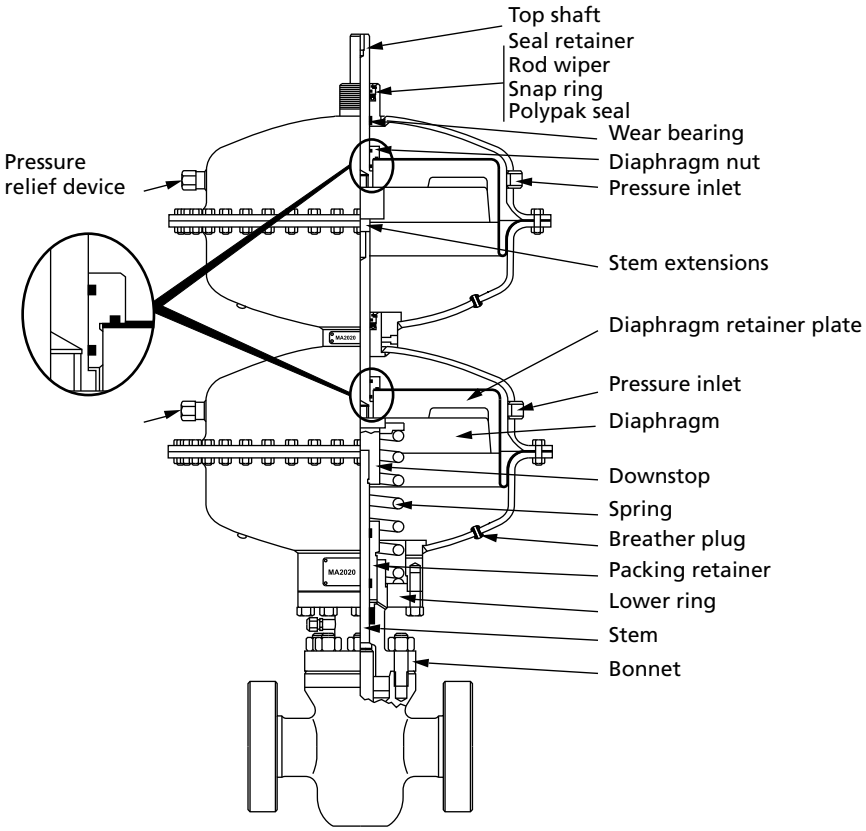
The MA 2016 series increases the area affected by applied control pressure.



MA 2020 Series

For use with 2”, 3”, 4”, 5”, 6” and 8” (50 mm, 80 mm, 100 mm, 125 mm, 150 mm and 200 mm) nominal gate valves (Family Group Code Y55020).

The MA 2020 series increases the area affected by applied control pressure.



PNEUMATIC PISTON ACTUATOR

MP 13 Series

For use with 2", 3" and 4" (50 mm, 80 mm and 100 mm) nominal gate valves (Family Group Code Y55013).

Description

Cameron's pneumatic piston actuator series is designed for use with all manufacturers' gate valves in nominal sizes of 2" to 4" (50 mm to 100 mm). Its remarkably simple design and operating principle make this piston actuator suitable for a variety of applications. Cameron's piston actuators are interchangeable and very versatile because they operate with many types of supply gas, compressed air, nitrogen or well gas.

Design Advantages

Stronger Actuator Mounting Arrangement

Unlike other designs, the mounting bolts on Cameron's actuators are positioned parallel to the centerline of the actuator, which loads the mounting bolts in tension. This design is not subject to bending and shear forces. This means it can withstand greater separation forces than other actuators on the market.

Corrosion-Resistant Materials

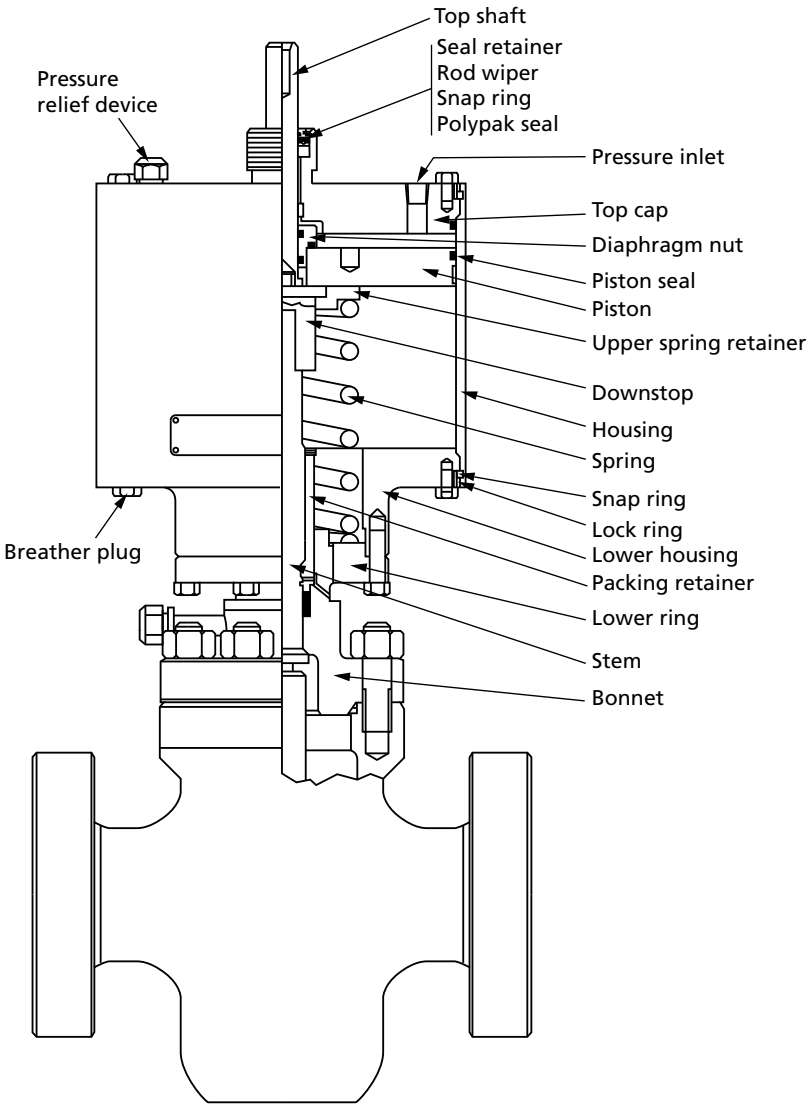
Cameron's piston actuators are manufactured to NACE MR0175. In addition, all non-stainless components are coated with Xylan to increase corrosion resistance.

Superior Diaphragm Design

Cameron's piston actuators utilize a single-piece stainless steel snap ring to facilitate easy cylinder removal. The dynamic piston has a large wear bearing that reduces any internal metal-to-metal contact.

Flexible Actuator Orientation

Connecting misaligned components with rigid tubing can be time-consuming and can induce high stress into the tubing connections. The MA lower ring is threaded to the bonnet, thus allowing rotation of the actuator to accommodate precise alignment.



OPERATING SIZE REQUIREMENTS

Model M – 2" to 4" (50 mm to 100 mm) ASME Classes 150 to 1500

Valve Size in. (mm)	ASME Class	ASME Working Pressure (psig)	Stem Thread			Recommended Operating Thrust (lbf)	Recommended Operating Torque (ft-lbf)	Block-and-Bleed Thrust (lbf)	Block-and-Bleed Torque (ft-lbf)	Maximum Allowable Thrust (lbf)	Maximum Allowable Torque (ft-lbf)	Total Stem Travel in. (mm)	Stem Nut Turns-to-Open Valve
			Size in.	Pitch in.	Lead in.								
2 (50)	150	290	0.875	0.167	0.167	457	3	535	4	12,597	93	2.63 (67)	15.8
2 (50)	300	750	0.875	0.167	0.167	1183	9	1383	10	12,597	93	2.63 (67)	15.8
2 (50)	600	1500	0.875	0.167	0.167	2366	17	2766	20	12,597	93	2.63 (67)	15.8
2 (50)	900	2250	0.875	0.167	0.167	3549	26	4149	30	12,597	93	2.63 (67)	15.8
2 (50)	1500	3750	0.875	0.167	0.167	5914	43	6915	51	12,597	93	2.63 (67)	15.8
3 (80)	150	290	1.000	0.200	0.200	803	7	1115	9	16,027	136	4.03 (102)	20.2
3 (80)	300	750	1.000	0.200	0.200	2078	18	2884	25	16,027	136	4.03 (102)	20.2
3 (80)	600	1500	1.000	0.200	0.200	4155	35	5769	49	16,027	136	4.03 (102)	20.2
3 (80)	900	2250	1.000	0.200	0.200	6233	53	8653	74	16,027	136	4.03 (102)	20.2
3 (80)	1500	3750	1.000	0.200	0.200	10,388	88	14,422	123	16,027	136	4.03 (102)	20.2
4 (100)	150	290	1.250	0.250	0.250	1327	14	1783	19	25,442	271	4.88 (124)	19.5
4 (100)	300	750	1.250	0.250	0.250	3432	37	4610	49	25,442	271	4.88 (124)	19.5
4 (100)	600	1500	1.250	0.250	0.250	6864	73	9221	98	25,442	271	4.88 (124)	19.5
4 (100)	900	2250	1.250	0.250	0.250	10,297	110	13,831	147	25,442	271	4.88 (124)	19.5
4 (100)	1500	3750	1.250	0.250	0.250	17,161	183	23,052	245	25,442	271	4.88 (124)	19.5

Model C6B – 6" to 12" (150 mm to 300 mm) ASME Classes 600 to 900

Valve Size in. (mm)	ASME Class	ASME Working Pressure (psig)	Stem Thread			Recommended Operating Thrust (lbf)	Recommended Operating Torque (ft-lbf)	Block-and-Bleed Thrust (lbf)	Block-and-Bleed Torque (ft-lbf)	Maximum Allowable Thrust (lbf)	Maximum Allowable Torque (ft-lbf)	Total Stem Travel in. (mm)	Stem Nut Turns-to-Open Valve
			Size in.	Pitch in.	Lead in.								
6 (150)	600	1500	1.250	0.250	0.250	9839	105	14,307	152	26,783	283	7.25 (184)	29
6 (150)	900	2250	1.250	0.250	0.250	14,758	157	21,460	228	27,685	335	7.25 (184)	29
8 (200)	600	1500	1.750	0.250	0.250	17,099	237	21,507	298	45,807	557	9.25 (235)	37
8 (200)	900	2250	1.750	0.250	0.250	25,649	355	32,261	447	49,637	604	9.25 (235)	37
10 (250)	600	1500	1.750	0.250	0.250	23,859	330	29,078	403	46,726	569	11.25 (286)	45
10 (250)	900	2250	1.750	0.250	0.250	35,789	495	43,617	604	57,297	697	11.25 (286)	45
12 (300)	600	1500	1.750	0.250	0.250	32,032	443	41,381	573	69,033	840	13.31 (338)	53
12 (300)	900	2250	2.000	0.250	0.250	49,816	770	62,072	959	80,522	1109	13.31 (338)	53
14 (350)	150	290	1.500	1.390	0.400	7149	104	16,674	242	9053	131	14.75 (375)	36.875
14 (350)	600	1500	2.000	1.864	0.500	39,183	741	64,831	1226	46,824	886	14.75 (375)	29.50
16 (400)	150	290	1.500	1.390	0.400	9177	133	27,543	399	11,448	166	16.75 (425)	41.875
16 (400)	600	1500	2.000	1.864	0.500	49,676	940	69,091	1307	59,215	1120	16.75 (425)	33.50
18 (450)	150	290	1.500	1.390	0.400	11,594	168	22,596	327	13,960	202	18.50 (470)	46.25
18 (450)	600	1500	2.250	2.113	0.500	63,501	1303	98,175	2014	72,208	1481	18.75 (470)	37.50
20 (500)	150	290	1.750	1.614	0.500	14,380	249	31,621	548	17,230	298	20.75 (527)	41.50
20 (500)	600	1500	2.750	2.536	0.500	79,986	1858	145,272	3375	89,122	2070	20.75 (527)	41.50
24 (600)	150	290	2.000	1.864	0.500	20,606	390	21,390	405	26,347	498	25.125 (638)	50.25
24 (600)	600	1500	3.250	3.036	0.800	114,674	3510	219,495	6718	136, 279	4171	25.00 (635)	31.25

Note:
1. Recommended operating thrust and torque are the loads required to open or close the valve with full differential pressure across the gate. The operator should be sized for these values.
2. Maximum allowable thrust and torque values are maximum allowable loads of the valve.
3. When block-and-bleed or double block-and-bleed service is specified, operators should be sized for these values.
4. Unless otherwise stated, handwheel rim pull for manual and motor operators shall not exceed 120 lb (54 kg).
5. All torque and thrust values are based on maximum working pressure at ambient temperature.

Models C6, C2B, C2C – 6" to 36" (150 mm to 900 mm) ASME Classes 150 to 900

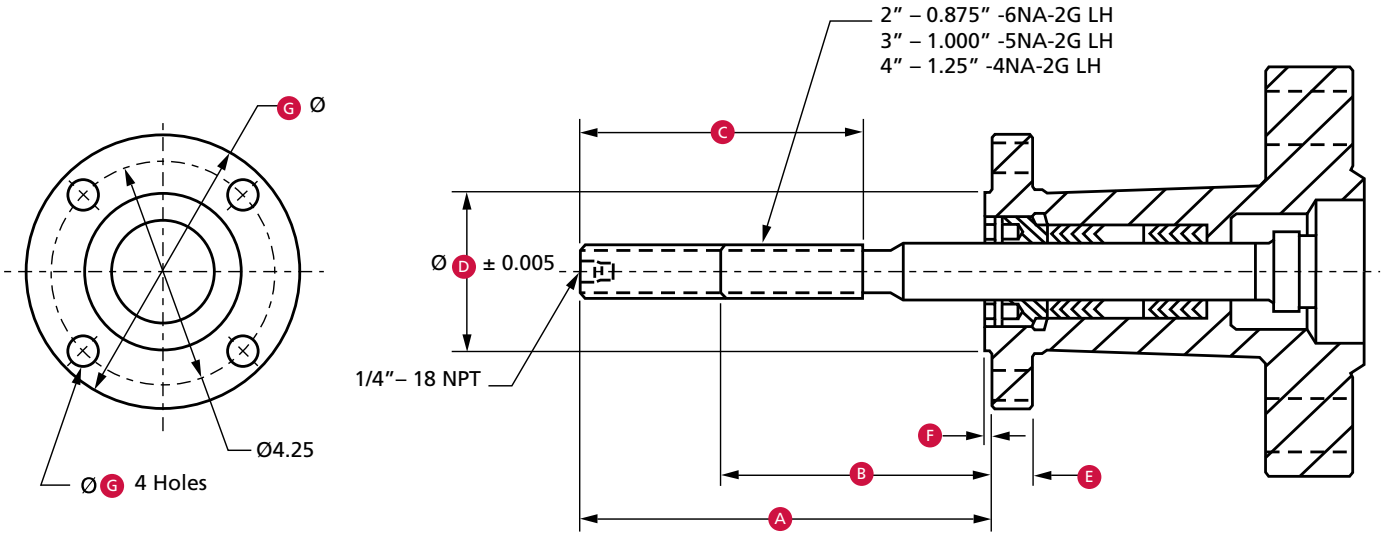
Valve Size in. (mm)	ASME Class	ASME Working Pressure (psig)	Stem Thread			Recommended Operating Thrust (lbf)	Recommended Operating Torque (ft-lbf)	Maximum Allowable Thrust (lbf)	Maximum Allowable Torque (ft-lbf)	Block-and-Bleed Thrust (lbf)	Block-and-Bleed Torque (ft-lbf)	Total Stem Travel in. (mm)	Stem Nut Turns-to-Open Valve
			Size in.	Pitch in.	Lead in.								
6 (150)	150	290	1.250	0.250	0.250	1902	18	31,785	307	2762	27	7.25 (184)	29
6 (150)	300	750	1.250	0.250	0.250	4919	47	31,785	307	7143	69	7.25 (184)	29
6 (150)	600	1500	1.250	0.250	0.250	9836	95	31,785	307	14,285	138	7.25 (184)	29
6 (150)	900	2250	1.250	0.250	0.250	14,757	142	31,785	307	21,428	207	7.25 (184)	29
8 (200)	150	290	1.500	0.250	0.250	3106	34	52,036	574	4153	46	9.25 (235)	37
8 (200)	300	750	1.500	0.250	0.250	8033	89	52,036	574	10,740	119	9.25 (235)	37
8 (200)	600	1500	1.500	0.250	0.250	16,067	177	52,036	574	21,481	237	9.25 (235)	37
8 (200)	900	2250	1.500	0.250	0.250	24,100	266	52,036	574	32,221	356	9.25 (235)	37
10 (250)	150	290	1.500	0.250	0.250	4413	49	52,036	574	5817	64	11.25 (286)	45
10 (250)	300	750	1.500	0.250	0.250	11,413	126	52,036	574	15,045	168	11.25 (286)	45
10 (250)	600	1500	1.500	0.250	0.250	22,828	252	52,036	574	30,090	332	11.25 (286)	45
10 (250)	900	2250	1.500	0.250	0.250	34,239	378	52,036	574	45,135	498	11.25 (286)	45
12 (300)	150	290	1.500	0.250	0.250	5993	66	52,036	574	7755	86	13.25 (337)	53
12 (300)	300	750	1.500	0.250	0.250	15,500	171	52,036	574	20,056	221	13.25 (337)	53
12 (300)	600	1500	1.500	0.250	0.250	30,999	342	52,036	574	40,113	443	13.25 (337)	53
12 (300)	900	2250	1.750	0.250	0.250	48,045	597	77,223	960	60,169	748	13.25 (337)	53
14 (350)	150	290	1.500	0.200	0.400	7149	95	54,521	722	9063	120	14.69 (373)	36.73
14 (350)	300	750	2.000	0.250	0.500	19,594	338	101,611	1754	23,439	405	14.69 (373)	29.38
14 (350)	600	1500	2.000	0.250	0.500	39,187	676	101,611	1754	46,878	809	14.69 (373)	29.38
14 (350)	900	2250	2.250	0.250	0.500	60,540	1129	135,875	2533	70,547	1315	14.69 (373)	29.38
16 (400)	150	290	1.500	0.200	0.400	9178	122	54,521	722	11,439	152	16.69 (424)	41.73
16 (400)	300	750	1.500	0.200	0.400	23,735	314	54,521	722	29,584	392	16.69 (424)	41.73
16 (400)	600	1500	2.000	0.250	0.500	49,680	857	101,611	1754	59,168	1021	16.69 (424)	33.38
16 (400)	900	2250	2.750	0.400	0.800	81,146	2040	180,794	4546	88,752	2232	16.69 (424)	20.86
18 (450)	150	290	1.500	0.200	0.400	11,594	154	54,521	722	13,974	185	18.44 (468)	46.10
18 (450)	300	750	1.750	0.250	0.500	30,500	484	72,304	1148	36,139	574	18.69 (475)	37.38
18 (450)	600	1500	2.250	0.250	0.500	63,504	1184	135,875	2533	72,278	1347	18.69 (475)	37.38
18 (450)	900	2250	2.750	0.400	0.800	99,884	2512	180,794	4546	108,418	2726	18.69 (475)	23.36
20 (500)	150	290	1.750	0.250	0.500	14,381	228	72,304	1148	17,245	274	20.75 (527)	41.50
20 (500)	300	750	2.000	0.250	0.500	37,782	652	101,611	1754	44,600	770	20.75 (527)	41.50
20 (500)	600	1500	2.750	0.400	0.800	79,982	2011	180,794	4546	89,200	2243	20.75 (527)	25.94
20 (500)	900	2250	3.000	0.400	0.800	122,624	3252	225,696	5986	133,801	3549	20.75 (527)	25.94
22 (550)	150	290	1.750	0.250	0.500	17,243	274	72,304	1148	21,470	341	22.94 (583)	45.88
22 (550)	300	750	2.250	0.250	0.500	45,845	855	135,875	2533	55,526	1035	22.94 (583)	45.88
22 (550)	600	1500	3.000	0.400	0.800	96,549	2561	225,696	5986	111,051	2945	22.94 (583)	28.68
24 (600)	150	290	2.000	0.250	0.500	20,605	356	101,611	1754	26,366	455	25.13 (638)	50.26
24 (600)	300	750	2.250	0.250	0.500	53,952	1006	135,875	2533	68,188	1271	25.13 (638)	50.26
24 (600)	600	1500	3.250	0.400	0.800	114,677	3200	275,560	7689	138,375	3806	25.13 (638)	31.41
24 (600)	900	2250	3.750	0.400	0.800	178,422	5474	390,393	11,977	204,563	6276	25.13 (638)	31.41
30 (750)	150	290	2.250	0.250	0.500	31,396	585	135,875	2533	42,018	783	31.25 (794)	62.50
30 (750)	300	750	3.000	0.400	0.800	83,626	2218	225,698	5986	108,866	2882	31.25 (794)	39.06
30 (750)	600	1500	3.750	0.400	0.800	173,437	5321	390,393	11,877	217,333	6668	31.25 (794)	39.06
36 (900)	150	290	2.750	0.400	0.800	44,184	1111	180,794	4546	57,303	1441	36.88 (937)	46.10
36 (900)	300	750	3.250	0.400	0.800	116,110	3240	275,560	7889	148,199	4135	36.88 (937)	46.10
36 (900)	600	1500	4.250	0.400	0.800	241,350	8075	525,088	17,568	296,397	9317	36.88 (937)	46.10

Note: 1. Use recommended operating thrust and torque for sizing bevel gear operators.
2. Use block-and-bleed thrust and torque for sizing power operators (electric, gas, hydraulic and more).
3. Maximum operating thrust and torque are the maximum allowable for the valve.

TOPWORKS

Model M

Sizes 2" to 4" (50 mm to 100 mm)
Classes 150, 600, 900 and 1500

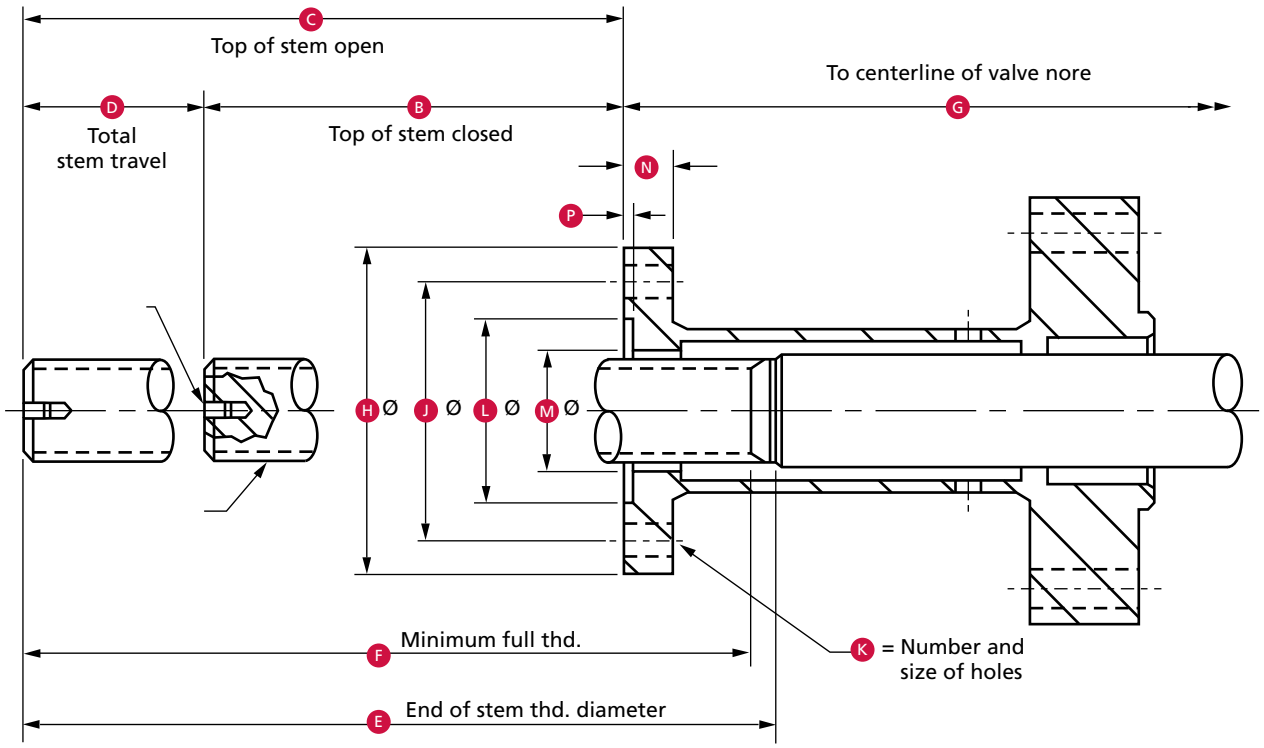


Model M

Size in. (mm)	ASME Class	Open	Closed							
		A	B	C	D	E	F	G	H	J
2 (50)	600 and 1500	9.25 (234.95)	6.56 (166.62)	6.44 (163.58)	2.808 (71.32)	0.63 (16.00)	0.12 (3.05)	5.00 (127.00)	4.00 (101.60)	4 (101.60)
3 (80)	150 and 1500	12.00 (304.80)	7.97 (202.44)	7.75 (196.85)	2.808 (71.32)	0.63 (16.00)	0.12 (3.05)	5.00 (127.00)	4.00 (101.60)	4 (101.60)
4 (100)	150 and 600	15.00 (381.00)	10.12 (257.05)	9.95 (252.73)	3.308 (84.02)	0.625 (15.88)	0.12 (3.05)	5.25 (133.35)	4.25 (107.95)	4 (101.60)
4 (100)	900 and 1500	13.63 (346.20)	8.75 (222.25)	9.95 (252.73)	3.308 (84.02)	1.00 (25.40)	0.12 (3.05)	6.00 (152.40)	5.00 (127.00)	4 (101.60)

Model C6

Sizes 6” to 12” (150 mm to 300 mm)
Class 150



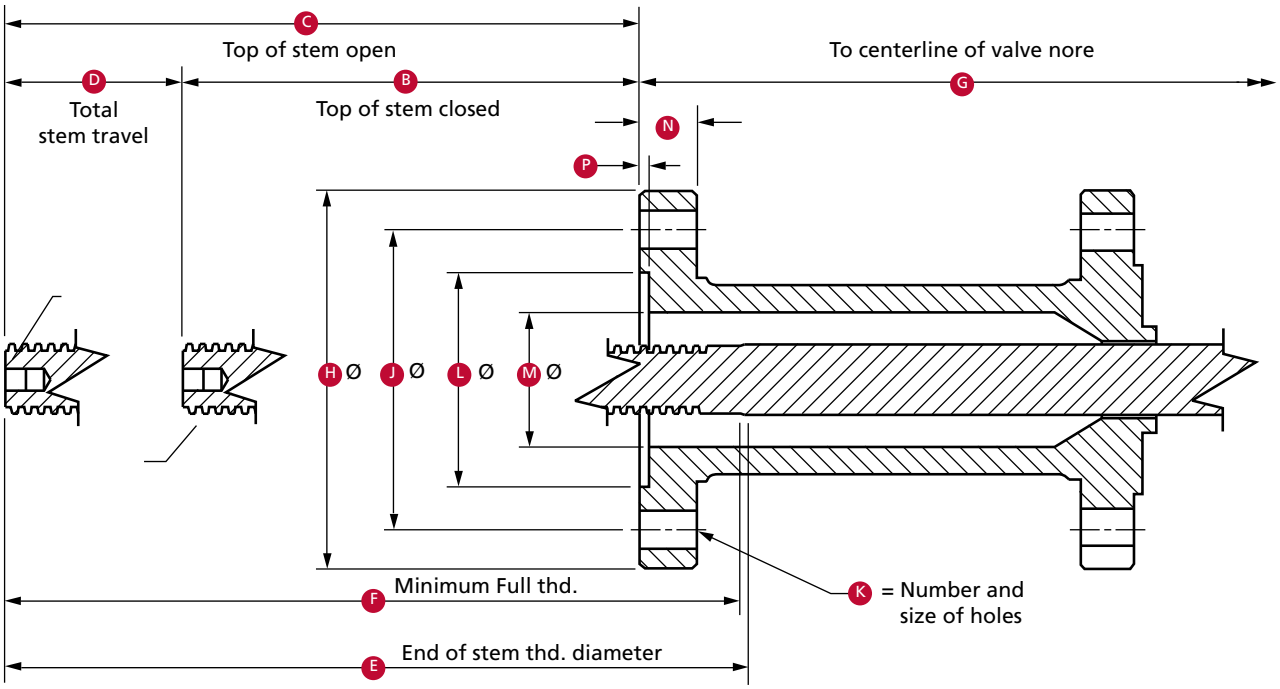
Model C6

Size in. (mm)	Series	ISO FLG	A -NA-2G-L.H. Single Lead Thd.	Closed	Open											
				B	C	D	E	F	G	H	J	K	L	M	N	P
6 (150)	150/3C	F14	1-1/2 - 0.250P - 0.250L	8.50 (215.90)	15.75 (400.05)	7.25 (184.15)	16.83 (427.48)	16.31 (414.27)	27.38 (695.45)	6.88 (174.75)	5.50 (139.70)	4 - 0.658 (4 - 16.71)	3.942 (100.127) 3.952 (100.381)	2.62 (66.55)	1.00 (25.40)	0.169 (4.29) 0.183 (4.65)
8 (200)	150/3C	F14	1-1/2 - 0.250P - 0.250L	10.19 (258.83)	19.44 (493.78)	9.25 (234.95)	20.58 (522.73)	20.06 (509.52)	35.44 (900.18)	6.88 (174.75)	5.50 (139.70)	4 - 0.688 (4 - 17.48)	3.942 (100.127) 3.952 (100.381)	2.62 (66.55)	1.00 (25.40)	0.169 (4.29) 0.183 (4.65)
10 (350)	150/3C	F14	1-1/2 - 0.250P - 0.250L	8.19 (208.03)	19.44 (493.78)	11.25 (285.75)	20.58 (522.73)	20.06 (509.52)	38.50 (977.90)	6.88 (174.75)	5.50 (139.70)	4 - 0.688 (4 - 17.48)	3.942 (100.127) 3.952 (100.381)	2.62 (66.55)	1.00 (25.40)	0.169 (4.29) 0.183 (4.65)
12 (300)	150/3C	F14	1-1/2 - 0.250P - 0.250L	9.69 (246.13)	23.00 (584.20)	13.31 (338.07)	24.20 (614.68)	23.69 (601.73)	44.00 (1117.60)	6.88 (174.75)	5.50 (139.70)	4 - 0.688 (4 - 17.48)	3.942 (100.127) 3.952 (100.381)	2.62 (66.55)	1.00 (25.40)	0.169 (4.29) 0.183 (4.65)

TOPWORKS

Model C6B

Sizes 6" to 12" (150 mm to 600 mm)
Classes 150, 600 and 900



Model C6B

Size in. (mm)	Class	ISO FLG	ACME Stem A	Closed B	Open C	D	E	F	G	H	J	K	L	M	N	P
6 (150)	600 and 900	F14	1-1/4 - 0.250P - 0.250L	7.83 (198.88)	10.02 (254.51)	7.19 (182.63)	16.69 (423.93)	16.25 (412.75)	28.06 (712.72)	6.89 (175.01)	5.512 (140.00)	4 - 0.688 (4 - 17.48)	3.945 (100.203) 3.955 (100.457)	2.50 (63.50)	1.03 (26.16)	0.168 (4.267) 0.188 (4.775)
8 (200)	600 and 900	F14	1-3/4 - 0.250P - 0.250L	10.17 (258.32)	19.37 (492.00)	9.20 (233.68)	20.44 (519.18)	20.00 (508.00)	35.41 (899.41)	6.89 (175.01)	5.512 (140.00)	4 - 0.688 (4 - 17.48)	3.945 (100.203) 3.955 (100.457)	2.50 (63.50)	1.03 (26.16)	0.168 (4.267) 0.188 (4.775)
10 (250)	600	F14	1-3/4 - 0.250P - 0.250L	8.17 (207.52)	19.37 (492.00)	11.20 (284.48)	20.44 (519.18)	20.00 (508.00)	38.47 (977.14)	6.89 (175.01)	5.512 (140.00)	4 - 0.688 (4 - 17.48)	3.945 (100.203) 3.955 (100.457)	2.50 (63.50)	1.03 (26.16)	0.168 (4.267) 0.188 (4.775)
10 (250)	900	F16	1-3/4 - 0.250P - 0.250L	8.17 (207.52)	19.37 (492.00)	11.20 (284.48)	20.44 (519.18)	20.00 (508.00)	38.47 (977.14)	8.27 (210.06)	6.496 (165.00)	4 - 0.812 (4 - 20.62)	5.240 (133.096) 5.260 (133.604)	2.50 (63.50)	1.50 (38.10)	0.220 (5.588) 0.240 (6.096)
12 (300)	600	F16	1-3/4 - 0.250P - 0.250L	9.61 (244.09)	22.83 (579.88)	13.22 (335.79)	24.06 (611.12)	23.62 (599.95)	43.91 (1115.31)	8.27 (210.06)	6.496 (165.00)	4 - 0.812 (4 - 20.62)	5.240 (133.096) 5.260 (133.604)	2.50 (63.50)	1.50 (38.10)	0.220 (5.588) 0.240 (6.096)
12 (300)	900	F16	2 - 0.250P - 0.250L	9.55 (242.57)	22.67 (575.82)	13.12 (333.25)	24.06 (611.12)	23.62 (599.95)	44.47 (1129.54)	8.27 (210.06)	6.496 (165.00)	4 - 0.812 (4 - 20.62)	5.240 (133.096) 5.260 (133.604)	3.25 (82.55)	1.50 (38.10)	0.220 (5.588) 0.240 (6.096)
14 (350)	150	FA14	1-1/2 - 0.200P - 0.400L	10.68 (271.27)	25.34 (643.64)	14.66 (372.36)	26.39 (670.31)	25.69 (652.53)	46.50 (1181.10)	6.89 (175.01)	5.512 (140.00)	4 - 0.688 (4 - 17.48)	3.945 (100.203) 3.955 (100.457)	2.50 (63.50)	1.03 (26.16)	0.168 (4.267) 0.188 (4.775)
14 (350)	600	FA16	2 - 0.250P - 0.500L	10.68 (271.27)	25.34 (643.64)	14.66 (372.36)	27.27 (692.66)	26.69 (677.93)	49.75 (1263.65)	8.25 (209.55)	6.500 (165.10)	4 - 0.812 (4 - 20.62)	5.010 (127.254) 5.020 (127.508)	2.88 (73.15)	1.50 (38.10)	0.220 (5.588) 0.240 (6.096)
16 (400)	150	FA14	1-1/2 - 0.200P - 0.400L	10.38 (263.65)	27.07 (687.58)	16.69 (423.93)	28.14 (714.76)	27.56 (700.02)	51.37 (1304.80)	6.89 (175.01)	5.512 (140.00)	4 - 0.688 (4 - 17.48)	3.945 (100.203) 3.955 (100.457)	2.50 (63.50)	1.03 (26.16)	0.168 (4.267) 0.188 (4.775)
16 (400)	600	FA25	2 - 0.250P - 0.500L	10.19 (258.83)	28.86 (733.04)	16.67 (423.42)	28.20 (716.28)	27.59 (700.79)	53.56 (1360.42)	11.50 (292.10)	10.000 (254.00)	8 - 0.688 (8 - 17.48)	6.010 (152.654) 6.020 (152.908)	3.12 (79.25)	2.00 (50.80)	0.220 (5.588) 0.240 (6.096)
18 (450)	150	FA14	1-1/2 - 0.200P - 0.400L	11.68 (296.67)	30.09 (764.29)	18.41 (467.61)	31.14 (790.96)	27.56 (700.02)	57.00 (1447.80)	6.89 (175.01)	5.512 (140.00)	4 - 0.688 (4 - 17.48)	3.945 (100.203) 3.955 (100.457)	2.50 (63.50)	1.03 (26.16)	0.168 (4.267) 0.188 (4.775)
18 (450)	600	FA25	2-1/4 - 0.250P - 0.500L	11.93 (303.02)	30.62 (777.75)	18.69 (474.73)	32.39 (822.71)	31.81 (807.97)	60.19 (1528.83)	11.50 (292.10)	10.000 (254.00)	8 - 0.688 (8 - 17.48)	6.010 (152.654) 6.020 (152.908)	3.00 (76.20)	2.36 (59.94)	0.220 (5.588) 0.240 (6.096)
20 (500)	150	FA14	1-3/4 - 0.250P - 0.500L	10.97 (278.64)	31.69 (804.93)	20.72 (526.29)	32.83 (833.88)	32.25 (819.15)	62.28 (1581.91)	6.89 (175.01)	5.512 (140.00)	4 - 0.688 (4 - 17.48)	3.945 (100.203) 3.955 (100.457)	2.50 (63.50)	1.03 (26.16)	0.168 (4.267) 0.188 (4.775)
20 (500)	600	FA30	2-3/4 - 0.400P - 0.800L	12.57 (319.28)	33.30 (845.82)	20.73 (526.54)	34.88 (885.95)	34.31 (872.24)	65.67 (1668.02)	13.62 (345.95)	11.750 (298.45)	8 - 0.875 (8 - 22.23)	7.010 (178.054) 7.020 (178.308)	3.50 (89.90)	2.75 (69.85)	0.220 (5.588) 0.240 (6.096)
24 (600)	150	FA14	2 - 0.250P - 0.500L	11.03 (280.16)	36.14 (917.96)	25.11 (637.79)	37.02 (940.31)	36.44 (925.58)	75.61 (1920.49)	6.89 (175.01)	5.512 (140.00)	4 - 0.688 (4 - 17.48)	3.945 (100.203) 3.955 (100.457)	2.50 (63.50)	1.03 (26.16)	0.168 (4.267) 0.188 (4.775)
24 (600)	600	FA35	3-1/4 - 0.400P - 0.800L	13.12 (333.25)	38.26 (971.80)	25.14 (638.56)	39.95 (1014.73)	39.38 (1000.25)	80.00 (2032.00)	16.12 (409.45)	14.000 (355.60)	8 - 1.120 (8 - 28.45)	8.510 (216.154) 8.520 (216.408)	4.50 (114.30)	3.00 (76.20)	0.223 (5.664) 0.237 (6.020)

FLOW COEFFICIENTS (C_V)

The following chart outlines the C_V for through-conduit gate valves having end-to-end dimensions and bore diameters in compliance with API 6D standards.

C_V is the flow of water through the valve at 1 psi pressure drop in gal/min. Since C_V is a calculated number, the actual value may vary.

Valve Size in. (mm)	150	300	400	600	900	1500	2500
2 (50)	476	432	378	378	337	337	218
3 x 2 (80 x 50)	-	-	165	165	203	239	-
2-1/2 (65)	-	-	682	682	558	558	305
3 (80)	1358	1155	1053	1109	1072	966	474
4 x 3 (100 x 80)	-	-	534	529	597	677	624
4 (100)	2508	2176	1925	1944	1890	1730	725
6 x 4 (150 x 100)	-	-	886	944	943	1231	-
6 (150)	5402	5300	4860	4577	4383	3622	2510
8 x 6 (200 x 150)	2583	2499	-	3240	3588	2137	-
8 (200)	11,261	11,054	9345	8886	8416	6879	5227
10 x 8 (250 x 200)	-	5218	-	5036	7975	4859	-
12 x 8 (300 x 200)	-	3302	-	3892	-	-	-
10 (250)	19,181	18,856	15,771	14,533	14,087	11,283	8313
12 (300)	29,435	28,980	23,834	22,729	21,025	16,843	12,282
12 x 10 (300 x 250)	7875	-	-	12,799	7299	-	-
14 (350)	35,605	30,883	29,921	28,837	23,846	20,336	-
16 x 14 (400 x 350)	-	-	-	21,096	-	-	-
16 (400)	49,979	42,224	41,022	39,144	33,358	27,548	21,396
20 x 16 (500 x 400)	13,060	-	15,761	-	-	-	-
18 (450)	66,156	55,740	54,277	51,368	45,004	-	-
20 (500)	83,865	70,386	68,680	64,559	56,871	-	-
22 (550)	-	86,869	85,422	80,279	-	-	-
24 (600)	127,916	106,835	103,504	97,240	84,836	-	-
26 (650)	149,428	123,222	120,829	114,905	-	-	-
28 (700)	176,798	144,355	142,391	135,267	-	-	-
30 (750)	212,313	170,229	163,776	157,401	133,706	-	-
36 (900)	322,548	245,362	236,147	224,424	-	-	-

FLOW COEFFICIENTS (K_V)

The following chart outlines the K_V for through-conduit gate valves having end-to-end dimensions and bore diameters in compliance with API 6D.

K_V is the flow of water through the valve at 1 bar pressure drop in cu m/hr. Since K_V is a calculated number, the actual value may vary.

Valve Size in. (mm)	150	300	400	600	900	1500	2500
2 (50)	412	373	327	327	291	291	188
3 x 2 (80 x 50)	-	-	142	142	175	207	-
2-1/2 (65)	-	-	590	590	483	483	264
3 (80)	1175	999	911	959	927	835	410
4 x 3 (100 x 80)	-	-	462	458	516	585	540
4 (100)	2170	1882	1665	1682	1635	1496	627
6 x 4 (150 x 100)	-	-	766	817	816	1065	-
6 (150)	4673	4585	4204	3959	3792	3133	2172
8 x 6 (200 x 150)	2234	2162	-	2803	3103	1849	-
8 (200)	9742	9562	8084	7687	7280	5951	4522
10 x 8 (250 x 200)	-	4514	-	4356	6898	4204	-
12 x 8 (300 x 200)	-	2857	-	3367	-	-	-
10 (250)	16,592	16,312	13,643	12,572	12,186	9761	7191
12 (300)	25,463	25,070	20,617	19,662	18,188	14,570	10,624
12 x 10 (300 x 250)	6812	-	-	11,072	6314	-	-
14 (350)	30,800	26,715	25,883	24,945	20,628	17,591	-
16 x 14 (400 x 350)	-	-	-	18,249	-	-	-
16 (400)	43,234	36,526	35,486	33,862	28,856	23,831	18,509
20 x 16 (500 x 400)	11,298	-	13,634	-	-	-	-
18 (450)	57,228	48,218	46,953	44,436	38,930	-	-
20 (500)	72,547	60,888	59,412	55,847	49,196	-	-
22 (550)	-	75,147	73,894	69,445	-	-	-
24 (600)	110,654	92,417	89,536	84,117	73,388	-	-
26 (650)	129,263	106,593	104,523	99,399	-	-	-
28 (700)	152,939	124,874	123,175	117,013	-	-	-
30 (750)	183,661	147,257	141,674	136,160	115,662	-	-
36 (900)	279,021	212,251	204,279	194,138	-	-	-

TRIM CHART

Service	Trim Code	Body and Bonnet	Gate	Seat	Stem Seal	Stem	Bolting	Fittings	Temperature Range
Waterflood, Corrosive	T-10	WCC Carbon Steel, Internally Coated	Carbon Steel, ASME Classes 300-600, Low-Alloy Steel 900 Class, Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low-Alloy Steel, Nickel-Plated	Alloy Steel, NACE	Stainless Steel	-20° F to 250° F (-29° C to 121° C)
Standard	T-11 2" to 4" only	WCC Carbon Steel	Carbon Steel, Low-Alloy Steel, Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	FKM Viton	Low-Alloy Steel, Nickel-Plated	Alloy Steel	Carbon Steel	-20° F to 250° F (-29° C to 121° C)
Corrosive Service	T-22	WCC Carbon Steel	410 Stainless Steel	410 Stainless Steel	PTFE	17-4 PH Stainless Steel	Alloy Steel	Stainless Steel	-20° F to 250° F (-29° C to 121° C)
Sour, Mildly Corrosive	T-24 2" and larger	WCC Carbon Steel	Carbon Steel, ASME Classes 300-600, Low-Alloy Steel 900 Class, Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low-Alloy Steel, Nickel-Plated	Alloy Steel, NACE	Stainless Steel	-20° F to 250° F (-29° C to 121° C)
Low-Temperature, Non-Sour	T-36	LCC Carbon Steel, Impact-Tested	Carbon Steel, ASME Classes 300-600, Low-Alloy Steel 900 Class, Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low-Alloy Steel, Impact-Tested, Nickel-Plated	Alloy Steel, Impact-Tested	Stainless Steel	-50° F to 250° F (-46° C to 121° C)
Low-Temperature, Sour	T-37	LCC Carbon Steel, Impact-Tested	Carbon Steel, ASME Classes 300-600, Low-Alloy Steel 900 Class, Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low-Alloy Steel, Impact-Tested, Nickel-Plated	Alloy Steel, NACE, Impact-Tested	Stainless Steel	-50° F to 250° F (-46° C to 121° C)
Anhydrous Ammonia	T-88	WCC/A36 Carbon Steel	Carbon Steel, Low-Alloy Steel, Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low-Alloy Steel, Nickel-Plated	Alloy Steel, NACE	Stainless Steel	-20° F to 250° F (-29° C to 121° C)
Standard	T-94	WCC Carbon Steel	Carbon Steel, ASME Classes 300-600, Low-Alloy Steel 900 Class, Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	Special	Low-Alloy Steel, Nickel-Plated	Alloy Steel	Carbon Steel	-20° F to 350° F (-29° C to 177° C)
MTBE	T-102 6" and larger	WCC Carbon Steel	Carbon Steel, ASME Classes 300-600, Low-Alloy Steel 900 Class, Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low-Alloy Steel, Nickel-Plated	Alloy Steel	Carbon Steel	-20° F to 250° F (-29° C to 121° C)
Standard	T-101 6" and larger	WCC Carbon Steel	Carbon Steel, ASME Classes 300-600, Low-Alloy Steel 900 Class, Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low-Alloy Steel, Nickel-Plated	Alloy Steel	Carbon Steel	-20° F to 250° F (-29° C to 121° C)

COMMON TRIMS

Waterflood (T-10) – Carbon steel body/bonnet with wetted surface, ENP-plated, internal parts of corrosion-resistant materials.

Model M (Sizes 2" to 4", (50 mm to 100 mm), Classes 600 through 1500) Standard (T-11) – For non-corrosive aromatic service with concentration of MTBE to 100%.

Corrosive Service – Internal Parts (T-22) – For substantially the same service as T-21, but where the corrosion resistance of internal parts is desirable. The valve internal sealing members are stainless steel to gain this corrosion resistance. This trim also is usable for mildly corrosive fluids and gases when limited corrosion of the internal body surfaces can be tolerated.

Sour Gas and Oil (NACE MR0175) (T-24) – Primarily for sour gas and oil (NACE MR0175) where resistance to H_2S embrittlement is required. Also suitable for other chemicals, products or hydrocarbons when H_2S is present. May be used when CO_2 is present in smaller amounts than H_2S.

Low-Temperature - 50° F (-46° C) NACE (T-36) – For essentially non-corrosive ladings, either liquid or gaseous. The pressure-retaining components (body, bonnet and bolting) are of impact-tested materials.

Low-Temperature Sour -50° F (-46° C) NACE (T-37) – Primarily for sour gas and oil (NACE MR0175) where resistance to H_2S embrittlement is required at -50° F (-46° C) service. The pressure-retaining components (body, bonnet and bolting) are of impact-tested materials. Also suitable for other chemicals, products or hydrocarbons when H_2S is present. Can be used when CO_2 is present in smaller amounts than H_2S.

Anhydrous Ammonia (T-88) – Special elastomers and stem nut for ammonia service

Fire-Tested to API 6FA (T-94) – These valves have been qualified as fire-tested and contain a special stem packing arrangement for essentially non-corrosive ladings. The elastomer O-rings used for seal and bonnet seals are of a material that will not swell and affect the operation of the valve. Typical examples of ladings are: gasoline, benzene, toluene, carbon-tetrachloride, 1,1, 1 trichloroethane, richloroethylene perchloroethylene and phosphate ester hydraulic fluids.

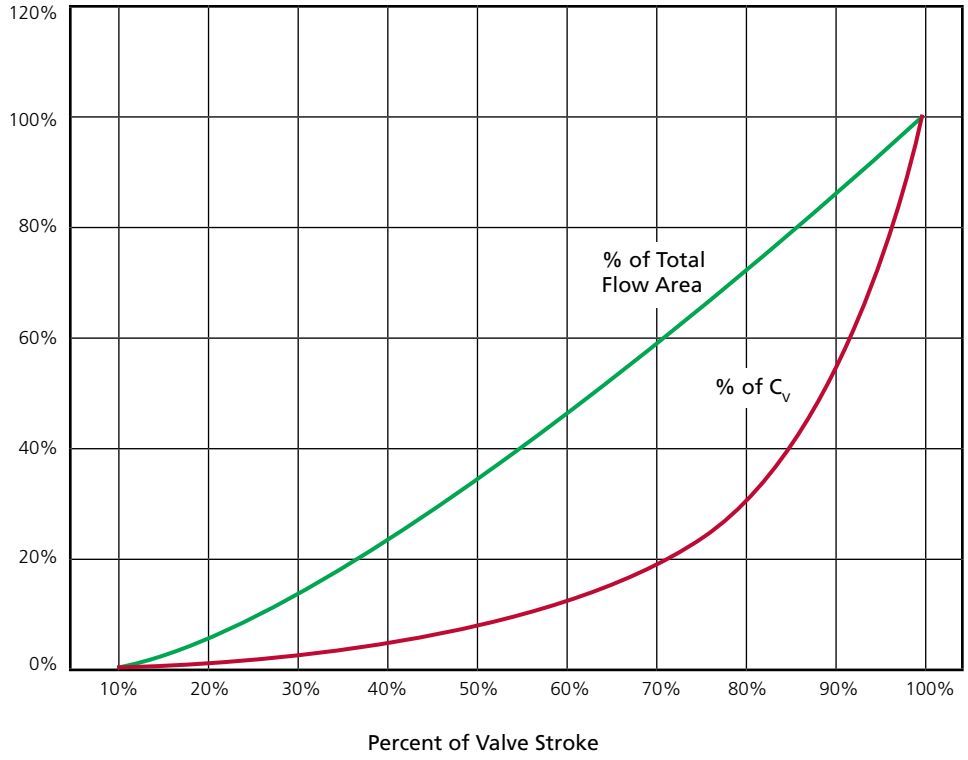
Aromatic (to 40% MTBE, Fire-Tested API 6FA or ISO 10497) (T-101) – For essentially non-corrosive, non-sour aromatic or non-aromatic service with methanol or ethanol based corrosion inhibitors where up to 40% MTBE may be present.

PARTIAL OPEN FLOW CHARACTERISTICS

The following graph approximates the flow coefficient, C_V or K_V, of gate valves as a function of the valve stroke going from closed to open. Note that this is an estimation only because of assumptions made in the valve stroke, as well as unpredictable flow characteristics around the gate-seat bore in the partially open position.

Gate valves are intended for on-off service. Intermittent throttling such as pressure equalization service is acceptable. Continuous throttling is not recommended. This information is provided only to facilitate the engineering of systems in the transition between open and closed positions of the valves. One example might be to evaluate the possibility of water hammer in liquid pipelines.

Partial Open Flow Characteristics (Through Conduit Gate Valves)



CAMSERV™ Aftermarket Services for Valves and Actuation

WE BUILD IT. WE BACK IT.

Global Network and Local Support

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.

Easily Accessible Parts and Spare Valves

- OEM spare valves, actuators and parts (including non-Cameron brands)
- Handling, storage, packaging and delivery
- Dedicated stocking program

Comprehensive Aftermarket Services Portfolio

- Parts and spare valves
- Repair
- Field services
- Preventative maintenance
- Equipment testing and diagnostics
- Remanufacturing
- Asset preservation
- Customer property management
- Training and recertification services
- Warranty

Customized Total Valve Care℠ (TVC) Programs

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

USA • CANADA • LATIN AMERICA • EUROPE • RUSSIA • AFRICA • MIDDLE EAST • ASIA PACIFIC

Trademark Information

WKM is a registered trademark of Cameron. CAMSERV is a trademark of Cameron.

This document contains references to registered trademarks or product designations, which are not owned by Cameron.

Trademark	Owner
Inconel	INCO Nickel Sales, Inc.
Monel	INCO Alloys International, Inc
Stellite	Stoody Deloro Stellite, Inc.
Teflon	E.I. Dupont De Nemours & Company
Viton	Dupont Dow Elastomers L.L.C.

CAMERON

3250 Briarpark Drive, Suite 300
Houston, TX 77042
USA
Toll Free 1 800 323 9160

Learn more about WKM gate valves at:
www.c-a-m.com/WKM
WKM@c-a-m.com

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.

CAMERON

WKM Pow-R-Seal Gate Valves

High-quality, through-conduit, expanding gate valves engineered for performance in critical isolation applications where a tight mechanical seal that is normally unaffected by pressure variations and vibrations is needed.

TECHNOLOGY

CAMERON

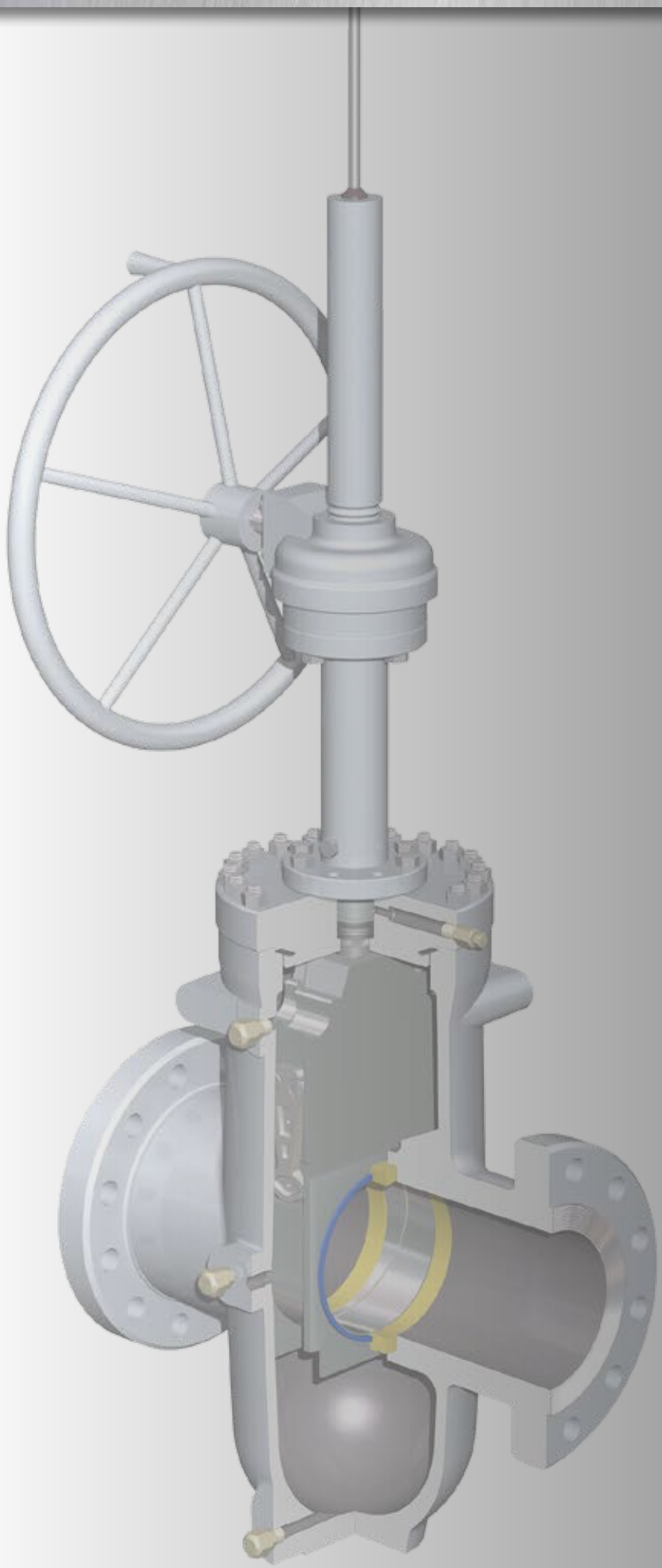


Table of Contents

WKM POW-R-SEAL GATE VALVES

WKM Pow-R-Seal Gate Valves

Ville Platte, La., USA

Cameron is a leading provider of valves and measurement systems to the oil and gas industry. Our products are primarily used to control, direct, and measure the flow of oil and gas as it is moved from individual wellheads through flowlines, gathering lines, and transmission systems to refineries, petrochemical plants, and industrial centers for processing.

Cameron provides a wide range of valves for use in natural gas, LNG, crude oil, and refined products transmissions lines. The traditional CAMERON® fully welded ball valve product line has been combined with the GROVE®, RING-O®, TOM WHEATLEY®, ENTECH™, and TK® product lines. This broad offering has strengthened Cameron's ability to serve as a single source for a wide scope of customer requirements. Cameron also provides critical service valves for refinery, chemical, and petrochemical processing businesses, and for associated storage terminal applications, particularly through the ORBIT® and GENERAL VALVE® lines. These brands are complemented by WKM®, TBV™, and TEXSTEAM™ valve products and considerably expand the scope of our product offerings.

Cameron's WKM Pow-R-Seal™ gate valve's smooth continuous bore reduces turbulence. Additionally, the seat faces are outside the flow stream and are protected from contact with the lading whether the valve is in the open or closed position. The WKM Pow-R-Seal gate valve's full bore makes it possible to run pigs, scrapers, or hot tap cutters through the valves without danger of damaging the valve, lodging the scraper, or jamming it with metal cuttings.

DESIGN

Cameron's WKM Pow-R-Seal valve's design provides the following specific advantages for reliable performance and long life, even in fluid, gas, steam, and hot water critical services up to 1000° F (538° C).

Protection of Seat Faces

Seat faces are outside the flow stream and in full contact with the gate, in both fully open and fully closed positions, greatly extending the seat life.

Smooth, Continuous Conduit for Flow

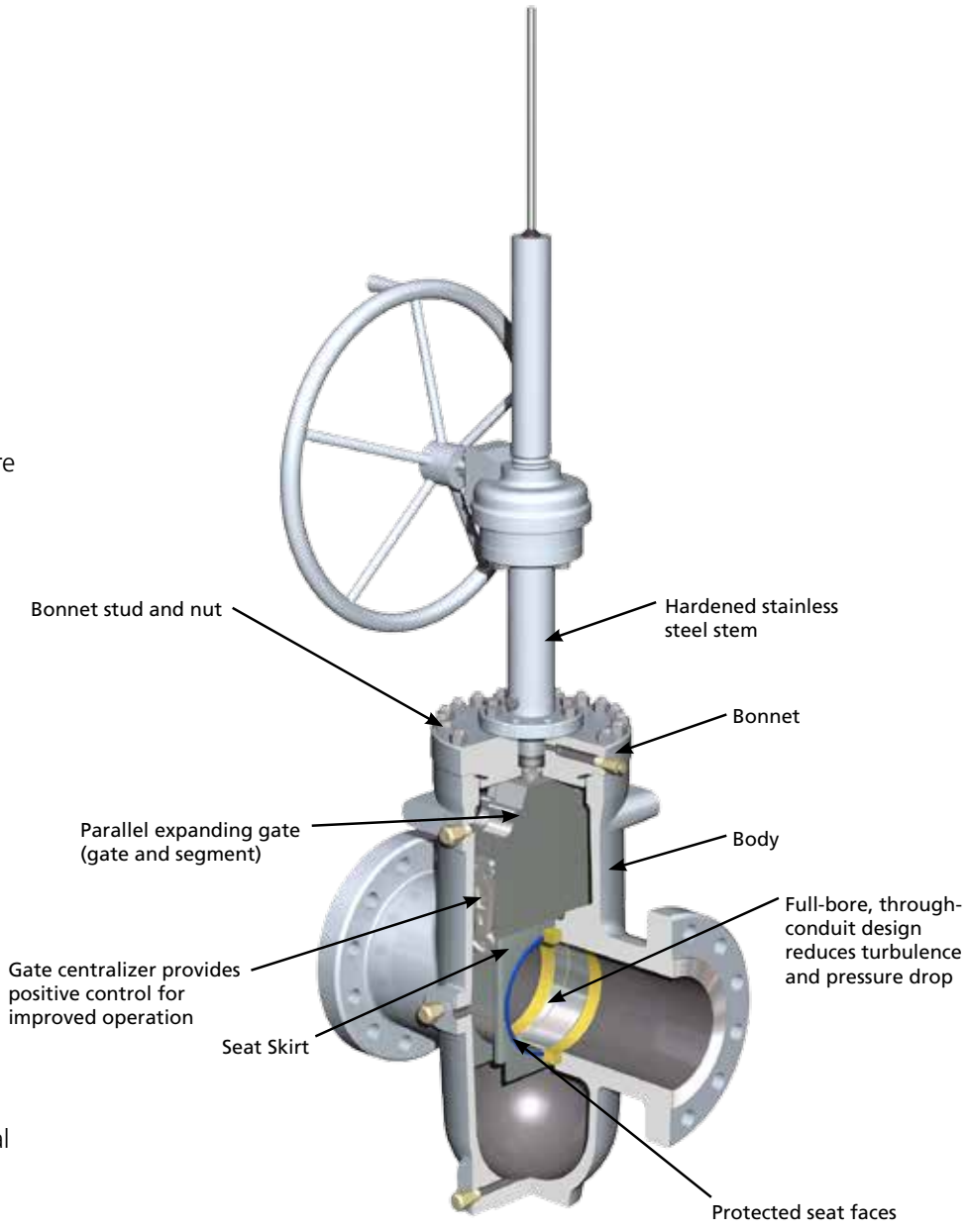
Destructive turbulence is nearly eliminated. In a full-bore valve, pressure drop through the valve is no greater than that through an equal length of equal diameter pipe.

Tight Mechanical Seal and Double Block-and-Bleed Capability

The WKM Pow-R-Seal valve's parallel expanding gate design provides a tight mechanical seal, upstream and downstream simultaneously, which is normally unaffected by pressure variations or vibration.

Metal-to-Metal Mechanical Sealing

The seal is unaffected by pressure surges, vibration, or heat under normal operating conditions. First, the seat insert contacts the gate. Then, the insert is compressed and a metal-to-metal seal is established.



Commonly Used Applications

- Pumps station isolation
- Launchers and receivers
- Decoking systems
- Gathering lines

FEATURES

1. Through-Conduit Parallel Expanding Gate Valve

- Provides a tight mechanical seal
- Full-bore design reduces pressure drop and allows passage of all types of scrapers (pigs)
- Nickel-plated gate and segment standard

2. Fugitive Emissions-Tested SLS Stem Seal*

- Stem seal is completely contained in the bonnet
- Stem is centralized by bearings
- Nickel-plated stem standard
- Seal is self-adjusting and does not depend on plastic packing
- PTFE compound resists virtually all ladings
- Pedestal supports the seal and acts as a stem scraper
- 6" to 24" (150 mm to 600 mm) Class 300 to 900 valves are fire-tested to API 6FA 3rd Edition

3. Interference Fit Seats

- Double sealing and in-line replaceable
- Upstream and downstream sealing
- Block-and-bleed per API 6D standards
- Simple design is resistant to dirty service
- Insert initiates the seal and helps clean the gate**
- Seals are compatible with virtually all ladings
- Seats may be lubricated to promote long life, reduce operating torques or effect a seal in an emergency
- Fire-tested to API 6FA 3rd Edition

4. Bolted Bonnet Valve is In-Line Repairable

- Bonnet seal resists virtually all landings
- Design provides metal-to-metal, tight sealing ideal for high temperature applications

5. Yoke-Tube Upper Flanges Comply with MSS-SP102 Standards

- Simplifies operator mounting
- Can also be manufactured to comply with ISO 5240

6. Single-Piece Cast Body Center Section

- Provides the necessary strength to resist pipeline bending
- Smooth shape reduces stress concentrations
- Made from pressure vessel quality steel

7. Valve Stroke is Established by Manufacturing Tolerances

- Stays in adjustment

8. LeverLock® Gate Centralizer***

- Retains gate and segment assembly in a neutral position during opening and closing travel
- Permits expansion of the assembly at the proper moment for seating

* For Model E-1C; does not apply to high-temperature valves. In-house FE testing only.
** High-temperature valves do not have insert
*** Standard on 6" and larger valves

OPTIONS

Bonnet Seal

- 6″ to 12″ (150 mm to 300 mm): flat metal gasket
- 14″ to 24″ (350 mm to 600 mm): O-ring seal
- High-temperature valves: spiral-wound metal gasket with a non-asbestos filler

Options

- Lubrication, packing, drain extensions
- Stem and yoke tube extensions
- Variety of coatings (coal tar epoxy for buried service, two- to three-part coating systems for marine environment, inorganic zinc rich epoxy, etc.)
- HF-6 overlay is available on request for the gate segment assembly and seat sealing surfaces
- Handwheel operator* (position indicator standard)
- Bevel gear operator (position indicator standard)
- Less gearing (bare stem)
- Electric motor operator
- Several types of body cavity thermal relief systems available
- Variety of paint and coatings

* 6″ through 10″ (150 mm through 250 mm) Class 300 to 900 valves and 12″ (300 mm) Class 300 to 600 valves only are available in selected sizes.

OPERATION

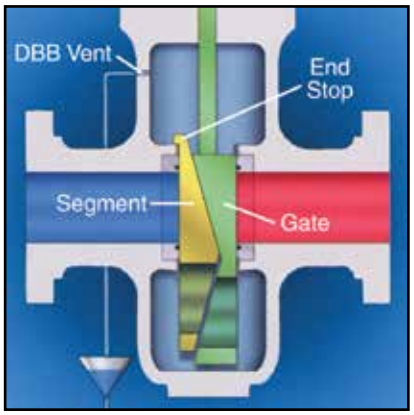
60 years of worldwide service in oil, gas, chemicals, water, slurry, and multiproduct applications has established the WKM Pow-R-Seal valve as one of the most trusted gate valves, where safety and seal reliability are critical.

The parallel expanding gate design provides a tight mechanical seal which is normally unaffected by vibrations or pressure variations.

The rigid, cast steel body resists pipeline bending moments which could affect seat sealing in other valves.

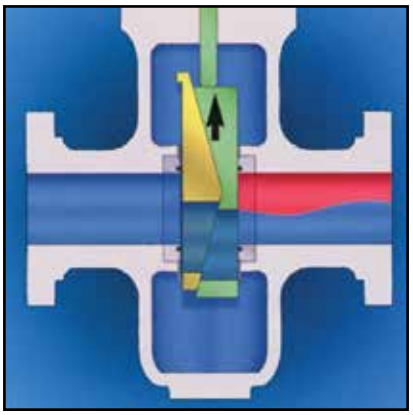
PTFE seals on both faces of the valve provide drop tight sealing, while metal-to-metal contact between the seals and gate mechanism provides tight shutoff.

All-metal seals also are available for service to 1000° F (538° C), where leakage rates comply with API 6D and ISO 5208 standards.



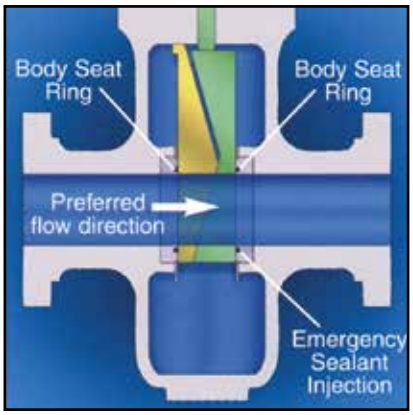
Sealed Closed

In the fully closed position, the segment has engaged with an end stop and the gate is wedged downward, expanding the segment and gate so that they form a tight mechanical closure against the upstream and downstream seats. Venting the body cavity will provide total, tight shutoff.



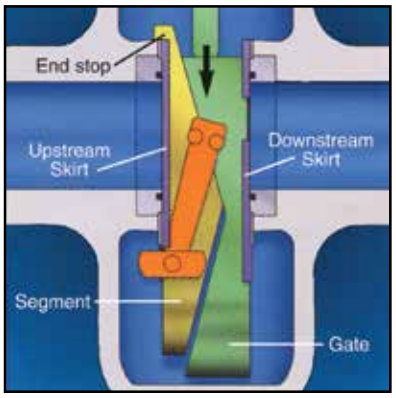
Mid-Travel

During travel towards opening, the gate slides across the wedge angle of the segment, collapsing the assembly so that it travels freely between the seal faces. The patented LeverLock gate centralizer holds the mechanism in the neutral position until seal expansion is required.



Fully Open

When the bore in the segment is aligned with the conduit bore, an end stop prevents further travel and the gate slides across the wedge angle, expanding the gate and the segment, isolating the flow from the body. The preferred flow direction ensures easier operation.



LeverLock Mechanism

The lever arm is held parallel to the gate faces by the skirt plates while the assembly is moving through its stroke. Near end-of-travel, the skirt allows the lever to tilt. The gate and segment slide against their angled faces, creating the expanding seal action. In their final position, the gate and segment are mechanically secured in place. The skirt plates are guide rails at the sides of the gate. The skirts align the gate and segments with the seats.

Single Spring-Loaded (SLS) Seal

FEATURES AND BENEFITS

The SLS stem seal system is designed to provide optimum performance while requiring minimal maintenance. Our in-house lab tests have shown FE leak rates below 500 ppm.

Testing and Certifications

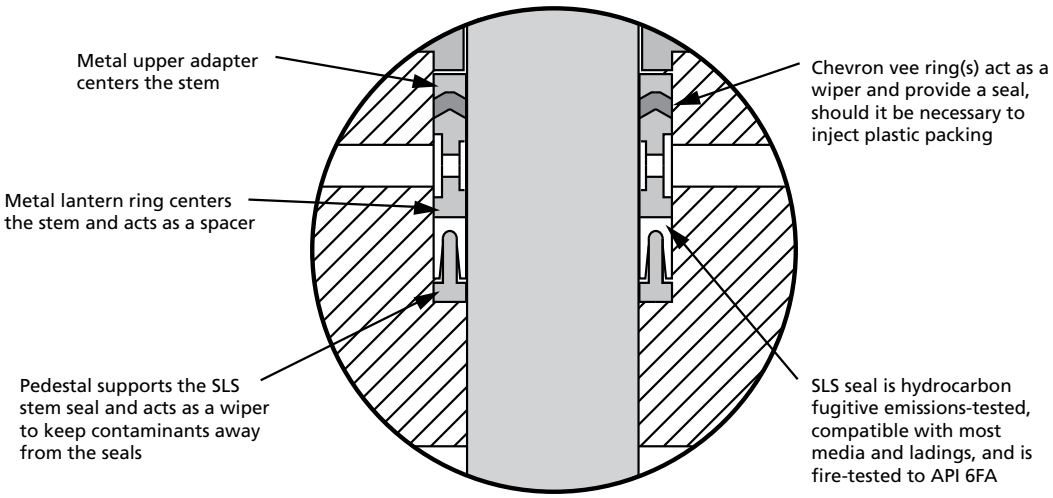
- Fire tests per API 6FA, BS 6755 Part 11
- ISO 10497

Design

- Single spring-loaded lip seal
- Lantern ring
- Chevron ring(s)
- Lower pedestal
- Upper adapter

Features

- Self-adjusting seal designed to reduce maintenance
- No plastic packing required to establish an effective seal
- Four separate sealing bands to promote reliability
- Filled PTFE shell backed with a corrosion-resistant alloy spring (making it suitable for virtually all line media)
- Metal spring provides an initial seal and uniform loading over a wide temperature range
- Lantern ring acts as a spacer in conjunction with the upper adapter as a bearing to center the stem
- Lower pedestal support seal acts as a stem wiper to keep contaminants away from sealing members
- Chevron ring(s) act as an emergency seal, should it be necessary to inject plastic packing, and keeps foreign matter away from the seal

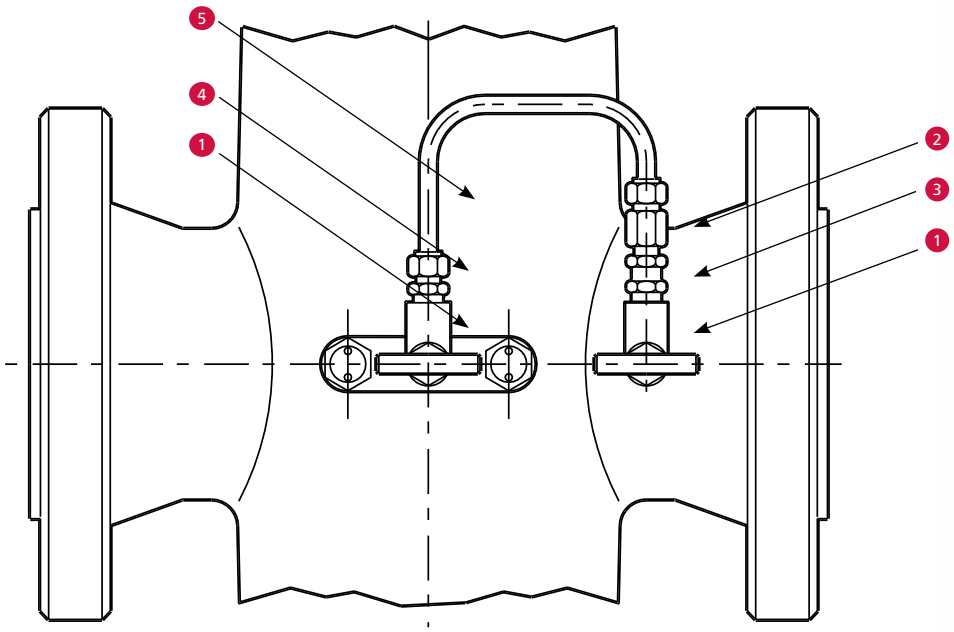


Thermal Relief System

OPERATION

Because of the split gate design, it is possible for excess body pressure to develop in the body cavities of closed valves. This usually results from heating that takes place in the valves while in liquid service. A thermal body cavity relief system is provided to relieve this excess body pressure. Thermal relief systems which direct excess body pressure to the upstream conduit are standard. This system consists of two needle valves, a check valve, tubing and two fittings. Body pressure greater than the segment conduit pressure causes the check valve to unseat and relieve excess pressure to the upstream conduit. The needle valves must be kept open while the valve is in service. These needle valves can be used to isolate the line pressure to service the relief systems, as needed.

Typical Thermal Body Cavity Relief Arrangement



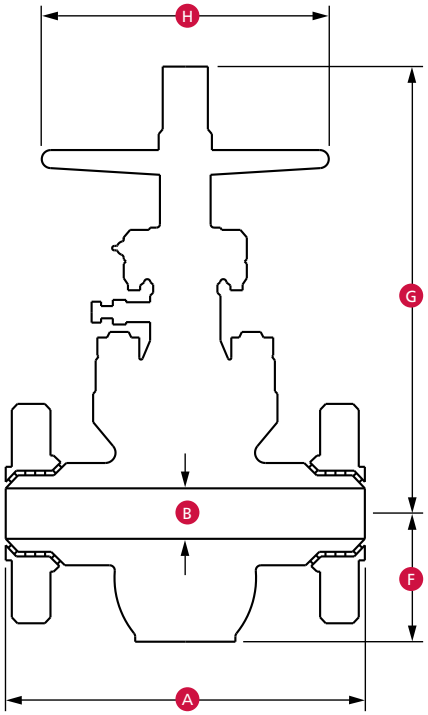
Item	Part	Qty.
1	Needle Valve	2
2	Female Tubing Connector	1
3	Check Valve	1
4	Male Tubing Connector	1
5	Tubing	1
	Tag (Not Shown)	2
	Wire (Not Shown)	1

Notes: These items are on the lettered side of the valve (letters not shown in diagram above).
Special thermal relief systems are available upon request.

2” to 4” (50 mm to 100 mm) Classes 600, 900, and 1500

MODELS M (HANDWHEEL OPERATED)

Max. WP at 100˚ F (38˚ C)	
Class 600:	1500 psi CWP 2250 psi Test
Class 900:	2250 psi CWP 3375 psi Test
Class 1500:	3750 psi CWP 5625 psi Test



PRINCIPAL DIMENSIONS

N = Number of turns to fully open or close valve

Class 600

Size in. (mm)	A	B	F	G	H	N	Weight lb (kg)		
							FE	WE	F x W
2	11-1/2	2-1/16	4-13/16	17-3/4	12	16	90	72	84
(50)	(292)	(52)	(122)	(451)	(305)	-	(41)	(33)	(38)
3	14	3-3/16	6-15/16	23-7/8	12	20	180	144	155
(80)	(356)	(81)	(176)	(606)	(305)	-	(82)	1(65)	(70)
4	17	4-1/8	8-5/8	27	14	20	345	259	245
(100)	(432)	(105)	(219)	(686)	(356)	-	(156)	(117)	(111)

Class 900

2	14-1/2	2-1/16	5-1/16	17-3/4	12	16	150	72	105
(50)	(368)	(52)	(129)	(451)	(305)	-	(68)	(33)	(48)
3	15	3-3/16	7-5/16	23-7/8	12	20	265	193	247
(80)	(381)	(81)	(186)	(606)	(305)	-	(120)	(88)	(112)
4	18	4-1/8	9-1/16	28-1/2	18	20	515	390	417
(100)	(457)	(105)	(230)	(724)	(457)	-	(234)	(177)	(189)

Class 1500

2	14-1/2	2-1/16	5-1/16	17-3/4	12	16	150	72	105
(50)	(368)	(52)	(129)	(451)	(305)	-	(68)	(33)	(48)
3	18-1/2	3-3/16	7-5/16	23-7/8	12	20	295	215	242
(80)	(470)	(81)	(186)	(606)	(305)	-	(134)	(98)	(110)
4	21-1/2	4-1/8	9-1/16	28-1/2	18	20	530	403	325
(100)	(546)	(105)	(230)	(724)	(457)	-	(240)	(183)	(147)

Flange dimensions conform to American National Standards Institute Standard B16.5, 1981. Information on power-actuated and other types of valves available on application.

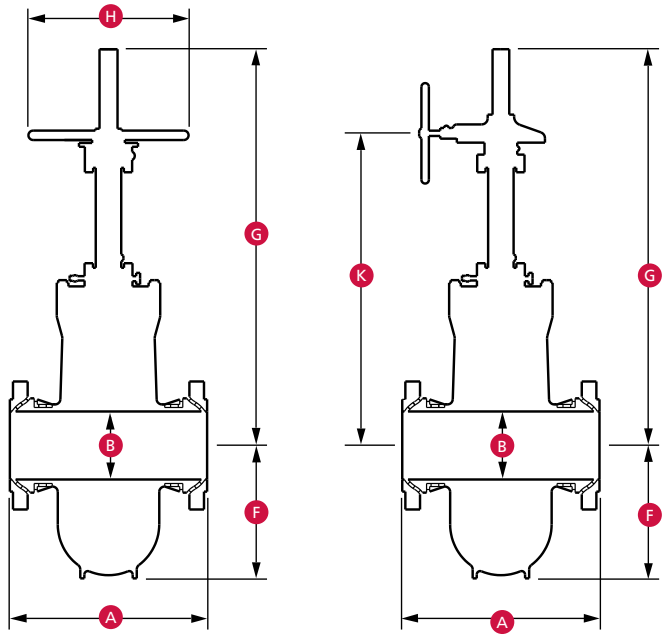
6” to 12” (150 mm to 300 mm) Classes 300 and 600

MODELS E1C
(HANDWHEEL AND BEVEL GEAR OPERATED)

Max. WP at 100˚ F (38˚ C)	
Class 300:	750 psi CWP 1125 psi Test
Class 600:	1500 psi CWP 2250 psi Test
Class 900:	2250 psi CWP 3375 psi Test
Class 1500:	3750 psi CWP 5625 psi Test

PRINCIPAL DIMENSIONS

N = Number of turns of handwheel or bevel gear operator handwheel to fully open or close valve.



Handwheel Operated Bevel Gear Operated

Class 300

Size in. (mm)	A	B	F	G HWO	G BGO	H	K	N HWO	N BGO	Weight lb (kg) HWO			Weight lb (kg) BGO		
										FE	WE	F x W	FE	WE	F x W
6 (150)	15-7/8 (403)	6 (152)	12-1/2 (318)	45-1/4 (1149)	46-1/4 (1175)	24 (610)	30-11/16 (779)	29 -	114 -	472 (214)	397 (180)	400 (181)	500 (227)	445 (202)	470 (213)
8 (200)	16-1/2 (419)	8 (203)	16 (406)	57-1/4 (1454)	56-1/4 (1429)	24 (610)	36-11/16 (932)	37 -	146 -	853 (387)	751 (341)	805 (365)	903 (410)	845 (383)	895 (406)
10 (250)	18 (457)	10 (254)	20 (508)	63-1/4 (1607)	64-1/4 (1632)	24 (610)	44-11/16 (1135)	45 -	180 -	1345 (610)	1200 (544)	1273 (577)	1475 (669)	1380 (626)	1448 (657)
12* (300)	30 (762)	12 (305)	22-3/4 (578)	73-3/8 (1864)	74-5/8 (1895)	30 (762)	51-11/16 (1313)	40 -	239 -	-	-	-	1950 (885)	1670 (757)	1880 (853)

Class 600

6 (150)	22 (559)	6 (152)	12-5/8 (321)	45-1/4 (1149)	46-1/4 (1175)	24 (610)	30-11/16 (779)	29 -	114 -	595 (270)	495 (225)	545 (247)	695 (315)	575 (261)	635 (288)
8 (200)	26 (660)	8 (203)	15-1/2 (394)	57-1/4 (1454)	56-1/4 (1429)	24 (610)	36-11/16 (932)	37 -	146 -	1028 (466)	730 (331)	865 (392)	1075 (488)	895 (406)	990 (449)
10 (250)	31 (787)	10 (254)	19-3/4 (502)	64-7/8 (1648)	66-1/8 (1680)	24 (610)	45-3/16 (1148)	34 -	203 -	1735 (787)	1370 (621)	1505 (683)	1895 (860)	1585 (719)	1835 (832)
12 (300)	33 (838)	12 (305)	23 (584)	73-3/8 (1864)	74-5/8 (1895)	30 (762)	51-11/16 (1313)	40 -	239 -	2525 (1145)	2360 (1070)	2480 (1125)	3030 (1374)	2250 (1021)	2360 (1070)

* 12” (300 mm) Class 300 valves have Class 400 end-to-end dimensions.

6” to 12” (150 mm to 300 mm) Classes 900 and 1500 (RTJ)

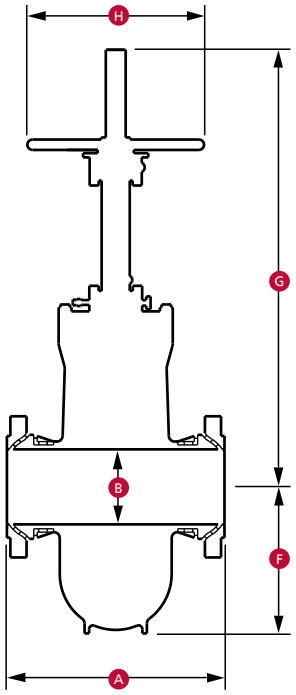
MODELS E1C

(HANDWHEEL AND BEVEL GEAR OPERATED)

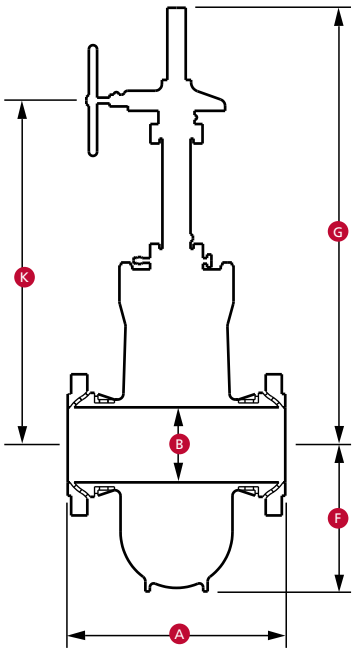
Max. WP at 100˚ F (38˚ C)	
Class 300:	750 psi CWP 1125 psi Test
Class 600:	1500 psi CWP 2250 psi Test
Class 900:	2250 psi CWP 3375 psi Test
Class 1500:	3750 psi CWP 5625 psi Test

PRINCIPAL DIMENSIONS

N = Number of turns of handwheel or bevel gear operator handwheel to fully open or close valve.



Handwheel-Operated



Bevel-Gear Operated

Class 900

Size in. (mm)	A	B	F	G HWO	G BGO	H	K	N HWO	N BGO	Weight lb (kg) HWO			Weight lb (kg) BGO		
										FE	WE	F x W	FE	WE	F x W
6 (150)	24 (610)	6 (152)	12-7/8 (327)	45-1/4 (1149)	46-1/4 (1175)	24 (610)	30-3/4 (781)	29 -	114 -	743 (337)	577 (262)	625 (283)	805 (365)	565 (256)	680 (308)
8 (200)	29 (737)	8 (203)	15-3/4 (400)	57-1/4 (1454)	56-1/4 (1429)	24 (610)	36-3/4 (933)	37 -	146 -	1272 (577)	1040 (472)	1180 (535)	1329 (603)	1180 (535)	1238 (562)
10 (250)	33 (838)	10 (254)	20-1/8 (511)	64-7/8 (1648)	66-1/8 (1680)	30 (762)	45-1/4 (1149)	34 -	203 -	2250 (1021)	1930 (875)	2085 (946)	2315 (1050)	1875 (850)	2185 (991)
12 (300)	38 (965)	12 (305)	23-1/2 (597)	-	73-3/4 (1873)	30 (762)	56-5/8 (1438)	40 -	318 -	3392 (1539)	2725 (1236)	2860 (1297)	3600 (1633)	2880 (1306)	3276 (1486)

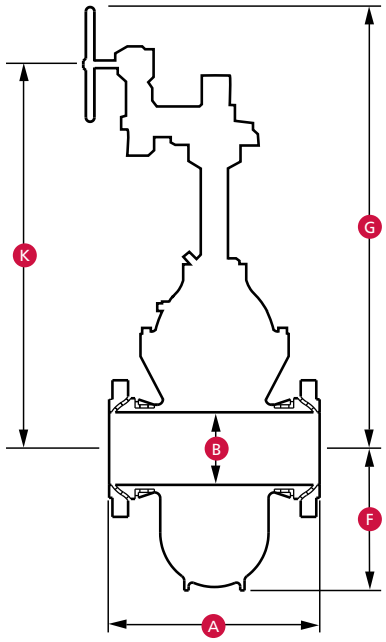
Class 1500 (RTJ)

6 (150)	28 (711)	5-3/4 (146)	14-5/8 (371)	-	61 (1549)	-	49 (1245)	22 -	-	-	-	-	1735 (788)	1486 (676)	1611 (732)
8 (200)	33-1/8 (841)	7-5/8 (194)	18-1/4 (464)	-	66-1/2 (1689)	-	54-1/2 (1384)	29 -	-	-	-	-	3181 (1446)	2979 (1354)	3080 (1400)
10 (250)	39-3/8 (1000)	9-1/2 (241)	22-1/4 (565)	-	79 (2007)	-	67 (1702)	36 -	-	-	-	-	4094 (1861)	3492 (1587)	3793 (1724)
12 (300)	45-1/8 (1146)	11-3/8 (289)	26-3/8 (670)	-	90 (2286)	-	72 (1829)	-	-	-	-	-	7603 (3456)	6443 (2929)	7028 (3195)

* 12” (300 mm) Class 300 valves have Class 400 end-to-end dimensions.

14” to 24” (350 mm to 600 mm) Classes 300, 600, and 900

MODELS E1C
(BEVEL GEAR OPERATED)



Max. WP at 100˚ F (38˚ C)	
Class 300:	750 psi CWP 1125 psi Test
Class 600:	1500 psi CWP 2250 psi Test
Class 900:	2250 psi CWP 3375 psi Test

PRINCIPAL DIMENSIONS

N = Number of turns of handwheel or bevel gear operator handwheel to fully open or close valve.

Class 300

Size in. (mm)	A	B	F	G	K	N	Weight lb (kg)		
							FE	WE	F x W
14* (350)	32-1/2 (826)	13-1/4 (337)	25-1/4 (641)	65-7/8 (1673)	53 (1346)	177 -	2632 (1194)	2230 (1012)	2500 (1134)
16 (400)	33 (838)	15-1/4 (387)	28-1/8 (714)	83-9/16 (2122)	58-3/8 (1483)	167 -	3450 (1565)	3015 (1368)	3310 (1501)
18 (450)	36 (914)	17-1/4 (438)	31 (787)	86-13/16 (2205)	65-5/16 (1659)	190 -	4650 (2109)	4260 (1932)	4375 (1984)
20 (500)	39 (991)	19-1/4 (489)	35-1/4 (895)	106-1/4 (2699)	73-7/8 (1876)	211 -	6248 (2834)	5780 (2622)	6000 (2722)
24* (600)	48-1/2 (1232)	23-1/4 (591)	42 (1067)	115-3/4 (2940)	86-3/8 (2194)	253 -	10,678 (4843)	9550 (4332)	10,240 (4645)

Class 600

14 (350)	35 (889)	13-1/4 (337)	25-9/16 (649)	69-3/4 (1772)	53-1/2 (1359)	177 -	3240 (1470)	2931 (1329)	3000 (1361)
16 (400)	39 (991)	15-1/4 (387)	28-1/8 (714)	81-1/8 (2061)	61-1/4 (1556)	167 -	4420 (2005)	3950 (1792)	4160 (1887)
18 (450)	43 (1092)	17-1/4 (438)	31-5/8 (803)	86-1/2 (2197)	66-5/8 (1692)	190 -	5705 (2588)	5115 (2320)	5200 (2359)
20 (500)	47 (1194)	19-1/4 (489)	36 (914)	98-1/8 (2492)	73-7/8 (1876)	211 -	7595 (3445)	7115 (3227)	6605 (2996)
24 (600)	55 (1397)	23-1/4 (591)	42-1/4 (1073)	113-1/2 (2883)	87-7/8 (2232)	253 -	12,994 (5894)	11,380 (5162)	12,730 (5774)

Class 900

14 (350)	40-1/2 (1029)	12-3/4 (324)	26-1/8 (664)	69-3/4 (1772)	53-1/2 (1359)	-	5200 (2359)	4902 (2224)	4902 (2224)
16 (400)	44-1/2 (130)	14-3/4 (375)	30-1/4 (768)	81-1/8 (2061)	66-5/8 (1692)	174 -	7346 (3332)	6435 (2919)	6959 (3155)
18 (450)	48 (1219)	16-3/4 (425)	33 (838)	92 (2337)	-	-	11,814 (5359)	10,226 (4638)	11,020 (4999)
20 (500)	52 (1321)	18-5/8 (473)	36 (914)	103 (2616)	-	-	15,581 (7067)	14,265 (6470)	14,866 (6743)
24 (600)	61 (1549)	22-1/2 (572)	44-1/2 (1130)	113-1/2 (2883)	87-7/8 (2232)	-	20,467 (9284)	18,561 (8419)	19,887 (9021)

*14” to 24” (350 mm to 600 mm) Class 300 valves have Class 400 end-to-end dimensions.
Note: 30” and 36” (750 mm and 900 mm). Class 300 and 600 prices are available upon request.

OPERATOR SIZING REQUIREMENTS

Model M – 2″ to 4″ (50 mm to 100 mm) ASME Classes 150 to 1500

Valve Size in. (mm)	ASME Class	ASME Working Pressure (psig)	Stem Thread			Recommended Operating Thrust (lbf)	Recommended Operating Torque (ft-lbf)	Block-and-Bleed Thrust (lbf)	Block-and-Bleed Torque (ft-lbf)	Maximum Allowable Thrust (lbf)	Maximum Allowable Torque (ft-lbf)	Total Stem Travel in. (mm)	Stem Nut Turns-to-Open Valve
			Size in.	Pitch in.	Lead in.								
2 (50)	150	290	0.875	0.167	0.167	457	3	535	4	12,597	93	2.63 (67)	16
2 (50)	300	750	0.875	0.167	0.167	1183	9	1383	10	12,597	93	2.63 (67)	16
2 (50)	600	1500	0.875	0.167	0.167	2366	17	2766	20	12,597	93	2.63 (67)	16
2 (50)	900	2250	0.875	0.167	0.167	3549	26	4149	30	12,597	93	2.63 (67)	16
2 (50)	1500	3750	0.875	0.167	0.167	5914	43	6915	51	12,597	93	2.63 (67)	16
3 (80)	150	290	1.000	0.200	0.200	803	7	1115	9	16,027	136	4.03 (102)	21
3 (80)	300	750	1.000	0.200	0.200	2078	18	2884	25	16,027	136	4.03 (102)	21
3 (80)	600	1500	1.000	0.200	0.200	4155	35	5769	49	16,027	136	4.03 (102)	21
3 (80)	900	2250	1.000	0.200	0.200	6233	53	8653	74	16,027	136	4.03 (102)	21
3 (80)	1500	3750	1.000	0.200	0.200	10,388	88	14,422	123	16,027	136	4.03 (102)	21
4 (100)	150	290	1.250	0.250	0.250	1327	14	1783	19	25,442	271	4.88 (124)	20
4 (100)	300	750	1.250	0.250	0.250	3432	37	4610	49	25,442	271	4.88 (124)	20
4 (100)	600	1500	1.250	0.250	0.250	6864	73	9221	98	25,442	271	4.88 (124)	20
4 (100)	900	2250	1.250	0.250	0.250	10,297	110	13,831	147	25,442	271	4.88 (124)	20
4 (100)	1500	3750	1.250	0.250	0.250	17,161	183	23,052	245	25,442	271	4.88 (124)	20

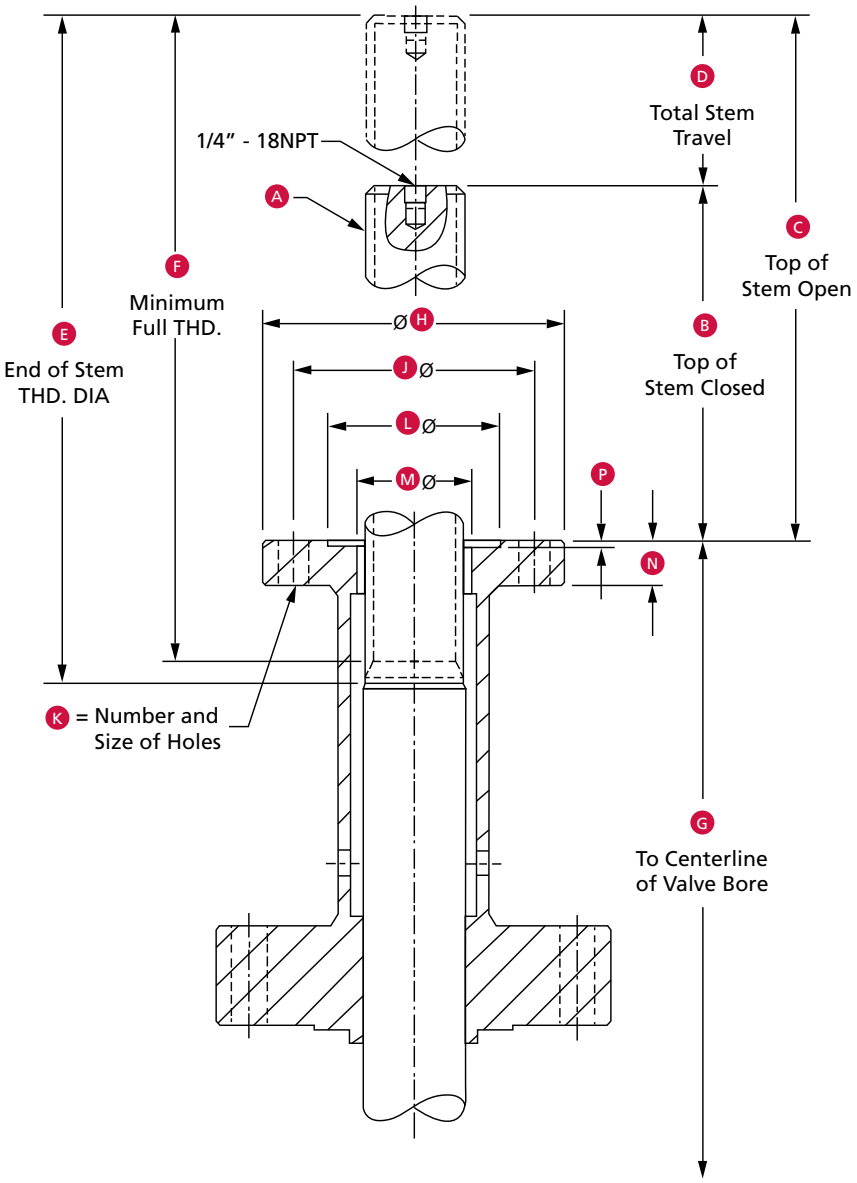
Model E1C – 6″ to 24″ (150 mm to 600 mm) ASME Classes 300 to 900

Valve Size in. (mm)	ASME Class	ASME Working Pressure (psig)	Stem Thread			Recommended Operating Thrust (lbf)	Recommended Operating Torque (ft-lbf)	Block-and-Bleed Thrust (lbf)	Block-and-Bleed Torque (ft-lbf)	Maximum Allowable Thrust (lbf)	Maximum Allowable Torque (ft-lbf)	Total Stem Travel in. (mm)	Stem Nut Turns-to-Open Valve
			Size in.	Pitch in.	Lead in.								
6 (150)	300	750	1.50	0.250	0.250	6626	82	8179	101	21,711	267	7.19 (183)	29
6 (150)	600	1500	1.50	0.250	0.250	13,252	163	16,358	201	21,711	267	7.19 (183)	29
6 (150)	900	2250	1.50	0.250	0.250	19,878	245	24,538	302	33,158	408	7.19 (183)	29
8 (200)	300	750	1.75	0.250	0.250	10,705	149	12,626	176	23,678	329	9.12 (232)	36
8 (200)	600	1500	1.75	0.250	0.250	21,410	298	25,253	351	26,577	370	9.12 (232)	36
8 (200)	900	2250	1.75	0.250	0.250	32,115	447	37,879	527	42,377	590	9.12 (232)	36
10 (250)	300	750	2.25	0.333	0.333	16,462	296	19,385	349	36,141	651	11.31 (287)	34
10 (250)	600	1500	2.25	0.333	0.333	32,924	593	3871	698	46,433	836	11.31 (287)	34
10 (250)	900	2250	2.25	0.333	0.333	49,386	889	58,156	1047	76,635	1380	11.31 (287)	34
12 (300)	300	750	2.25	0.333	0.333	21,911	395	27,588	497	52,472	945	13.38 (340)	40
12 (300)	600	1500	2.25	0.333	0.333	43,822	789	55,175	994	64,733	1166	13.38 (340)	40
12 (300)	900	2250	2.25	0.333	0.333	65,732	1184	82,763	1490	84,560	1523	13.38 (340)	40
14 (350)	300	750	2.00	0.250	0.500	25,138	477	32,355	614	78,209	1485	14.88 (378)	30
14 (350)	600	1500	2.00	0.250	0.500	50,276	955	64,709	1229	78,209	1485	14.88 (378)	30
14 (350)	900	2250	2.25	0.333	0.333	72,608	1308	101,857	1835	110,039	1982	14.88 (378)	45
16 (400)	300	750	2.50	0.400	0.800	33,517	868	39,174	1015	108,946	2822	16.88 (429)	21
16 (400)	600	1500	2.50	0.400	0.800	67,035	1736	78,348	2029	108,946	2822	16.88 (429)	21
16 (400)	900	2250	2.75	0.400	0.800	97,481	2681	146,275	4022	162,485	4468	17.38 (441)	22
18 (450)	300	750	2.50	0.400	0.800	41,440	1073	48,846	1265	113,120	2930	18.94 (481)	24
18 (450)	600	1500	2.50	0.400	0.800	82,881	2147	97,691	2530	113,120	2930	18.94 (481)	24
18 (450)	900	2250	3.00	0.400	0.400	123,194	2901	173,424	4084	185,236	4362	19.88 (505)	50
20 (500)	300	750	2.75	0.400	0.800	51,116	1406	60,201	1655	113,120	3111	21.12 (536)	27
20 (500)	600	1500	2.75	0.400	0.800	102,231	2811	120,401	3311	129,553	3562	21.12 (536)	27
20 (500)	900	2250	3.5	0.400	0.800	153,347	4953	248,075	8031	253,737	8196	21.12	27
22 (550)	300	No Design											
22 (550)	600	1500	3.00	0.400	0.800	123,768	3601	149,487	4349	118,661	3453	23.25 (591)	29
22 (550)	900	No Design											
24 (600)	300	750	3.00	0.400	0.800	72,557	2111	91,789	2671	113,120	3291	25.25 (641)	32
24 (600)	600	1500	3.00	0.400	0.800	145,115	4222	183,577	5341	203,038	5908	25.25 (641)	32
24 (600)	900	2250	3.75	0.400	0.800	214,524	7273	356,572	12,089	351,789	11,927		

Note:
1. Use recommended operating thrust and torques for sizing bevel gear operators.
2. Use block-and-bleed thrusts and torques for sizing power operators (electric, gas, hydraulic, etc.).
3. Maximum operating thrust and torques are the maximum allowable for the valve.

OPERATOR INTERFACE

The operator interface on 6" through 12" (150 mm through 300 mm) valves is manufactured to comply with ISO 5210 and MSS-SP-102.
The operator interface on 14" (350 mm) and larger valves is manufactured to comply with MSS-SP-102.



OPERATOR INTERFACE DIMENSIONS TOPWORKS DATA

Imperial

Size in.	Class	MSS FLG	A-NA-2G-L.H.	B	C	D	E	F	G	H	J	K	L	M	N	P
6	3-9C	FA14	1-1/2-.250P-.250L Single Lead Thread	8.31	15.50	7.19	16.44	16.06	26.88	7.00	5.50	4-0.69	3.955 3.945	2.50	1.03	0.178
8	3-9C	FA14	1-3/4-.250P-.250L Single Lead Thread	8.44	17.56	9.12	18.94	18.56	32.00	7.00	5.50	4-0.69	3.955 3.945	2.50	1.03	0.178
10	3-9C	FA16	2.25-.333P-.333L Single Lead Thread	9.38	20.69	11.31	24.38	24.00	42.13	8.38	6.50	4-0.81	5.230 5.220	3.12 3.75	1.50 2.75	0.230
12	3-6C	FA16	2.25-.333P-.333L Single Lead Thread	11.50	24.88	13.38	26.06	25.69	45.44	8.38	6.50	4-0.81	5.230 5.220	3.12	1.50	0.230
	9C	FA16	2.25-.333P-.333L Single Lead Thread	11.34	24.75	13.38	26.06	25.69	45.56	8.38	6.50	4-0.81	5.230 5.220	3.12	1.50	0.230
14	3-6C	FA16	2-.250P-.500L Double Lead Thread	9.56	24.38	14.81	27.50	26.88	50.44	8.38	6.50	4-0.81	5.230 5.220	3.12	1.50	0.230
16	3-6C	FA25	2-1/2-.400P-.800L Double Lead Thread	10.19	27.06	16.88	31.19	30.56	56.50	11.50	10.00	8-0.69	6.020 6.010	3.75	2.00	0.230
18	3-6C	FA25	2-1/2-.400P-.800L Double Lead Thread	9.31	28.25	18.94	32.69	32.19	63.88	11.50	10.00	8-0.69	6.020 6.010	3.75	2.00	0.230
20	3C	FA25	2-3/4-.400P-.800L Double Lead Thread	11.50	32.62	21.12	37.00	36.44	70.31	11.50	10.00	8.-0.69	6.020 6.010	3.75	2.00	0.230
	6C	FA30	2-3/4-.400P-.800L Double Lead Thread	11.50	32.62	21.12	37.00	36.44	70.31	13.62	11.75	8-0.81	7.020 7.010	3.75	2.75	0.230
24	3C	FA25	3-.400P-.800L Double Lead Thread	12.37	37.62	25.25	43.06	42.56	85.19	11.50	10.00	8-.069	6.020 6.010	3.75	2.00	0.230
	6C	FA35	3-.400P-.800L Double Lead Thread	12.37	37.62	25.25	43.06	42.56	85.19	16.12	14.00	8-1.12	8.520 8.510	4.00	3.25	0.230

Metric

Size mm	Class	MSS FLG	A-NA-2G-L.H.	B	C	D	E	F	G	H	J	K	L	M	N	P
150	3-9C	FA14	38.1-.250P-.250L Single Lead Thread	211	394	183	418	408	683	178	140	4-17.53	100.46 100.20	63.5	26.16	4.52
200	3-9C	FA14	44.45-.250P-.250L Single Lead Thread	214	446	232	481	471	813	178	140	4-17.53	100.46 100.20	63.5	26.16	4.52
250	3-9C	FA16	57.15-.333P-.333L Single Lead Thread	238	526	287	619	610	1070	213	165	4-20.57	132.84 132.59	79.25 95.25	38.1 69.85	5.84
300	3-6C	FA16	57.15-.333P-.333L Single Lead Thread	292	632	340	662	653	1154	213	165	4-20.57	132.84 132.59	79.25	38.1	5.84
	9C	FA16	57.15-.333P-.333L Single Lead Thread	288	629	340	662	653	1157	213	165	4-20.57	132.84 132.59	79.25	38.1	5.84
350	3-6C	FA16	50.8-.250P-.500L Double Lead Thread	243	619	376	699	683	1281	213	165	4-20.57	132.84 132.59	79.25	38.1	5.84
400	3-6C	FA25	63.5-.400P-.800L Double Lead Thread	259	687	429	792	776	1435	292	254	8-17.53	152.91 152.65	95.25	50.8	5.84
450	3-6C	FA25	63.5-.400P-.800L Double Lead Thread	9.31	718	481	830	818	1623	292	254	8-17.53	152.91 152.65	95.25	50.8	5.84
500	3C	FA25	69.85-.400P-.800L Double Lead Thread	292	829	536	940	926	1786	292	254	8-17.53	152.91 152.65	95.25	50.8	5.84
	6C	FA30	69.85-.400P-.800L Double Lead Thread	292	829	536	940	926	1786	346	298	8-20.57	178.31 178.10	95.25	69.85	5.84
600	3C	FA25	76.2-.400P-.800L Double Lead Thread	314	956	641	1094	1081	2164	292	254	8-17.53	152.91 152.65	95.25	50.8	5.84
	6C	FA35	76.2-.400P-.800L Double Lead Thread	314	956	641	1094	1081	2164	409	356	8-28.45	216.41 216.15	101.6	82.55	5.84

FLOW COEFFICIENTS (C_V)

The following chart outlines the C_V for through conduit gate valves having end-to-end dimensions and bore diameters in compliance with API 6D.*

Since C_V is a calculated number, the actual value may vary.

Valve Size in. (mm)	300	400	600	900	1500	2500
2 (50)	432	378	378	337	337	218
3 x 2 (80 x 50)	-	165	165	203	239	-
2-1/2 (65)	-	682	682	558	558	305
3 (80)	1155	1053	1109	1072	966	474
4 x 3 (100 x 80)	-	534	529	597	677	624
4 (100)	2176	1925	1944	1890	1730	725
6 x 4 (150 x 100)	-	886	944	943	1231	-
6 (150)	5300	4860	4577	4383	3622	2510
8 x 6 (200 x 150)	2499	-	3240	3588	2137	-
8 (200)	11,054	9345	8886	8416	6879	5227
10 x 8 (250 x 200)	5218	-	5036	7975	4859	-
12 x 8 (300 x 200)	3302	-	3892	-	-	-
10 (250)	18,856	15,771	14,533	14,087	11,283	8313
12 (300) (Note 1)	228,980	23,834	22,729	21,025	16,843	12,282
12 x 10 (300 x 250)	-	-	12,799	7299	-	-
14 (350) (Note 1)	30,883	29,921	28,837	23,846	20,336	-
16 x 14 (400 x 350)	-	-	21,096	-	-	-
16 (400)	42,224	41,022	39,144	33,358	27,548	21,396
20 x 16 (500 x 400)	-	15,761	-	-	-	-
18 (450)	55,740	54,277	51,368	45,004	-	-
20 (500)	70,386	68,680	64,559	56,871	-	-
22 (550)	86,869	85,422	80,279	-	-	-
24 (600) (Note 1)	106,835	103,504	97,240	84,836	-	-
26 (650)	123,222	120,829	114,905	-	-	-
28 (700)	144,355	142,391	135,267	-	-	-
30 (750)	170,229	163,776	157,401	133,706	-	-
36 (900)	245,362	236,147	224,424	-	-	-

* As Applicable.
Notes: 1. Class 300 valves have Class 400 end-to-ends in these size Pow-R-Seal designs. Use the Class 400 C_V.

FLOW COEFFICIENTS (K_V)

The following chart outlines the K_V for through conduit gate valves having end-to-end dimensions and bore diameters in compliance with API 6D.*

Since K_V is a calculated number, the actual value may vary.

Valve Size in. (mm)	300	400	600	900	1500	2500
2 (50)	373	327	327	291	291	188
3 x 2 (80 x 50)	-	142	145	175	207	-
2-1/2 (65)	-	590	590	483	483	264
3 (80)	999	911	959	927	835	410
4 x 3 (100 x 80)	-	462	458	516	585	540
4 (100)	1882	1665	1682	1635	1496	627
6 x 4 (150 x 100)	-	766	817	816	1065	-
6 (150)	4585	4204	3959	3792	3133	2172
8 x 6 (200 x 150)	2162	-	2803	3103	1849	-
8 (200)	9562	8084	7687	7280	5951	4522
10 x 8 (250 x 200)	4514	-	4356	6898	4204	-
12 x 8 (300 x 200)	2857	-	3367	-	-	-
10 (250)	16,312	13,643	12,572	12,186	9761	7191
12 (300) (Note 1)	25,070	20,617	19,662	18,188	14,570	10,624
12 x 10 (300 x 250)	-	-	11,072	6314	-	-
14 (350) (Note 1)	26,715	25,883	24,945	20,628	17,591	-
16 x 14 (400 x 350)	-	-	-	-	-	-
16 (400)	-	-	18,249	-	-	-
20 x 16 (500 x 400)	36,526	35,486	33,862	28,856	23,831	18,509
18 (450)	-	13,634	-	-	-	-
20 (500)	48,218	46,953	44,436	38,930	-	-
22 (550)	60,888	59,412	55,847	49,196	-	-
24 (600) (Note 1)	75,147	73,894	69,445	-	-	-
26 (650)	92,417	89,536	84,117	73,388	-	-
28 (700)	106,593	104,523	99,399	-	-	-
30 (750)	124,874	123,175	117,013	-	-	-
36 (900)	147,257	141,674	136,160	115,662	-	-
40 x 30 (1000 x 750)	-	-	-	60,464	-	-
36 (900)	212,251	204,279	194,138	-	-	-
42 x 36 (1050 x 900)	70,357	-	-	-	-	-
40 (1000)	266,697	265,814	265,814	-	-	-
42 (1050)	-	302,576	293,854	-	-	-
48 (1200)	-	-	408,871	-	-	-

* As Applicable.
Notes: 1. Class 300 valves have Class 400 end-to-ends in these size Pow-R-Seal designs. Use the Class 400 K_V.

PRESSURE TEMPERATURE RATINGS

Standard WCC Material

Temperature		Working Pressure by Class, psig					
°C	°F	150	300	400	600	900	1500
29° C to 38° C	20° F to 100° F	290	750	1000	1500	2250	3750
93° C	200° F	260	750	1000	1500	2250	3750
149° C	300° F	230	730	970	1455	2185	3640
204° C	400° F	200	705	940	1410	2115	3530
260° C	500° F	170	665	885	1330	1995	3325
316° C	600° F	140	605	805	1210	1815	3025
343° C	650° F	125	590	785	1175	1765	2940
371° C	700° F	110	570	755	1135	1705	2840
399° C	750° F	95	505	670	1010	1510	2520
427° C	800° F	80	410	550	825	1235	2060

Ref.: API 6D, ASME B16.34

Temperature		Working Pressure by Class, psig				
°C	°F	150	300	600	900	1500
-29° C to 38° C	-20° F to 100° F	19.8	51.7	103.4	155.1	258.6
50° C	122° F	19.5	51.7	103.4	155.1	258.6
100° C	212° F	17.7	51.5	103.0	154.6	257.6
150° C	302° F	15.8	50.2	100.3	150.5	250.8
200° C	392° F	13.8	48.6	97.2	145.8	243.2
250° C	482° F	12.1	46.3	97.2	139.0	231.8
300° C	572° F	10.2	42.9	85.7	128.6	214.4
325° C	617° F	9.3	41.4	82.6	124.0	206.6
350° C	662° F	8.4	40.0	80.0	120.1	200.1
375° C	707° F	7.4	37.8	75.7	113.5	189.2
400° C	752° F	6.5	34.7	69.4	104.2	173.6
425° C	797° F	5.5	28.8	57.5	86.3	143.8

General Notes: (a) Flanged end valve ratings terminate at 1000° F (538° C).

PRESSURE TEMPERATURE RATINGS

Standard WC6 Material

Temperature		Working Pressure by Class, psig				
°C	°F	150	300	600	900	1500
-29° C to 38° C	-20° F to 100° F	290	750	1500	2250	3750
93° C	200° F	260	750	1500	2250	3750
149° C	300° F	230	720	1445	2165	3610
204° C	400° F	200	695	1385	2080	3465
260° C	500° F	170	665	1330	1995	3325
316° C	600° F	140	605	1210	1815	3025
343° C	650° F	125	590	1175	1765	2940
371° C	700° F	110	570	1135	1705	2840
399° C	750° F	95	530	1065	1595	2660
427° C	800° F	80	510	1015	1460	2540
454° C	850° F	65	485	975	1350	2435
482° C	900° F	50	450	900	955	2245
510° C	950° F	35	320	640	650	1595
538° C	1000° F	20	215	430	430	1080

Temperature		Working Pressure by Class, psig				
°C	°F	150	300	600	900	1500
-28° C to 38° C	-20° F to 100° F	19.8	51.7	103.4	155.1	258.6
50° C	122° F	19.5	51.7	103.4	155.1	258.6
100° C	212° F	17.7	51.5	103.0	154.4	257.4
150° C	302° F	15.8	49.7	99.5	149.2	248.7
200° C	392° F	13.8	48.0	95.9	143.9	239.8
250° C	482° F	12.1	46.3	92.7	139.0	231.8
300° C	572° F	10.2	42.9	85.7	128.6	214.4
325° C	617° F	9.3	41.4	82.6	124.0	206.6
350° C	662° F	8.4	40.3	80.4	120.7	201.1
375° C	707° F	7.4	38.9	77.6	116.5	194.1
400° C	752° F	6.5	36.5	73.3	109.8	183.1
425° C	797° F	5.5	35.2	70.0	105.1	175.1
450° C	842° F	4.6	33.7	67.7	101.4	169.0
475° C	887° F	3.7	31.7	63.4	95.1	158.2
500° C	932° F	2.8	25.7	51.5	77.2	128.6
538° C	1000° F	1.4	14.9	29.8	44.7	74.5

General Notes: (a) Flanged end valve ratings terminate at 1000° F (538° C).

TRIM CHART

Service	Trim Code	Body and Bonnet	Gate and Segment	Seat	Stem Seal	Stem	Bolting	Fittings	Temperature Range
Waterflood, Corrosive	T-10	WCC Carbon Steel, Nickel-Plated	Carbon Steel 300-600, Low Alloy 900 Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low Alloy Steel, Nickel-Plated	Alloy Steel NACE	Stainless Steel	-20° F to 250° F (-29° C to 121° C)
Standard 2"- 4" only	T-11	WCC Carbon Steel	Carbon Steel, Low Alloy Steel, Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	FKM Viton	Low Alloy Steel, Nickel-Plated	Alloy Steel	Carbon Steel	-20° F to 250° F (-29° C to 121° C)
Sour, Mildly Corrosive 2" and larger	T-24	WCC Carbon Steel	Carbon Steel 300-600, Low Alloy 900 Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low Alloy Steel, Nickel-Plated	Alloy Steel NACE	Stainless Steel	-20° F to 250° F (-29° C to 121° C)
High-Temperature	T-30	WCC Carbon Steel	CA6NM Stainless Steel, HF-6 Hard Faced	Carbon Steel, HF-6 Hard Faced	Flexible Graphite	400 Series Stainless Steel	Alloy Steel	Stainless Steel	-20° F to 650° F (-29° C to 343° C)
High-Temperature	T-31	WC6 Carbon Steel	CA6NM Stainless Steel, HF-6 Hard Faced	A182 F11 Carbon Steel, HF-6 Hard Faced	Flexible Graphite	400 Series Stainless Steel	Alloy Steel	Stainless Steel	-20° F to 1000° F (-29° C to 538° C)
Low-Temperature, Non-Sour	T-36	LCC Carbon Steel Impact-Tested	Nickel-Plated Carbon Steel 300-600 Low Alloy Steel 900 Class	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low Alloy Steel, Impact Nickel-Plated	Alloy Steel, Impact-Tested	Stainless Steel	-50° F to 250° F (-46° C to 121° C)
Low-Temperature, Sour	T-37	LCC Carbon Steel Impact-Tested	Nickel-Plated Carbon Steel 300-600 Low Alloy Steel 900 Class	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low Alloy Steel, Impact Nickel-Plated	Alloy Steel, Impact-Tested	Stainless Steel	-50° F to 250° F (-49° C to 121° C)
Standard 6" and larger	T-101	WCC Carbon Steel	Carbon Steel 300-600, Low Alloy 900 Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low Alloy Steel, Impact Nickel-Plated	Alloy Steel	Carbon Steel	-20° F to 250° F (-29° C to 121° C)
Standard Special Services 6" and larger	T-102	WCC Carbon Steel	Carbon Steel 300-600, Low Alloy 900 Nickel-Plated	Carbon Steel, Nickel-Plated PTFE Insert	PTFE	Low Alloy Steel, Impact Nickel-Plated	Alloy Steel	Carbon Steel	-20° F to 250° F (-29° C to 121° C)

COMMON TRIMS

Waterflood (Uninhibited) (T-10) – Carbon steel body/bonnet with wetted surface, ENP-plated, internal parts of corrosion-resistant materials.

Model M (Sizes 2" to 4", (50 mm to 100 mm), Classes 600 through 1500) Standard (T-11) – For non-corrosive aromatic service with concentration of MTBE to 100%.

Sour Gas and Oil (NACE MR0175) (T-24) – Primarily for sour gas and oil (NACE MR0175) where resistance to H_2S embrittlement is required. Also suitable for other chemicals, products or hydrocarbons when H_2S is present. May be used when CO_2 is present in smaller amounts than H_2S.

High-Temperature -20° F to 650° F (-29° C to 343° C) (T-30) – For higher temperature service where the corrosion resistance and wire drawing resistance of the stainless internals with stellite overlay are suitable. The limiting temperature is a function of the body material which follows the appropriate pressure rating table. (Ref. ASME Std. B16.34, 1977).

High-Temperature Up to 1000° F (538° C) (T-31) – For service above 550° F (288° C). Same qualifications as T-30, except metal-to-metal seating is only required for temperatures from 650° F to 1000° F (343° C to 538° C).

Low-Temperature -50° F (-46° C) NACE (T-36) – For essentially non-corrosive ladings, either liquid or gaseous. The pressure-retaining components (body, bonnet and bolting) are of impact-tested materials.

Low-Temperature Sour -50° F (-46° C) NACE (T-37) – Primarily for sour gas and oil (NACE MR0175) where resistance to H_2S embrittlement is required at -50° F (-46° C) service. The pressure-retaining components (body, bonnet and bolting) are of impact-tested materials. Also suitable for other chemicals, products or hydrocarbons when H_2S is present. Can be used when CO_2 is present in smaller amounts than H_2S.

Aromatic (to 40% MTBE, Fire-Tested API 6FA or ISO 10497) (T-101) – For essentially non-corrosive, non-sour aromatic or non-aromatic service with methanol or ethanol based corrosion inhibitors where up to 40% MTBE may be present.

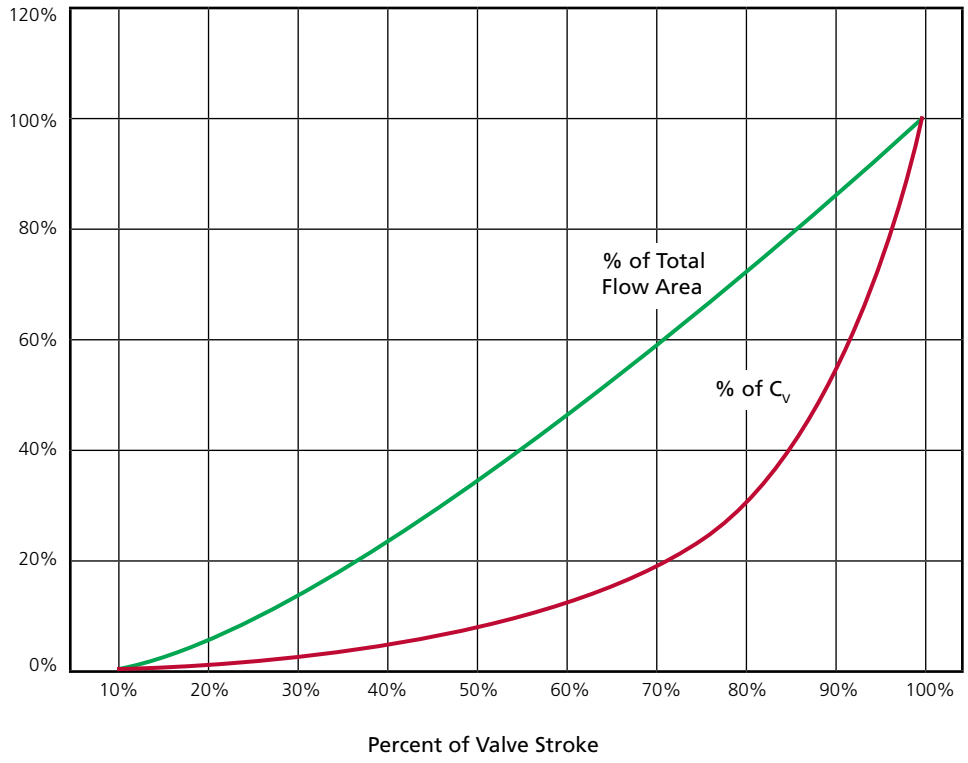
High-Aromatic (Special Services for 6" to 24" [150 mm to 600 mm], Classes 300 to 1500) (T-102) – For non-corrosive aromatic service with concentration of MTBE, Ethanol, Methanol to 100 percent.

PARTIAL OPEN FLOW CHARACTERISTICS

The following graph approximates the flow coefficient, C_V or K_V, of gate valves as a function of the valve stroke going from closed to open. Note that this is an estimation only because of assumptions made in the valve stroke, as well as unpredictable flow characteristics around the gate-seat bore in the partially open position.

Gate valves are intended for on-off service. Intermittent throttling such as pressure equalization service is acceptable. Continuous throttling is not recommended. This information is provided only to facilitate the engineering of systems in the transition between open and closed positions of the valves. One example might be to evaluate the possibility of water hammer in liquid pipelines.

Partial Open Flow Characteristics (Through-Conduit Gate Valves)



CAMSERV™ Aftermarket Services for Valves and Actuation

WE BUILD IT. WE BACK IT.

Global Network and Local Support

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.

Easily Accessible Parts and Spare Valves

- OEM spare valves, actuators, and parts (including non-Cameron brands)
- Handling, storage, packaging, and delivery
- Dedicated stocking program

Comprehensive Aftermarket Services Portfolio

- Parts and spare valves
- Repair
- Field services
- Preventative maintenance
- Equipment testing and diagnostics
- Remanufacturing
- Asset preservation
- Customer property management
- Training and recertification services
- Warranty

Customized Total Valve Care℠ (TVC) Programs

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

CAMERON

3250 Briarpark Drive, Suite 300
Houston, TX 77042
USA
Toll Free 1 800 323 9160

Learn more about WKM gate valves at:
www.c-a-m.com/WKM/gate
WKM@c-a-m.com

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.

CAMERON
A Schlumberger Company

WKM 320F

Flanged floating ball valves

Contents

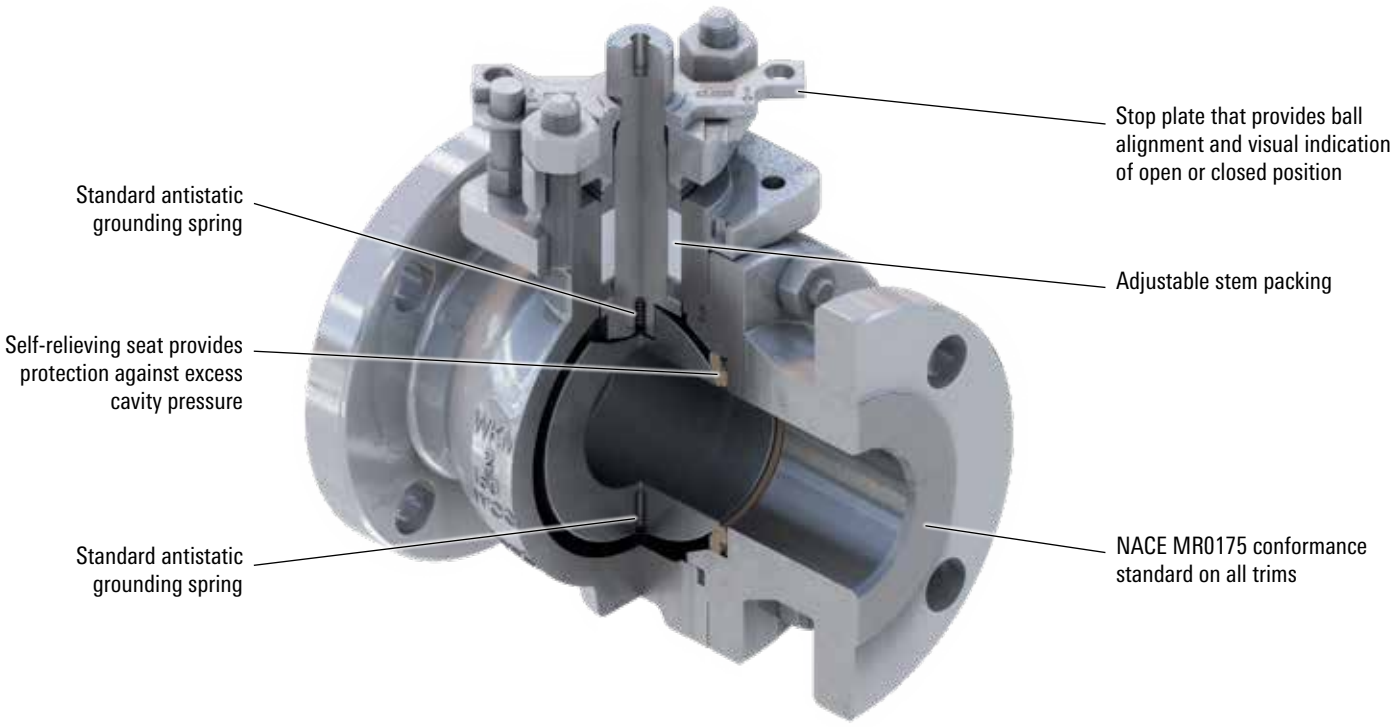
WKM 320F Flanged Floating Ball Valves

Features and Benefits

The handle can be correctly installed only in alignment with the ball port. The valve is open when the handle is aligned with piping and is closed when the handle is perpendicular to piping.

ASME Classes 150 through 600

½-in full port through 8-in reduced port
NACE MR0175/ISO 15156



WKM 320F* flanged floating ball valves satisfy a wide range of applications. Available in a variety of standard and optional materials, the valves are engineered for heavy-duty, maintenance-free performance and serve a variety of applications in virtually any industry.

Chemical and petrochemical plants
There is a wide range of chemical and petrochemical applications for WKM 320F ball valves. They serve in plastic plants, handling such slurries as 40% vinyl chloride in high-pressure catalyst lines, and in processes, handling dry lading such as polyethylene and polystyrene powders.

Refining
The WKM 320F ball valve is ideal for the refining industry. The many seats, seals, and trims available offer the versatility to handle the wide variety of products used in the refining process.

Low-temperature service
Standard trims accommodate temperatures to –20 degF [–29 degC], and temperature trims are available to –50 degF [–46 degC].

Maintenance-free performance
Under most conditions, the WKM 320F ball valve will provide years of trouble-free service with no maintenance required. In some severe applications, such as handling extremely abrasive slurries at high temperature, it may be necessary to replace the seats occasionally. Seat and seal kits are available, and replacement can be done easily with ordinary tools.

Sour oil and gas service
WKM* valves have served for years in gathering lines, manifolds, and field processing units in sour oil and gas fields. All trim combinations conform with NACE MR0175/ISO 15156.

Self-relieving seats
A patent-pending seat design provides automatic cavity relief without requiring a vented ball or external relief valve. API Spec 6D monogram is available upon request.

Actuation friendly
A variety of actuator types, including pneumatic, hydraulic, diaphragm, vane, electromechanical, and electrohydraulic, can be easily installed.

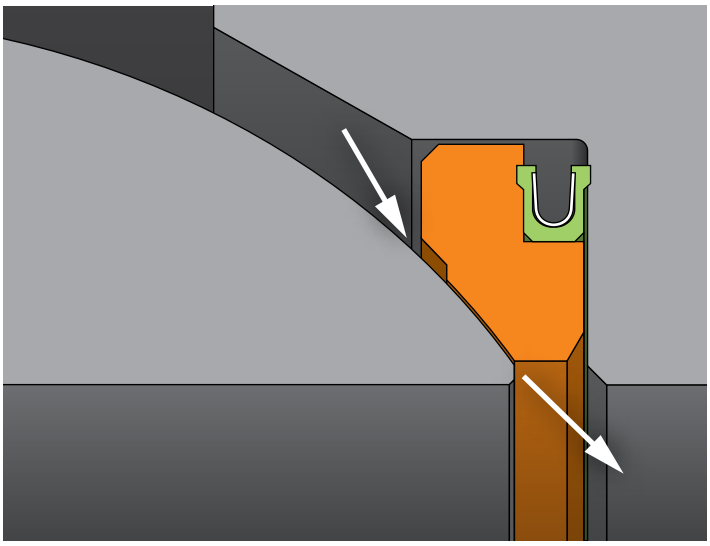
Fire tested for safety
All WKM 320F ball valves are qualified under API Standard 607 7th Ed. The seat and locked-in stem design contributes to its fire-tested characteristics. Should the soft seats be destroyed by fire, the ball floats downstream, providing a tight metal-to-metal seal against the lip of the seat pocket. If the tailpiece seals are destroyed, the metal-to-metal tailpiece-to-body connection retards external leakage.

Adjustable, replaceable packing
The inline valve stem packing options consist of PTFE and graphite. The packing is field adjustable and virtually never requires lubrication.

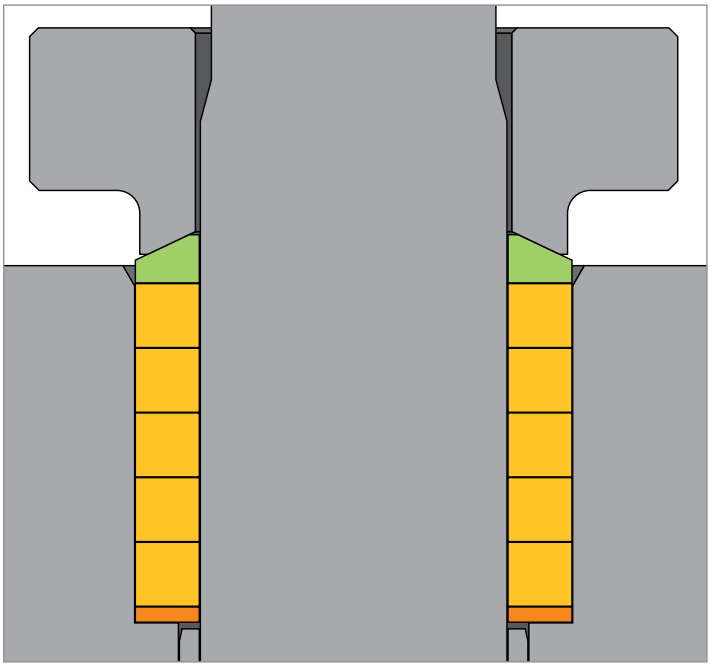
Fugitive emissions
WKM 320F ball valves can be supplied and certified to meet the requirements of fugitive emissions (FE) as regulated by ISO and API.

Positively retained stem
The stem is positively retained and cannot be removed with the valve in service.

Tight-sealing floating ball design
The ground, polished ball is free to float and mates perfectly with the conical seats for a positive, leak-proof seal. Self-cleaning and self-adjusting, the ball also is pressure activated—the higher the line pressure, the tighter the seal.



Seat that relieves excess cavity pressure to the upstream side of the valve.



Fugitive-emissions packing arrangement.

Specifications

ASME Classes 150 through 600

Operating temperatures

- From –50 to 500 degF [–46 to 260 degC]

Standard material

- Body
  - Carbon steel and stainless steel
- Ball and stem
  - Carbon steel and stainless steel
  - Optional materials available upon request

Industry compliance

- American Society of Mechanical Engineers (ASME) Standards B16.5 and B16.34
- Manufacturers Standardization Society Specifications MSS SP-25, 55, and 72
- API Spec 607 7th Ed. fire-test specification
- Canadian Registration Number (CRN)
- API Spec 608
- NACE MR0175
- ANSI Standard B16.34
- API Spec 6D upon request
- ISO or API fugitive emissions upon request
- European Pressure Equipment Directive (PED/CE) available upon request

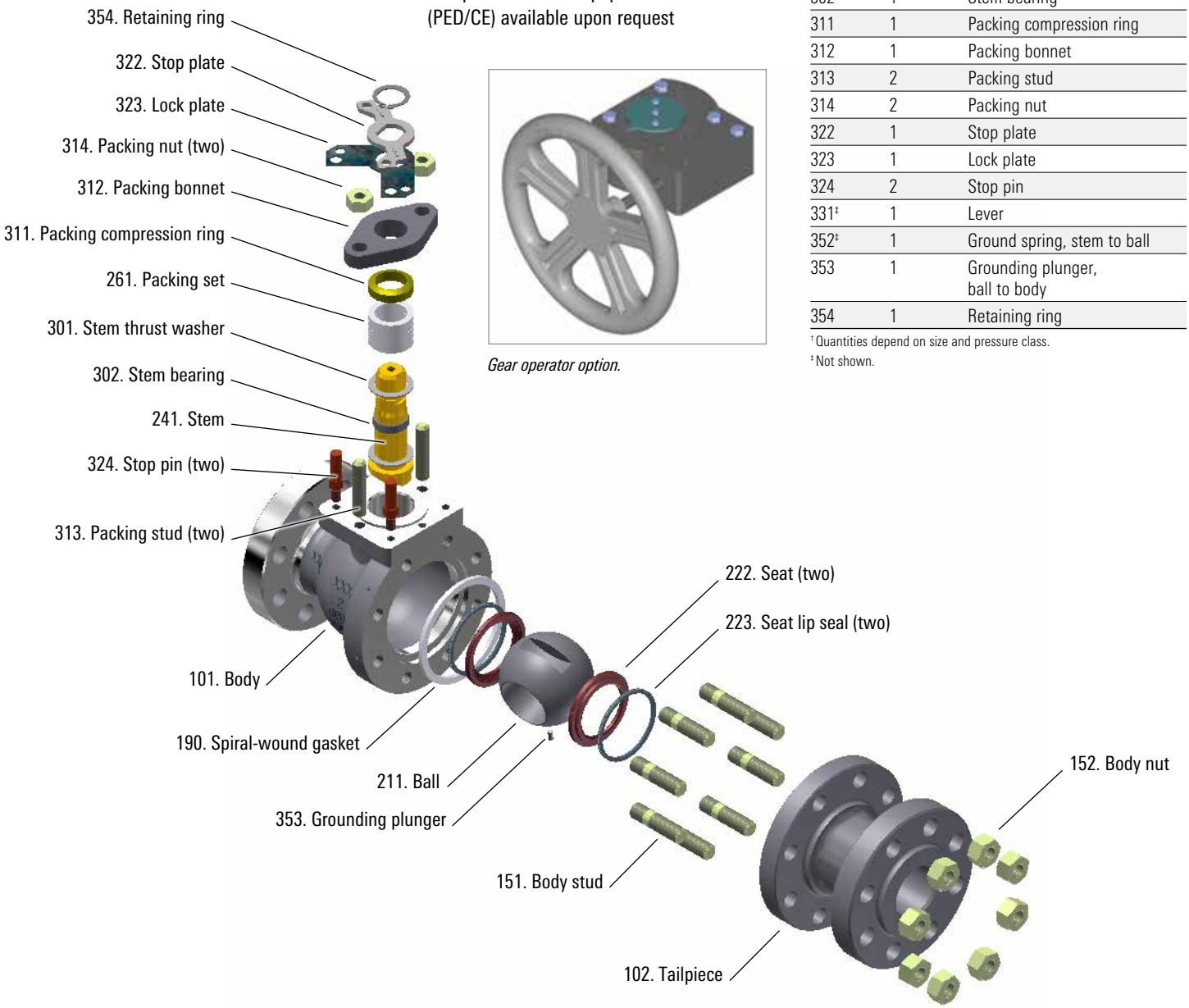
Gear operator option.

Bill of Materials

Part No.	Quantity	Description
101	1	Body
102	1	Tailpiece
151	–†	Body stud
152	–†	Body nut
190	1	Spiral-wound (SW) gasket, body to tail
211	1	Ball
222	2	Seat
223	2	Seat lip seal
241	1	Stem
261	1	Packing set (PTFE or graphite)
301	2	Stem thrust washer
302	1	Stem bearing
311	1	Packing compression ring
312	1	Packing bonnet
313	2	Packing stud
314	2	Packing nut
322	1	Stop plate
323	1	Lock plate
324	2	Stop pin
331‡	1	Lever
352‡	1	Ground spring, stem to ball
353	1	Grounding plunger, ball to body
354	1	Retaining ring

† Quantities depend on size and pressure class.

‡ Not shown.



Materials List

Body Group Trim Number				
Part	**Carbon Steel (NACE) 24**	**Carbon Steel for Low Temperature (NACE) 37**	**Stainless Steel (NACE) 23**	**Carbon Steel with Coating (NACE) 26**
Body	A216 Grade wrought carbon (WCC)	A352 Grade low-temperature wrought carbon (LCC)	A351 Grade CF8M	A216 Grade WCC, ZPEX® coating
Tailpiece	A216 Grade WCC	A352 Grade LCC	A351 Grade CF8M	A216 Grade WCC, ZPEX coating
Bonnet cap	Low-alloy carbon steel (CS) zinc plated			
Studs	A320 Grade L7M zinc plated with e-coat			
Nuts	A194 Grade 7M zinc plated with e-coat			
Packing studs	A320 Grade L7M zinc plated with e-coat			
Packing nuts	A194 Grade 7M zinc plated with e-coat			

NACE indicates compliance with NACE MR0175/ISO 15156.

Internal Group Trim Number				
Ball	A105 CS ENP	–[†]	A351 CF8M or 316 SS	A105 CS ENP
Stem	A105 CS ENP	–[†]	316 stainless steel (SS)	A105 CS ENP
Ground spring	INCONEL® material	–[†]	INCONEL	INCONEL
Compression ring	316 SS	–[†]	316 SS	316 SS
Thrust washer	CS and TFE	–[†]	SS and TFE	CS and TFE

[†] Low-temperature model requires 23 stainless internal group.

Seal Group Trim Code				
Part	**LTF**	**TTF**	**CGF**	**PGF**
Temperature limits	–20 to 220 degF [–29 to 104 degC]	–50 to 300 degF [–46 to 149 degC]	–50 to 500 degF [–46 to 260 degC]	–50 to 500 degF [–46 to 260 degC]
Seat	Delrin® material	Filled PTFE	High-performance PTFE	PEEK
Packing	PTFE	PTFE	Graphite	Graphite
Body seal	Spiral-wound gasket Grafoil® and SS	Spiral-wound gasket Grafoil and SS	Spiral-wound gasket Grafoil and SS	Spiral-wound gasket Grafoil and SS

Actuator Trim Codes

Actuator Codes	
Part (Body)	**Worm Gear—For All Body Material Codes**
Mounting bracket	Carbon steel
Bolting	Carbon steel
Set screw	Carbon steel
Stem adapter	Carbon steel
Actuator	As selected
Handwheel	Carbon steel

Actuator Codes (Wrenches)	
Part (Body)	**Wrench—For All Body Material Codes**
Wrench head	Steel
Wrench handle	Carbon steel
Wrench handle pin	Carbon steel
Capscrew	Alloy steel
Stop plate	Carbon steel

How to Order

Flanged (two-piece cast)

Example

2398031 1 1 2 1 1 2 3

Assembly base number
Pressure class
End connections
Seat insert material
Packing and gasket material
Trim material
Actuation

Assembly Base Number

Size, in	Port	Base Number
½	FP	2398100
¾	RP	2398101
	FP	2398102
1	RP	2398103
	FP	2398031
1½	FP	2398032
2	RP	2398033
	FP	2398034
3	RP	2398035
	FP	2398036
4	RP	2398037
	FP	2398038
6	RP	2398039
	FP LP†	2398040
8	RP LP§	2398041
	RP SP††	2397511

†LP CL 150–600
‡SP CL 150 only
§LP CL 150 and 600 only
††SP 300 only

Pressure Class

1	Class 150—WKM valve
2	Class 300—WKM valve
3	Class 600—WKM valve

End Connection

1	RF flange
5	RTJ flange (Class 600 and above)

Body and Tailpiece Material

1	Carbon steel (24)
2	Stainless steel (23)
3	Low-temperature carbon steel (37)
4	Carbon steel/ internal coating (26)

Seat Insert Material

1	Delrin (L)
2	Filled PTFE (T) (Class 150 and 300 only)
3	PEEK® (P)
4	High-performance PTFE (C) (Class 600)
5	Metal (M): tungsten carbide
6	Metal (N): chrome carbide

Packing and Gasket Material

1	PTFE (T)
2	Graphite (G)

Trim Material

1	Carbon steel/ 1-mm ENP (24)
2	Stainless steel (23)

Actuation

1	Bare stem, less gear bracket (BS)
2	Wrench (WR)
3	Gear operated with lock device (WG)
4	Less gear, including WG mounting bracket (LG)
5	Wrench head (WH)
6	Wrench head with pipe (WHP)

See price sheet for wrench/wrench head options

Trim Codes

Example

2 320F 600 RF × RF 24 L T F 24 LG

Size, in [mm]
Model
Pressure Class
End connections
Body group
Packing group
Fire-tested
Internal group
Actuation

Size, in [mm]

½ to 8 × 6 [50 to 200 × 150]

Model

320F

Pressure Class

150 to 600

End Connections

RF × RF

Body Group

23	Stainless steel NACE
24	Carbon steel NACE
37	Carbon low-temperature NACE

Seat Group

L	Delrin
T	Filled PTFE
C	High-performance PTFE
P	PEEK
M	Metal: tungsten carbide

Packing Group

T	PTFE
G	Graphite
E	F packing

Fire tested

F

Internal Group

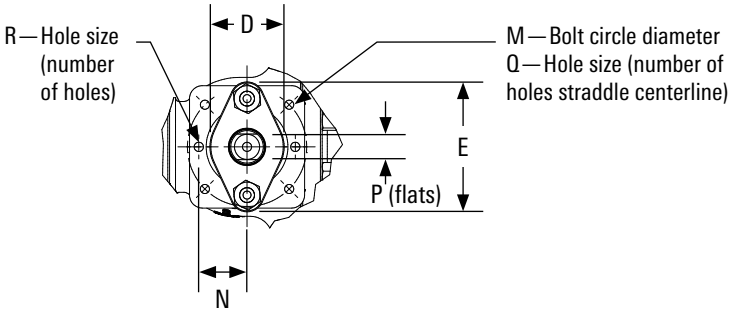
23	Stainless steel NACE
24	Carbon steel NACE

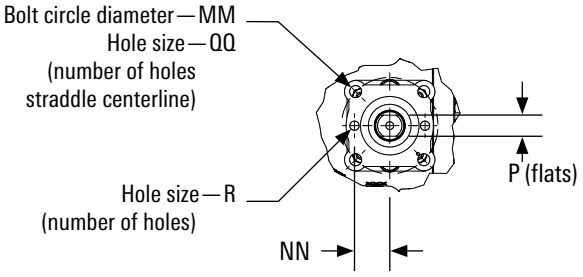
Actuation

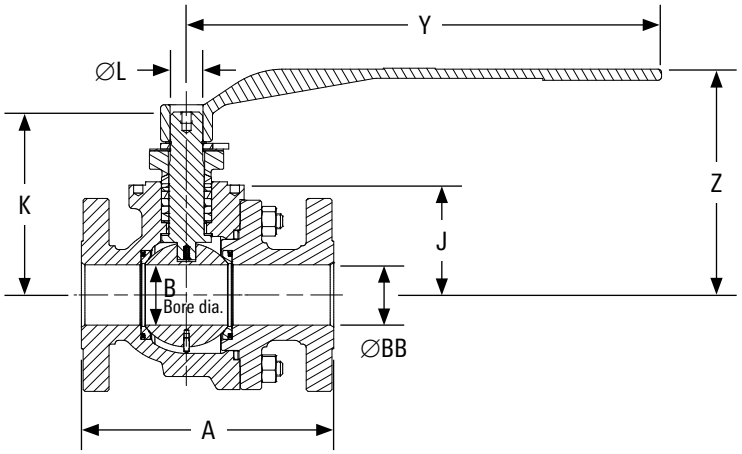
LG	Less gear
WG	Worm gear
WH	Wrench head
BS	Bare stem
WHP	Wrench head with pipe

Dimensional Data

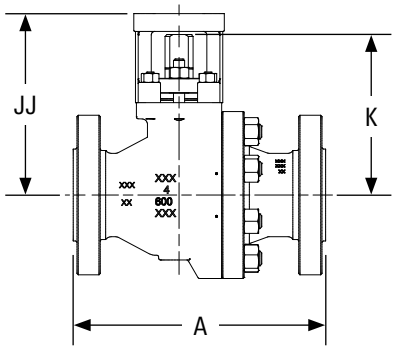
½-in full port through 8-in reduced port
ASME Classes 150, 300, and 600



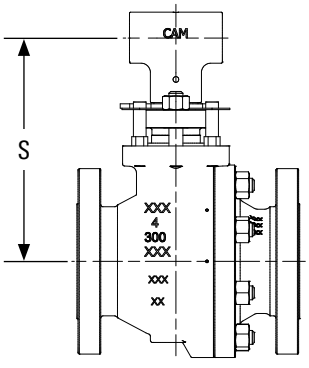




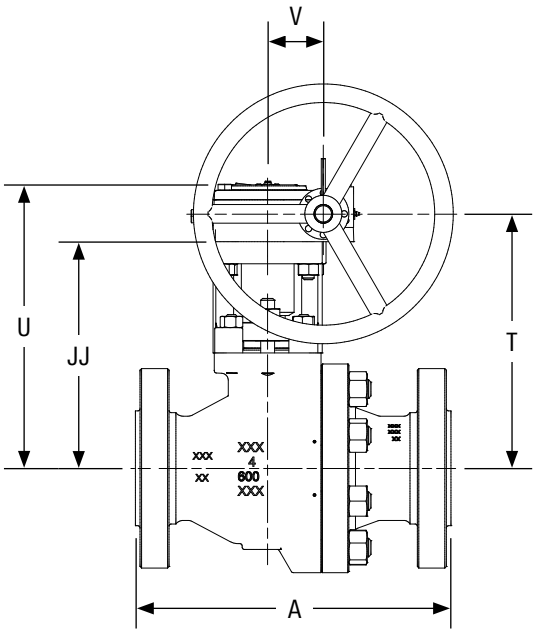
Valve with wrench (lever).



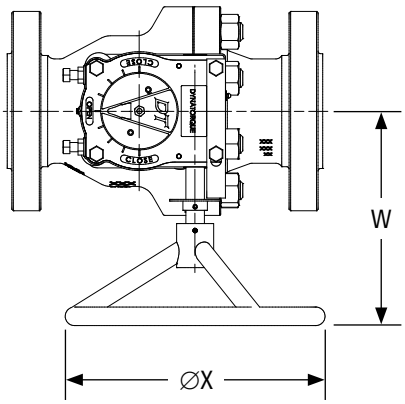
2-in 600 valve with bracket.



Valve with wrench head.



Valve with gear.



Dimensions

WKM 320F Valve Class 150 Dimensions

Size, in [mm]	A RF	∅B	BB	D	E	J	JJ	K	∅L	∅M	MM	N	NN	P	∅Q	∅QQ	∅R	∅RR	S	T	U	V	W	X	Y	Z
½ [13]	4.25 [108]	0.51 [13]	0.51 [13]	1.12 [28.5]	2.35 [60]	1.51 [38.4]	–	2.66 [67.6]	0.47 [11.9]	1.88 [47.6]	–	0.69 [17.5]	–	0.35 [8.9]	10-24 unc (4) 0.38 dp	–	0.13-(2) 0.19 dp	–	–	–	–	–	–	–	6 [152]	3.37 [85.6]
¾ × ½ [19 × 13]	4.625 [117.5]	0.51 [13]	0.76 [19.3]	1.12 [28.5]	2.35 [60]	1.513 [38.4]	–	2.66 [67.6]	0.47 [11.9]	1.88 [47.6]	–	0.69 [17.5]	–	0.35 [8.9]	10-24 unc (4) 0.38 dp	–	0.13-(2) 0.19 dp	–	–	–	–	–	–	–	6 [152]	3.37 [85.62
¾ × ¾ [19 × 19]	4.625 [117.5]	0.76 [19.3]	0.76 [19.3]	1.12 [28.5]	2.35 [60]	1.73 [43.9]	–	2.88 [73]	0.47 [11.9]	1.88 [47.6]	–	0.69 [17.5]	–	0.35 [8.9]	10-24 unc (4) 0.38 dp	–	0.13-(2) 0.25 dp	–	–	–	–	–	–	–	6 [152]	3.59 [91]
1 × ¾ [25 × 19]	5 [127]	0.76 [19.3]	1.01 [25.7]	1.12 [28.5]	2.35 [60]	1.73 [43.9]	–	2.88 [73]	0.47 [11.9]	1.88 [47.6]	–	0.69 [17.5]	–	0.35 [8.9]	10-24 unc (4) .025 dp	–	0.13-(2) 0.25 dp	–	–	–	–	–	–	–	6 [152]	3.59 [91]
1 [25]	5 [127]	1.01 [26]	1.01 [26]	1.25 [31.8]	2.66 [67.6]	1.99 [51]	–	3.54 [90]	0.55 [14]	2.13 [54]	–	0.81 [21]	–	0.43 [11]	0.25-20 (4) 0.38 dp	–	0.19-(2) 0.31 dp	–	–	–	–	–	–	–	8 [203]	4.65 [118]
1½ [38]	6.50 [165]	1.51 [38]	1.51 [38]	1.76 [44.7]	3.37 [85.6]	2.76 [70]	–	4.50 [114]	0.71 [18]	2.76 [70]	–	1.21 [31]	–	0.55 [14]	0.25-20 (4) 0.44 dp	–	0.19-(2) 0.31 dp	–	–	–	–	–	–	–	10 [254]	5.85 [149]
2 × 1½ [50 × 38]	7 [178]	1.51 [38]	2.03 [52]	1.76 [44.7]	3.37 [85.6]	2.76 [70]	–	4.50 [114]	0.71 [18]	2.76 [70]	–	1.21 [31]	–	0.55 [14]	0.25-20 (4) 0.44 dp	–	0.19-(2) 0.31 dp	–	–	–	–	–	–	–	10 [254]	5.85 [149]
2 [50]	7 [178]	2.03 [52]	2.03 [52]	2.24 [57]	3.88 [98.6]	3.46 [88]	–	5.65 [143]	0.86 [22]	3.38 [86]	–	1.38 [35]	–	0.67 [17]	0.38-16 (4) 0.41 dp	–	0.25-(2) 0.38 dp	–	–	–	–	–	–	–	12 [305]	7.27 [185]
3 × 2 [80 × 50]	8 [200]	2.03 [52]	3.03 [77]	2.24 [57]	3.88 [98.6]	3.46 [88]	–	5.65 [143]	0.86 [22]	3.38 [86]	–	1.38 [35]	–	0.67 [17]	0.38-16 (4) 0.41 dp	–	0.25-(2) 0.38 dp	–	–	–	–	–	–	–	12 [305]	7.27 [185]
3 [80]	8 [200]	3.03 [77]	3.03 [77]	2.5 [63.5]	4.38 [111]	4.51 [115]	8 [200]	7 [178]	1.10 [28]	4.02 [102]	4.02 [102]	1.63 [41]	1.63 [41]	0.86 [22]	0.38-16 (4) 0.63 dp	0.44-(4) thru	0.31-(2) 0.38 dp	0.31-(2) 0.53 dp	7.91 [201]	9.12 [232]	10.68 [271]	1.75 [44]	9.08 [231]	6 [152]	16 [406]	8.42 [214]
4 × 3 [100 × 80]	9 [229]	3.03 [77]	4.03 [102]	2.5 [63.5]	4.38 [111]	4.51 [115]	8 [200]	7 [178]	1.10 [28]	4.02 [102]	4.02 [102]	1.63 [41]	1.63 [41]	0.86 [22]	0.38-16 (4) 0.63 dp	0.44-(4) thru	0.31-(2) 0.38 dp	0.31-(2) 0.53 dp	7.91 [201]	9.12 [232]	10.68 [271]	1.75 [44]	9.08 [231]	6 [152]	16 [406]	8.42 [214]
4 [100]	9 [229]	4.03 [102]	4.03 [102]	3 [76]	5.38 [137]	5.89 [150]	10.51 [267]	9.32 [237]	1.41 [36]	4.92 [125]	4.92 [125]	1.94 [49]	1.94 [49]	1.06 [27]	0.50-13 (4) 0.75 dp	0.56-(4) thru	0.44-(2) 0.63 dp	0.44-(2) 0.63 dp	10.31 [217]	11.88 [302]	13.49 [343]	2.51 [64]	9.22 [2341]	10 [254]	24 [610]	11.50 [292]
6 × 4 [150 × 100]	10.50 [267]	4.03 [102]	6 [150]	3 [76]	5.38 [137]	5.89 [150]	10.51 [267]	9.32 [237]	1.41 [36]	4.92 [125]	4.92 [125]	1.94 [49]	1.94 [49]	1.06 [27]	0.50-13 (4) 0.75 dp	0.56-(4) thru	0.44-(2) 0.63 dp	0.44-(2) 0.63 dp	10.31 [217]	11.88 [302]	13.58 [345]	2.51 [64]	12.08 [307]	10 [254]	24 [610]	11.50 [292]
6 [150]	15.50 [394]	6 [150]	6 [150]	3.5 [89]	6.25 [159]	7.72 [196]	13.72 [349]	12.31 [313]	1.89 [48]	5.51 [140]	6.47 [165]	2.38 [60]	2.38 [60]	1.41 [36]	0.63-11 (4) 1.00 dp	0.81-(4) thru	0.63-(2) 0.75 dp	0.63-(2) 0.81 dp	–	15.17 [385]	16.97 [431]	3 [76]	11.56 [294]	14 [356]	–	–
8 × 6 [200 × 150]	18 [457]	6 [150]	8 [200]	3.5 [89]	6.25 [159]	7.72 [196]	13.72 [349]	12.31 [313]	1.89 [48]	5.51 [140]	6.47 [165]	2.38 [60]	2.38 [60]	1.41 [36]	0.63-11 (4) 1.00 dp	0.81-(4) thru	0.63-(2) 0.75 dp	0.63-(2) 0.81 dp	–	15.22 [387]	16.98 [431]	3 [76]	11.56 [294]	14 [356]	–	–

WKM 320F Valve Class 300 Dimensions

Size, in [mm]	A RF	∅B	BB	D	E	J	JJ	K	∅L	∅M	MM	N	NN	P	∅Q	∅QQ	∅R	∅RR	S	T	U	V	W	X	Y	Z
½ [13]	5.50 [139.7]	0.51 [13]	0.51 [13]	1.12 [28]	2.35 [59.7]	1.51 [38.4]	–	2.66 [67.6]	0.47 [12]	1.88 [47.6]	–	0.69 [17.5]	–	0.35 [8.9]	10-24 unc (4) 0.38 dp	–	0.13-(2) 0.19 dp	–	–	–	–	–	–	–	6 [150]	3.37 [85.6]
¾ × ½ [193 × 13]	6.00 [152.4]	0.51 [13]	0.76 [19.3]	1.12 [28]	2.35 [59.7]	1.51 [38.4]	–	2.66 [67.6]	0.47 [12]	1.88 [47.6]	–	0.69 [17.5]	–	0.35 [8.9]	10-24 unc (4) 0.38 dp	–	0.13-(2) 0.19 dp	–	–	–	–	–	–	–	6 [150]	3.37 [85.6]
¾ × ¾ [193 × 19.3]	6 [152.4]	0.76 [19.3]	0.76 [19.3]	1.25 [32]	2.66 [67.6]	1.80 [45.7]	–	3.34 [84.9]	0.55 [14]	2.13 [54]	–	0.81 [20.6]	–	0.43 [10.2]	0.250-20 (4) 0.44 dp	–	0.19-(2) 0.31 dp	–	–	–	–	–	–	–	8 [200]	4.18 [106]
1 × ¾ [25 × 19]	6.5 [165.1]	0.76 [19.3]	1.01 [25.7]	1.25 [32]	2.66 [67.6]	1.80 [45.7]	–	3.34 [84.9]	0.55 [14]	2.13 [54]	–	0.81 [20.6]	–	0.43 [10.2]	0.250-20 (4) 0.44 dp	–	0.19-(2) 0.31 dp	–	–	–	–	–	–	–	8 [200]	4.18 [106]
1 [25]	6.50 [165]	1.01 [26]	1.01 [26]	1.76 [45]	3.37 [85.6]	2.39 [61]	–	4.12 [105]	0.71 [18]	2.76 [70]	–	1.21 [31]	–	0.55 [14]	0.25-20 (4) 0.38 dp	–	0.19-(2) 0.31 dp	–	–	–	–	–	–	–	10 [254]	5.48 [139]
1½ [38]	7.50 [191]	1.51 [38]	1.51 [38]	2.24 [57]	3.88 [98.6]	3.08 [78]	–	5.27 [134]	0.86 [22]	3.38 [86]	–	1.38 [35]	–	0.67 [17]	0.38-16 (4) 0.63 dp	–	0.25-(2) 0.38 dp	–	–	–	–	–	–	–	12 [305]	6.89 [175]
2 × 1½ [50 × 38]	8.50 [216]	1.51 [38]	2.03 [52]	2.24 [57]	3.88 [98.6]	3.08 [78]	–	5.27 [134]	0.86 [22]	3.38 [86]	–	1.38 [35]	–	0.67 [17]	0.38-16 (4) 0.63 dp	–	0.25-(2) 0.38 dp	–	–	–	–	–	–	–	12 [305]	6.89 [175]
2 [50]	8.50 [216]	2.03 [52]	2.03 [52]	2.5 [63.5]	4.38 [111]	3.70 [94]	–	6.16 [156]	1.10 [28]	4.02 [102]	–	1.63 [41]	–	0.86 [22]	0.38-16 (4) 0.63 dp	–	0.31-(2) 0.38 dp	–	–	–	–	–	–	–	16 [406]	7.61 [193]
3 × 2 [80 × 50]	11.12 [282]	2.03 [52]	3.03 [77]	2.5 [63.5]	4.38 [111]	3.70 [94]	–	6.19 [157]	1.10 [28]	4.02 [102]	–	1.63 [41]	–	0.86 [22]	0.38-16 (4) 0.63 dp	–	0.31-(2) 0.38 dp	–	–	–	–	–	–	–	16 [406]	7.61 [193]
3 [80]	11.13 [283]	3.03 [77]	3.03 [77]	3 [77]	5.38 [137]	5.14 [131]	9.76 [248]	8.57 [218]	1.41 [36]	4.92 [125]	4.92 [125]	1.94 [49]	1.94 [49]	1.06 [27]	0.50-13 (4) 0.75 dp	0.56-(4) thru	0.44-(2) 0.63 dp	0.44-(2) 0.63 dp	9.56 [243]	11.13 [283]	12.83 [326]	2.51 [64]	12.08 [307]	14 [356]	24 [610]	10.75 [273]
4 × 3 [100 × 80]	12 [305]	3.03 [77]	4.08 [104]	3 [77]	5.38 [137]	5.14 [131]	9.76 [248]	8.57 [218]	1.41 [36]	4.92 [125]	4.92 [125]	1.94 [49]	1.94 [49]	1.06 [27]	0.50-13 (4) 0.75 dp	0.56-(4) thru	0.44-(2) 0.63 dp	0.44-(2) 0.63 dp	9.56 [243]	11.26 [286]	13.02 [331]	3 [76]	11.56 [294]	14 [356]	24 [610]	10.75 [273]
4 [100]	12 [305]	4.03 [102]	4.08 [104]	3.5 [89]	6.25 [159]	6.22 [158]	12.22 [310]	10.81 [275]	1.89 [48]	5.51 [140]	6.5 [165]	2.38 [60]	2.38 [60]	1.41 [36]	0.63-(4) 1.00 dp	0.81-(4) thru	0.63-(2) 0.81 dp	0.63-(2) 0.75 dp	12.06 [306]	13.72 [349]	15.48 [393]	3 [76]	13.31 [338]	20 [508]	–	–
6 × 4 [150 × 100]	15.88 [403]	4.03 [102]	6 [150]	3.5 [89]	6.25 [159]	6.22 [158]	12.22 [310]	10.81 [275]	1.89 [48]	5.51 [140]	6.5 [165]	2.38 [60]	2.38 [60]	1.41 [36]	0.63-(4) 1.00 dp	0.81-(4) thru	0.63-(2) 0.81 dp	0.63-(2) 0.75 dp	12.06 [306]	13.72 [349]	15.48 [393]	3 [76]	13.31 [338]	20 [508]	–	–
6 [150]	15.88 [403]	6 [150]	6 [150]	4.25 [108]	7.75 [197]	8.05 [205]	15.43 [392]	14.09 [358]	2.36 [60]	6.5 [165]	6.5 [165]	3 [76]	3 [76]	–	0.75-(4) 0.81 dp	0.81-(4) thru	0.75-(2) 1.06 dp	0.75-(2) 1.06 dp	–	17.05 [433]	18.98 [482]	3.62 [92]	13.21 [336]	14 [356]	–	–
8 × 6 [200 × 150] Short pattern	16.5 [419]	6 [150]	8 [200]	4.25 [108]	7.75 [197]	8.05 [205]	15.43 [392]	14.09 [358]	2.36 [60]	6.5 [165]	6.5 [165]	3 [76]	3 [76]	–	0.75-(4) 0.81 dp	0.81-(4) thru	0.75-(2) 1.06 dp	0.75-(2) 1.06 dp	–	17.05 [433]	18.98 [482]	3.62 [92]	13.21 [336]	14 [356]	–	–

WKM 320F Valve Class 600 Dimensions

Size, in [mm]	A		∅B	BB	D	E	J	JJ	K	∅L	∅M	MM	N	NN	P	∅Q	∅QQ	∅R	∅RR	S	T	U	V	W	X	Y	Z
	RF	RJ																									
½ [13]	6.5 [165]	6.5 [165]	0.51 [13]	0.51 [13]	1.12 [28.5]	2.35 [59.7]	1.51 [38.4]	–	2.66 [67.6]	0.47 [11.9]	1.88 [47.6]	–	0.69 [17.5]	–	0.35 [8.92]	10-24 unc (4) 0.38 dp	–	0.125-(2) 0.19 dp	–	–	–	–	–	–	–	6 [152]	3.37 [85.6]
¾ × ½ [19 × 13]	7.5 [191]	7.5 [191]	0.51 [13]	0.76 [19.3]	1.12 [28.5]	2.35 [59.7]	1.51 [38.4]	–	2.66 [67.6]	0.47 [11.9]	1.88 [47.6]	–	0.69 [17.5]	–	0.35 [8.92]	10-24 unc (4) 0.38 dp	–	0.125-(2) 0.19 dp	–	–	–	–	–	–	–	6 [152]	3.37 [85.6]
¾ × ¾ [19 × 19]	7.5 [191]	7.5 [191]	0.76 [19.3]	0.76 [19.3]	1.25 [31.8]	2.66 [67.6]	1.80 [45.7]	–	3.34 [84.9]	0.55 [13.9]	2.13 [54]	–	0.81 [20.6]	–	0.43 [10.9]	0.25-(4) 0.44 dp	–	0.187-(2) 0.31 dp	–	–	–	–	–	–	–	8 [203]	4.18 [106]
1 × ¾ [25 × 19]	8.5 [216]	8.5 [216]	0.76 [19.3]	1.01 [25.7]	1.25 [31.8]	2.66 [67.6]	1.80 [45.7]	–	3.341 [84.9]	0.55 [13.9]	2.13 [54]	–	0.81 [20.6]	–	0.43 [10.9]	0.25-(4) 0.44 dp	–	0.187-(2) 0.31 dp	–	–	–	–	–	–	–	8 [203]	4.18 [106]
1 [25]	8.5 [216]	8.5 [216]	1.01 [26]	1.01 [25.7]	1.76 [44.7]	3.37 [85.6]	2.39 [61]	–	4.12 [105]	0.71 [18]	2.76 [70]	–	1.21 [31]	–	0.55 [14]	0.25-(4) 0.38 dp	–	0.19-(2) 0.31 dp	–	–	–	–	–	–	–	10 [254]	5.48 [139]
1½ [38]	9.5 [241]	9.5 [241]	1.51 [38]	1.51 [38.4]	2.24 [56.9]	3.88 [98.6]	3.08 [78]	–	5.27 [134]	0.86 [22]	3.38 [86]	–	1.38 [35]	–	0.67 [17]	0.38-(4) 0.63 dp	–	0.25-(2) 0.38 dp	–	–	–	–	–	–	–	12 [305]	6.89 [175]
2 × 1½ [50 × 38]	11.5 [292]	11.6 [295]	1.51 [38]	2.03 [51.6]	2.24 [56.9]	3.88 [98.6]	3.08 [78]	–	5.27 [134]	0.86 [22]	3.38 [86]	–	1.38 [35]	–	0.67 [17]	0.38-(4) 0.63 dp	–	0.25-(2) 0.38 dp	–	–	–	–	–	–	–	12 [305]	6.89 [175]
2 [50]	11.5 [292]	11.6 [295]	2.03 [51.6]	2.03 [51.6]	2.5 [63.5]	4.38 [111]	3.70 [94]	7.2 [183]	6.19 [157]	1.10 [28]	4.02 [102]	4.02 [102]	1.63 [41]	1.63 [41]	0.86 [22]	0.38-(4) 0.63 dp	0.44-(4) thru	0.31-(2) 0.38 dp	0.31-(2) 0.53 dp	–	8.3 [211]	9.85 [250]	1.75 [44.5]	9.08 [231]	6 [152]	16 [406]	7.61 [193]
3 × 2 [80 × 50]	14 [356]	14.1 [359]	2.03 [51.6]	3.03 [77]	2.5 [63.5]	4.38 [111]	3.70 [94]	7.2 [183]	6.19 [157]	1.10 [28]	4.02 [102]	4.02 [102]	1.63 [41]	1.63 [41]	0.86 [22]	0.38-(4) 0.63 dp	0.44-(4) thru	0.31-(2) 0.38 dp	0.31-(2) 0.53 dp	–	8.3 [211]	9.85 [250]	1.75 [44.5]	9.08 [231]	6 [152]	16 [406]	7.61 [193]
3 [80]	14 [283]	14.1 [359]	3.03 [77]	3.03 [77]	3 [76.2]	5.38 [137]	5.14 [131]	9.76 [248]	8.57 [217]	1.41 [36]	4.92 [125]	4.92 [125]	1.94 [49]	1.94 [49]	1.06 [27]	0.50-(4) 0.75 dp	0.56-(4) thru	0.44-(2) 0.63 dp	0.44-(2) 0.63 dp	9.56 [243]	11.1 [283]	12.8 [326]	2.51 [63.8]	12.2 [310]	12 [305]	24 [610]	10.8 [273]
4 × 3 [100 × 80]	17 [432]	17.1 [435]	3.03 [77]	4.08 [104]	3 [76.2]	5.38 [137]	5.14 [131]	9.76 [248]	8.57 [217]	1.41 [36]	4.92 [125]	4.92 [125]	1.94 [49]	1.94 [49]	1.06 [27]	0.50-(4) 0.75 dp	0.56-(4) thru	0.44-(2) 0.63 dp	0.44-(2) 0.63 dp	9.56 [243]	11.3 [286]	13.0 [331]	3 [76.2]	11.7 [297]	12 [305]	24 [610]	10.8 [273]
4 [100]	17 [432]	17.1 [435]	4.03 [102]	4.03 [102]	3.5 [88.9]	6.25 [159]	6.22 [158]	12.2 [310]	10.8 [275]	1.89 [48]	5.51 [140]	6.5 [165]	2.38 [60]	2.38 [60]	1.41 [36]	0.63-(4) 1.00 dp	0.81-(4) thru	0.63-(2) 0.75 dp	0.63-(2) 0.81 dp	12.1 [306]	13.7 [348]	15.5 [393]	3 [76.2]	11.6 [294]	14 [356]	–	–
6 × 4 [150 × 100]	22 [559]	22.1 [562]	4.03 [102]	6.00 [152]	3.5 [88.9]	6.25 [159]	6.22 [158]	12.2 [310]	10.8 [275]	1.89 [48]	5.51 [140]	6.5 [165]	2.38 [60]	2.38 [60]	1.41 [36]	0.63-(4) 1.00 dp	0.81-(4) thru	0.63-(2) 0.75 dp	0.63-(2) 0.81 dp	12.1 [306]	13.7 [348]	15.5 [393]	3 [76.2]	11.6 [294]	14 [356]	–	–
6 [150]	22 [559]	22.13 [562]	6.00 [152]	6.00 [152]	4.25 [108]	7.75 [197]	15.4 [392]	15.4 [392]	14.1 [358]	2.36 [60]	6.5 [165]	6.5 [165]	3 [76]	3 [76]	–	0.75-(4) 0.81 dp	0.81-(4) thru	0.75-(2) 1.00 dp	0.75-(2) 1.06 dp	–	17.1 [433]	18.98 [482]	3.63 [92.1]	13.2 [336]	20 [508]	–	–
8 × 6 [200 × 150]	26 [660]	–	6.00 [152]	8.06 [205]	4.25 [108]	7.75 [197]	15.4 [392]	15.4 [392]	14.1 [358]	2.36 [60]	6.5 [165]	6.5 [165]	3 [76]	3 [76]	–	0.75-(4) 0.81 dp	0.81-(4) thru	0.75-(2) 1.00 dp	0.75-(2) 1.06 dp	–	17.1 [433]	18.98 [482]	3.63 [92.1]	13.2 [336]	20 [508]	–	–

Torque Estimation and MAST

Delrin or Teflon® Seat with Teflon Stem Packing

Valve Port Size, in [mm]	Pressure Class	Gauge Pressure (P), psi	Run Torque at Max. P, lbf.in	Break Torque at Max. P, lbf.in	MAST,† lbf.in
½ [13]	150	80–290	11	20	228
	300	286–750	14	31	228
	600	741–1,500	19	45	228
¾ [19]	150	80–290	17	37	228
	300	286–750	27	65	401
	600	741–1,500	37	97	401
1 [25]	150	80–290	29	69	401
	300	286–750	52	125	881
	600	741–1,500	73	187	881
1½ [38]	150	80–290	67	185	881
	300	286–750	117	335	1,549
	600	741–1,500	164	506	1,549
2 [50]	150	80–290	136	385	1,549
	300	286–750	215	677	3,290
	600	741–1,500	301	1,026	3,290
3 [80]	150	80–290	301	1,037	3,290
	300	286–750	498	1,865	6,944
	600	741–1,500	696	2,843	6,944
4 [100]	150	80–290	611	2,158	6,944
	300	286–750	995	3,866	16,747
	600	741–1,500	1,392	5,899	16,747
6 [150]	150	80–290	1,562	6,013	16,747
	300	286–750	2,439	10,699	40,040
	600	741–1,500	3,372	16,339	40,040

† Maximum-allowable stem torque (MAST) for standard material option. Consult factory for high MAST options.

Delrin or Teflon Seat with Graphite Stem Packing

Valve Port Size, in [mm]	Pressure Class	Gauge Pressure (P), psi	Run Torque at Max. P, lbf.in	Break Torque at Max. P, lbf.in	MAST, lbf.in
½ [13]	150	80–290	42	51	228
	300	286–750	45	61	228
	600	741–1,500	49	74	228
¾ [19]	150	80–290	48	68	228
	300	286–750	88	126	401
	600	741–1,500	94	154	401
1 [25]	150	80–285	90	129	401
	300	286–740	183	256	881
	600	741–1,480	196	311	881
1½ [38]	150	80–285	198	315	881
	300	286–740	391	609	1,549
	600	741–1,480	423	764	1,549
2 [50]	150	80–285	410	659	1,549
	300	286–740	652	1,114	3,290
	600	741–1,480	713	1,438	3,290
3 [80]	150	80–285	738	1,474	3,290
	300	286–740	1,367	2,734	6,944
	600	741–1,480	1,516	3,662	6,944
4 [100]	150	80–285	1,480	3,027	6,944
	300	286–740	2,540	5,411	16,747
	600	741–1,480	2,850	7,356	16,747
6 [150]	150	80–285	3,108	7,559	16,747
	300	286–740	5,343	13,603	40,040
	600	741–1,480	6,110	19,077	40,040

Weights

Valve Size, in [mm]	Weight, lbm [kg]		
	150	300	600
½ [13]	5.6 [2.5]	7.6 [3.4]	9.0 [4.1]
¾ × ½ [19 × 13]	6.6 [3]	9.9 [4.5]	11.7 [5.3]
¾ × ¾ [19 × 19]	7.2 [3.3]	11.7 [5.3]	14.3 [6.5]
1 × ¾ [25 × 19]	8.4 [3.8]	13.2 [6]	16.3 [7.4]
1 [25]	9.7 [4.4]	17.1 [7.8]	22.9 [10.4]
1½ [38]	20.1 [9.1]	32.1 [14.5]	40.9 [18.5]
2 × 1½ [50 × 38]	24.4 [11.1]	37.1 [16.8]	46.9 [21.3]
2 [50]	33.4 [15.1]	44.4 [20.1]	57.3 [26]
3 × 2 [80 × 50]	44.3 [20.1]	63.3 [28.7]	80.2 [36.3]
3 [80]	82.5 [37.4]	96.8 [43.9]	118.6 [53.7]
4 × 3 [100 × 80]	73.1 [33.1]	118.9 [53.9]	165.4 [74.9]
4 [100]	110.0 [49.8]	162.2 [73.5]	236.3 [107]
6 × 4 [150 × 100]	132.9 [60.2]	213.2 [96.6]	335.6 [152]
6 [150]	251.2 [113.8]	332.9 [150.8]	487.8 [221]
8 × 6 [200 × 150]	356 [161.5]	452.6 [205.3]	599.7 [271.7]

WKM 320F

slb.com/valves

CAMERON
A Schlumberger Company

CAMERON

WKM DynaSeal 210 and 310 Floating Ball Valves

Industry-recognized flanged and threaded end floating ball valves for oilfield and industrial applications

TECHNOLOGY

Table of Contents

WKM DYNASEAL 210 AND 310 FLOATING BALL VALVES

WKM DynaSeal 210 Floating Ball Valves

HOW TO ORDER

J0XXXXX	-	2	1	X	X	X	0	X
Base Part Number		Pressure Rating (CWP)	Body Material	Seat Trim	Seal Material	Ball and Stem		Handle

Female Threaded Ends 750/1000# MOP

Size in.	Size (mm)	Base Number
2 x 1-1/2	(50 x 40)	24925
2 x 2	(50 x 50)	25144
3 x 2	(80 x 50)	24926
3 x 3	(80 x 80)	25145
4 x 3	(100 x 80)	25154

1500/2000# MOP

1 x 1	(25 x 25)	24190
2 x 1-1/2	(50 x 40)	24132
2 x 2	(50 x 50)	24056
2-1/2 x 2	(65 x 50)	24059
3 x 2	(80 x 50)	24063
3 x 3	(80 x 80)	24178*
4 x 3	(100 x 80)	24211*

* Maximum pressure rating of 1500 psi for 4" x 3" (100 mm x 80 mm) and 3" x 3" (80 mm x 80 mm).

Grooved Ends 750# MOP

2 x 1-1/2	(50 x 40)	25111
3 x 2	(80 x 50)	25112
4 x 3	(100 x 80)	25113

Body Material	
Ductile Iron	1

Pressure Rating (CWP)	
750 psi	1
1000 psi	2
1500 psi	3
2000 psi	4

Seat Trim	
Acetal Plastic (43)	3
Filled Teflon (42)	5

Seal Material	
Buna	1
FKM	2

Ball and Stem	
Carbon Steel	1
Stainless Steel	2
Carbon Steel Unidirectional	3
Stainless Steel Unidirectional	4

* See page 4 for details.

Handle	
No Handle	0
Handle	1
No Handle with Seal Pin	2
Handle with Seal Pin	3

Examples:

Standard Trim 2" (50 mm)	J024925-2131100
H_2S, NACE Trim Suffix Code	= standard -213220X
	= unidirectional -213240X

NACE MR0175/ISO 15156 Compliance – Materials of construction shall be in compliance with the pre-qualified material requirements specified by NACE MR0175/ISO 15156. According to NACE MR0175/ISO 15156, it is the manufacturer's responsibility for meeting metallurgical requirements and the customer/user responsibility to ensure that a material will be satisfactory in the intended environment. When given the application requirements (environment) by the customer/user, Cameron can make technical recommendations in accordance with NACE MR0175/ISO 15156, but that in no way certifies or warrants the product or materials for the application.

FEATURES AND BENEFITS

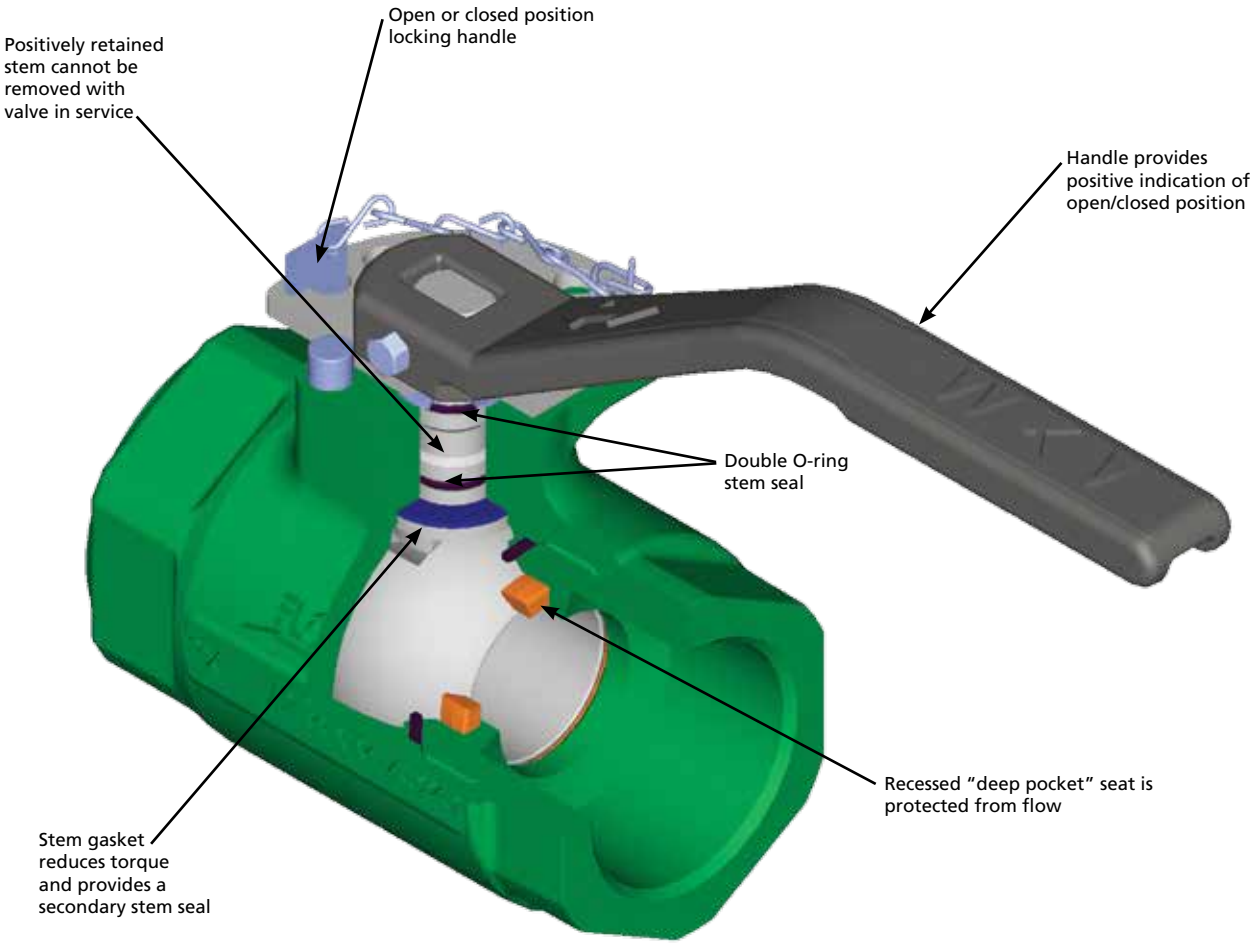
This rugged yet economical ductile iron ball valve is ideal for threaded end oilfield applications where carbon steel body material is not a requirement.

Cameron's WKM® DynaSeal™ 210 ball valve is a two-piece design with a ductile iron body and tailpiece. This valve is economical and includes many of the premium design features found in the WKM DynaSeal 310 carbon steel ball valve.

It is available in 1" to 4" x 3" (25 mm to 100 mm x 80 mm) sizes. Working pressures offered are 750, 1000, 1500 and 2000 psi. (See size/pressure table on page 5.)

This valve is used primarily in the oilfield market for the following applications:

- Production wing valves on low-pressure gas wells
- Production flowlines
- Production gathering systems for water, oil and gas
- Gas blowdown service
- Tank batteries for storage or production
- Frac water tanks



Locking Capability is Standard

- The valve can be locked in the open or closed position.

Positively Retained Stem

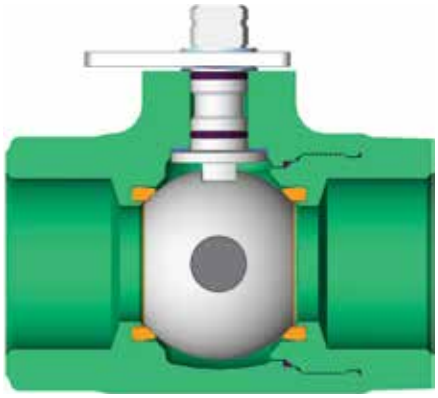
- The stem is positively retained. It is designed to prevent stem blowout while the valve is in service.

Color-coded Working Pressures

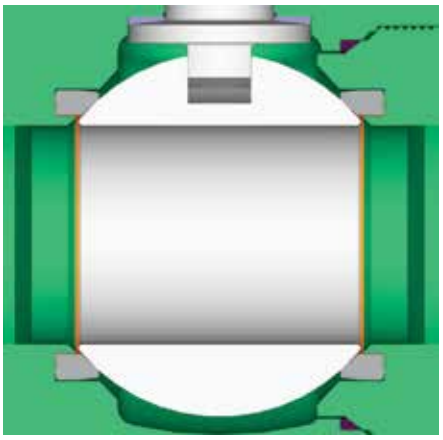
The lock plates are color-coded so pressure ratings are quickly identified.

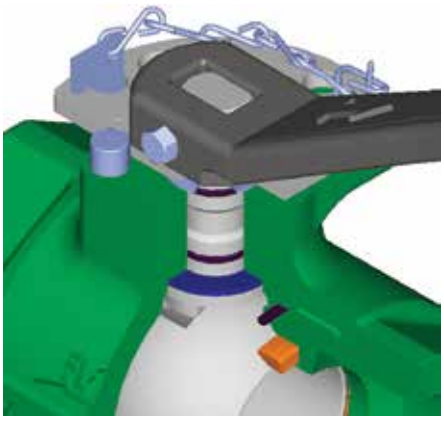
- 750/1000 psi: green
- 1500 psi: blue
- 2000 psi: red

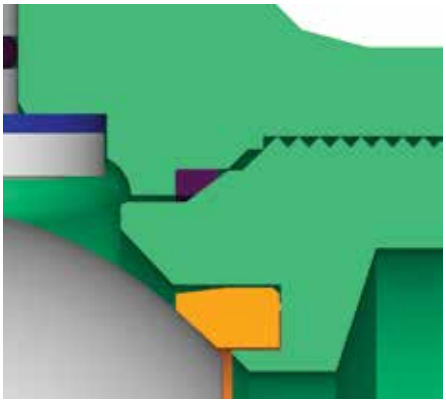
Unidirectional Ball (Option)



The WKM DynaSeal 210 unidirectional valve option provides relief to valves that might have water trapped in the body cavity and then are exposed to a temporary freeze. Since this option relies on a relief hole in the ball to relieve the excess pressure, the valve is stamped with a directional flow arrow to be sure the side of the ball with the hole is installed upstream.







Fire-tested Design

The WKM DynaSeal 210 ball valves are qualified under API Standard 607.

The deep-pocketed seat, locked in stem and body/tailpiece designs give this valve excellent fire-tested characteristics.

Superior Stem Journal Design Prevents Stem Seizure

The stem is designed with two internal O-ring grooves located on either side of a shallow grease groove.

The top O-ring is a weather seal while the bottom one seals the stem bore against the line media. The stem gasket provides a backup seal.

The shallow groove between the O-rings provides three benefits:

- Prevents stem seizure
- Reduces torque
- Provides a space for lubricating grease applied at the factory during assembly

TFE Body Seal

A TFE body seal is positioned between the line bore and tailpiece threads, isolating the threads from the line media.

Deep Recessed Seats

The seat is recessed into a deep machined pocket, which serves to surround and protect the seat on all sides. This design eliminates cold flow into the valve conduit where it can be damaged by the action of the ball or the flow medium. The result is long and extended service life.

Seal Pin Device Provided as Standard on 750 and 1000 psi; 2", 3" and 4" (50 mm, 80 mm and 100 mm) Reduced Port Valves

A secondary seal pin device for applying tamper detection is provided on these valves. They are a popular choice for production tank batteries where tamper detection often is required.

SPECIFICATIONS

1" Full Port through 4" x 3" Reduced Port

Standards and Specifications

WKM DynaSeal 210 ball valves conform to the following design and testing standards:

Standard Materials

- API line pipe threads
- Body: Ductile iron
- Ball and Stem: Carbon steel or stainless steel
- Seat and Seals: Acetal plastic/Buna-N

Optional Materials

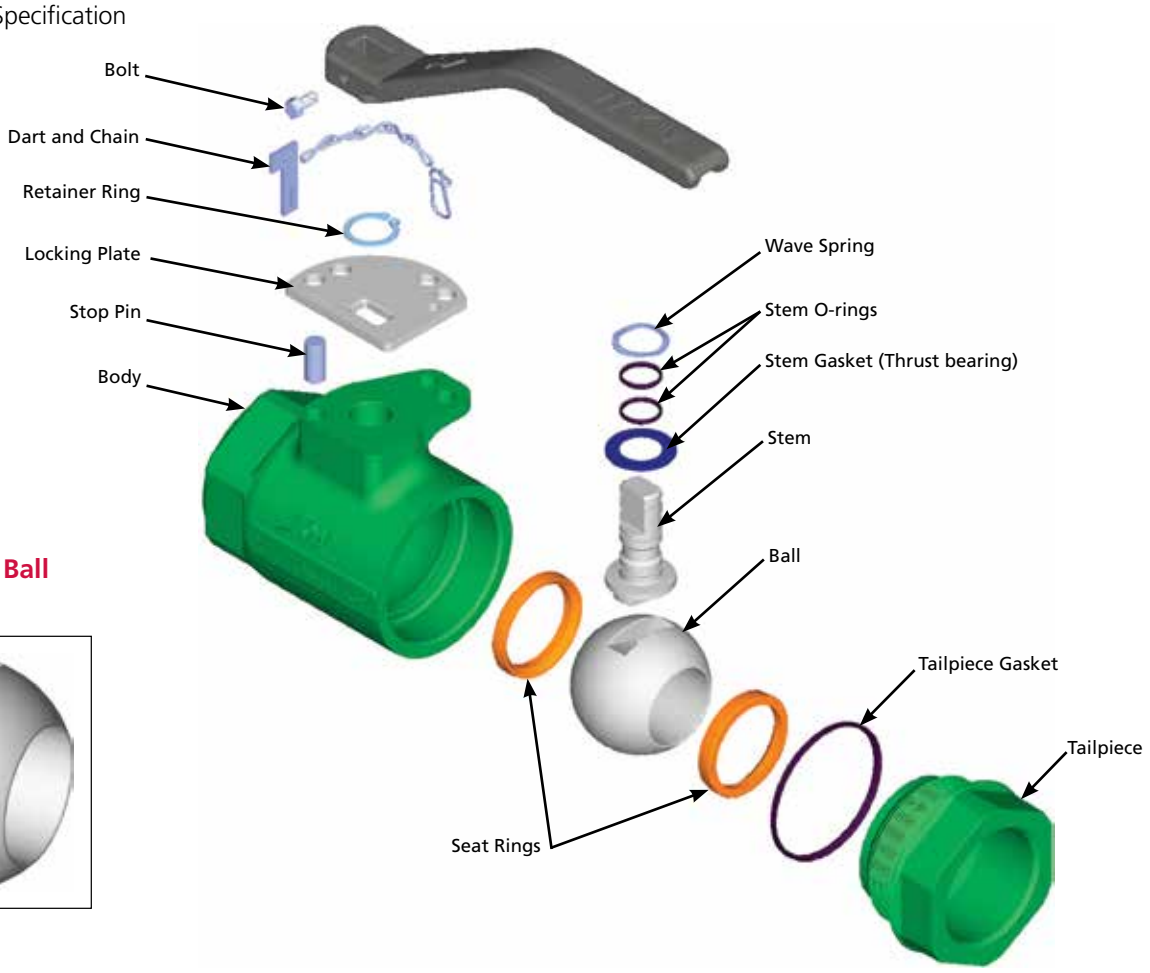
- Ball and Stem: Stainless steel
- Seat and Seals: TFE/FKM

Compliances

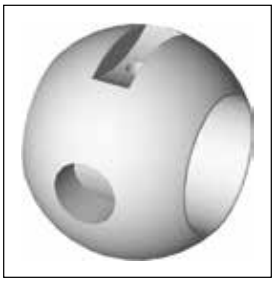
- ASME B16.5
- MSS-SP-6, 25, 55, 72 and 61
- NACE MR0175/ISO 15156
- API 607 Fire-test Specification

ASME Pressure Classes

Size			Classes			
in.	(mm)		750	1000	1500	2000
1	(25)	FP			•	•
2 x 1-1/2	(50 x 40)	RP	•	•	•	•
2	(50)	FP	•		•	•
2-1/2 x 2	(65 x 50)	RP			•	•
3 x 2	(80 x 50)	RP	•	•	•	•
3	(80)	FP	•	•	•	
4 x 3	(100 x 80)	RP	•	•	•	



Unidirectional Ball (Optional)



MATERIALS LIST

1" Full Port through 4" x 3" Reduced Port

750, 1000, 1500 and 2000 psig Working Pressure

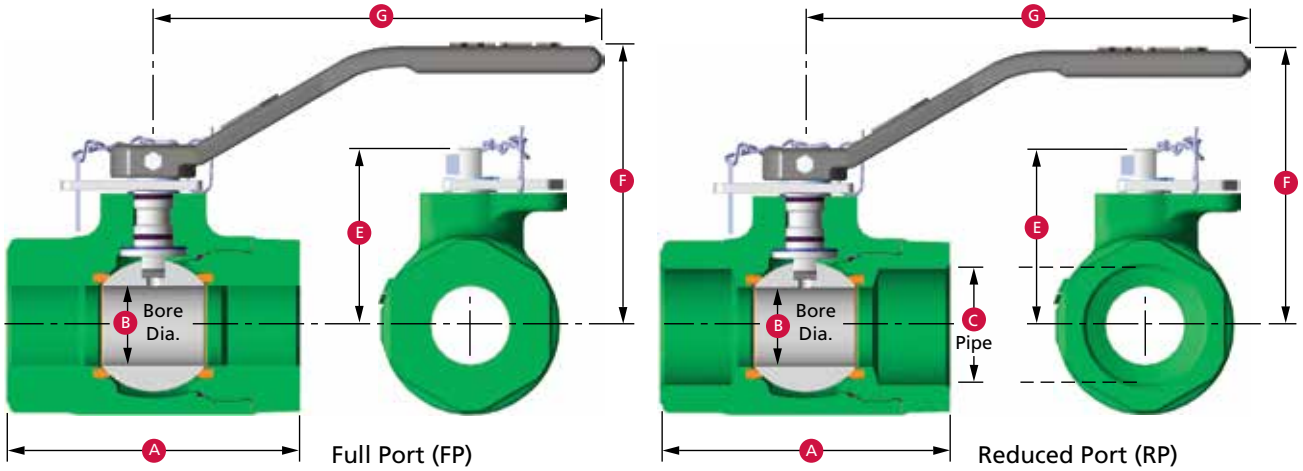
Standard Materials

Qty.	Description	Material
1	Body	ASTM A395 Ductile Iron
1	Tailpiece	ASTM A395 Ductile Iron
1	Ball	Carbon Steel Chrome-plated 316 SS
1	Stem	AISI 1213/1215, Steel, Zinc-plated 316 SS (Type 630 on 2" x 1-1/2" (50 mm x 40 mm))
2	Seat Ring	Acetal Plastic (43) Filled TFE (42)
1	Tailpiece Gasket	PTFE
2	Stem O-ring	Buna-N FKM
1	Stem Gasket (Thrust Bearing)	Filled TFE
1	Locking Plate	Steel 1018/26
1	Locking Plate Retaining Ring	Spring Steel
1	Wave Spring	Spring Steel
1	Stop Pin	Spring Steel
1	Handle	ASTM A395 Ductile Iron
1	Seal Pin/Dart	Brass or Aluminum

NOTE: For H_2S service, use Trim Code -X13220X. Meets NACE MR0175/ISO 15156 (see "How to Order" on page 2).

DIMENSIONS AND WEIGHTS

1" Full Port through 4" x 3" Reduced Port



Dimensions

Size in. (mm)	Dimension A Threaded	Dimension A Grooved	B	C	E	F	G
1 FP	4.00	–	1.00	1.00	2.77	4.0	7.1
(25 FP)	(102)	–	(25)	(25)	(70)	(102)	(180)
2 RP	5.55	5.25	1.50	2.00	3.56	4.9	7.1
(50 RP)	(141)	(133)	(38)	(50)	(90)	(124)	(180)
2 FP	6.00	–	2.00	2.00	4.50	4.9	15.0
(50 FP)	(152)	–	(51)	(50)	(114)	(124)	(381)
2-1/2 RP	7.00	–	2.00	2.50	4.50	4.9	15.0
(65 RP)	(178)	–	(51)	(65)	(114)	(124)	(381)
3 RP	7.25	7.25	2.00	3.00	4.50	4.9	15.0
(80 RP)	(184)	(184)	(51)	(80)	(114)	(124)	(381)
3 FP	8.75	–	3.00	3.00	5.66	6.0	15.0
(80 FP)	(222)	–	(76)	(80)	(144)	(152)	(381)
4 RP	8.75	8.88	3.00	4.00	5.66	6.0	15.0
(100 RP)	(222)	(226)	(76)	(100)	(144)	(152)	(381)

NOTE: The dimensions are approximated.

Weights – Full Port

Operation	Valve Size (in.) and Weight (lb) 1 x 1	2 x 2	3 x 3
Without Handle	4.0	14.4	42.8
With Handle	4.5	17.6	46.0
Operation	**Valve Size (mm) and Weight (kg) 25 x 25**	**50 x 50**	**80 x 80**
Without Handle	1.8	6.5	19.4
With Handle	2.0	8.0	20.9

Weights – Reduced Port

Operation	Valve Size (in.) and Weight (lb) 2 x 1-1/2	2-1/2 x 2	3 x 2	4 x 3
Without Handle	9.4	15.5	16.6	35.5
With Handle	9.9	18.0	19.8	38.7
Operation	**Valve Size (mm) and Weight (kg) 50 x 40**	**65 x 50**	**80 x 50**	**100 x 80**
Without Handle	4.3	7.0	7.5	16.1
With Handle	4.5	8.2	9.0	17.6

WKM DynaSeal 310 Floating Ball Valves

TRIM GUIDELINES FOR ALL DYNASEAL 310 VALVES

This chart is an abbreviated guide to the chemical resistance and pressure/temperature limitations of the seal materials used in the WKM DynaSeal 310 floating ball valve. Consult Cameron regarding questions about trim selections.

Seal Code	Seat Material	Tailpiece Gasket	Service Application
01	TFE	TFE	Seat and tailpiece gaskets are of virgin TFE. Use where lading contamination from glass or other fillers is not desirable, such as in food service. Recommended for low-temperature service to -50° F (-46° C). Also recommended for vacuum service.
42	Filled TFE	TFE	Seat material is TFE filled with inert materials for use at elevated temperatures and pressures. Same chemical resistance as virgin TFE except slightly affected by hot concentrated alkaline solutions. Some chlorinated compounds can cause swelling. Good for vacuum service. Also recommended for low-temperature service -50° F (-46° C).
43	Homopolymer Acetal Plastic	TFE	For general use at high pressures to a temperature of 220° F (104° C).
48	Homopolymer Acetal Plastic	Filled TFE	For general use at high pressures to a temperature of 220° F (104° C). Used on socket weld end valves 3" (80 mm) bore size and smaller.
07	*FKM/SS	TFE	High- and low-pressure block-and-bleed. General use for low-pressure and abrasion resistance. Not suitable for steam. Good for vacuum service. Available in bore sizes to 3" (80 mm).
18	HPT-2	Filled TFE	HPT-2 is a special TFE formulation for use at temperatures above trim 42 capability. Best suited for constant temperature or constant pressure applications. Proven service in steam, hot oil, heat transfer fluids, hot resins and boiler feed water. Same chemical resistance as TFE. Slightly affected by hot, concentrated alkaline solutions. Some fluorinated compounds cause swelling.
23	Celcon	TFE	For use in high-pressure applications. Temperature limited to 225° F (107° C) (1/4" to 3/4" (8 mm to 20 mm) bores only).
28	Filled TFE	Filled TFE	Same as 42, except tailpiece gasket is filled TFE. Used on weld end valves 4" (100 mm) and larger.
60S	Nickel Alloy HVOF/316	Graphite	Metal-to-metal QPQ ball and seat made of nickel alloy over 316 SS.
92H	Chrome Carbide/316	Graphite	Metal-to-metal ball and seat made of chrome carbide over 316 SS.

NOTE 1: Trim 07 and 18 should be tested for each application by actual use.
NOTE 2: All seal codes, with the exception of 07, have been fire-tested (and qualified) to API 607 4th edition requirements.
* Trim sizes smaller than 1-1/2" (40 mm) in trim 07 are 100% elastomeric. Sizes 1-1/2" (40 mm) and larger are elastomeric with a metal insert.

HOW TO ORDER

2	R	B	1	X	X	C	S	4	3	S	2	W	R
Size (in.)	Port Reduced Port = R Full Port = F	Valve Type*				Body Tailpiece Code		Seal Code		Ball and Stem Code		Actuator Code	

* See chart below.
† Not all trim combinations are possible.
Consult factory for availability and for materials not listed.

Material	Codes
Carbon steel	CS
Controlled hardness carbon steel for H_2S service	CS2*
Same as CS2, but special for -50° F (-46° C) service	CS3*
316 stainless steel for wetted parts	S1
316 stainless steel with stainless steel external trim; good for -50° F (-46° C)	S8*

* Meets NACE *MR0175/ISO 15156.

Material	Code
Carbon steel	CS
316 Stainless steel	S1
Type 630	S2*

* NACE 4" (100 mm) RP and smaller.
Type 630 stem, 316 stainless steel ball.

Actuator Code	
Wrench*	WR
Oval Handwheel	OH
Worm Gear	WG
Bare Stem	BS
Less Gear	LG
Less Wrench	LW

* Wrenches are part of the valve assembly on 4R bore and smaller valves. In 4" F through 8" x 6" (100 mm F through 200 x 150 mm), they are sold separately.

Seal Number	Seal Material	Tailpiece Gasket Material
01	PTFE	PTFE
42	Filled PTFE	PTFE
43	Homopolymer Acetal Plastic	PTFE
07	FKM	PTFE
18	HPT-2	Filled PTFE
23	Celcon	PTFE
28	Filled PTFE	Filled PTFE
60S	316 w/Nickel Alloy HVOF	Graphite
92H	316 w/Chrome Carbide	Graphite

310 Two-piece Valve Type

Size in.	Size (mm)		150 RF LP	150 RF SP	300 RF LP	300 RF SP	600 RF	600 RJ
1	(25)	FP	B110	–	B128	–	B182	B172
1-1/2	(40)	FP	B110	–	B128	–	B182	B172
2	(50)	RP	B100	–	B120	–	B114	B170
2	(50)	FP	B110	–	B128	–	B182	B172
3 x 2	(80 x 50)	RP	B100	–	B120	–	B114	B170
3	(80)	FP	B110	–	B128	–	B182	B172
4	(100)	RP	B100	–	B120	–	B114	B170
4	(100)	FP	B110	–	B128	–	B182***	B172***
6	(150)	RP	–	B102	B120	–	B114***	B170***
6	(150)	FP	B110	B113	B128	–	B182***	B172***
8	(200)	RP	B100	B102	–	B122	B114***	B170***

*** The 4" (100 mm) and larger sizes are available in trim CS2-43-S2-WGA (worm gear-operated) only.

310 Two-piece Valve Type

Size in.	Size (mm)		Female Thread	Male X Female
1/4	(8)	FP	B138	–
3/8	(10)	FP	B138	–
1/2	(15)	RP	B136	–
1/2	(15)	FP	B138	–
3/4	(20)	FP	B138	B138 (M x F)**
1	(25)	RP	B136	B136 (M x F)**
1	(25)	FP	B138	–
1-1/2	(40)	FP	B138	–
2	(50)	RP	B136	–
2	(50)	FP	B138	–
3	(80)	RP	B138	–
3	(80)	FP	B138	–
4	(100)	RP	B136	–

** Available in body tailpiece code S8 only.
NOTE: Threaded end valves have NPT internal pipe thread in full conformance with ASME B2.1 and Federal Thread Handbook H-28.

NACE MR0175/ISO 15156 Compliance – Materials of construction shall be in compliance with the pre-qualified material requirements specified by NACE MR0175/ISO 15156. According to NACE MR0175/ISO 15156, it is the manufacturer's responsibility for meeting metallurgical requirements and the customer/user responsibility to ensure that a material will be satisfactory in the intended environment. When given the application requirements (environment) by the customer/user, Cameron can make technical recommendations in accordance with NACE MR0175/ISO 15156, but that in no way certifies or warrants the product or materials for the application.

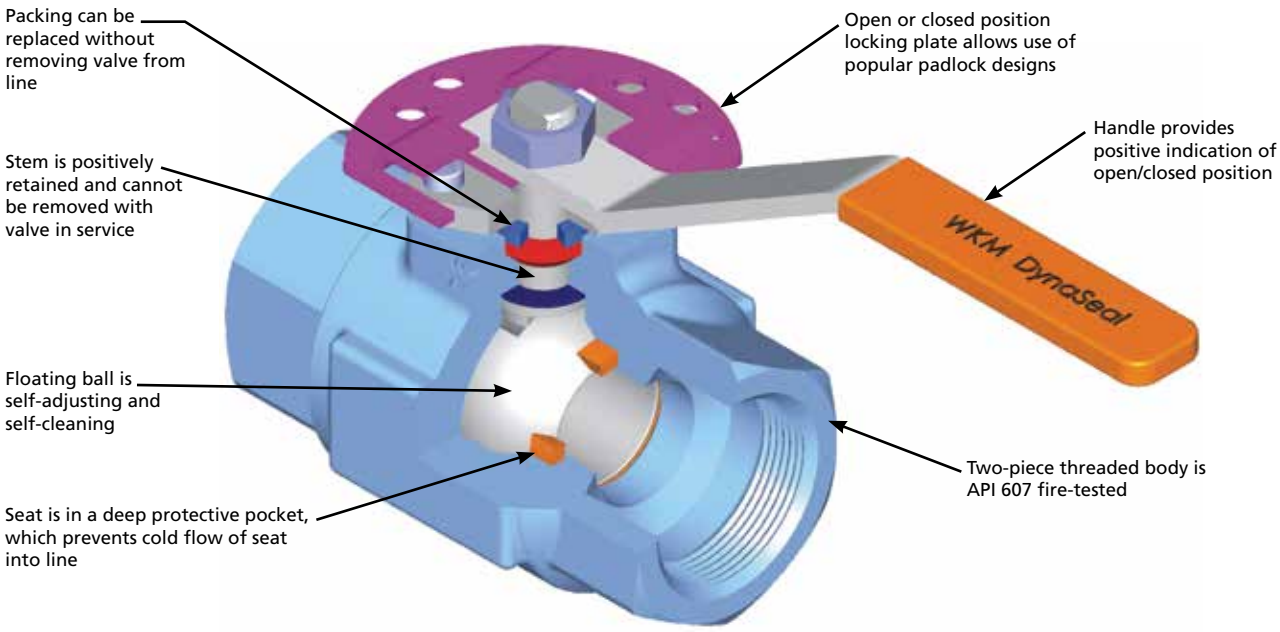
310 Three-piece Valve Type

Size in.	Size (mm)		Socket Weld
1/4	(8)	FP	B103
3/8	(10)	FP	–
3/4	(20)	FP	B103
1	(25)	RP	B106
1-1/2	(40)	FP	B103
2	(50)	RP	B106

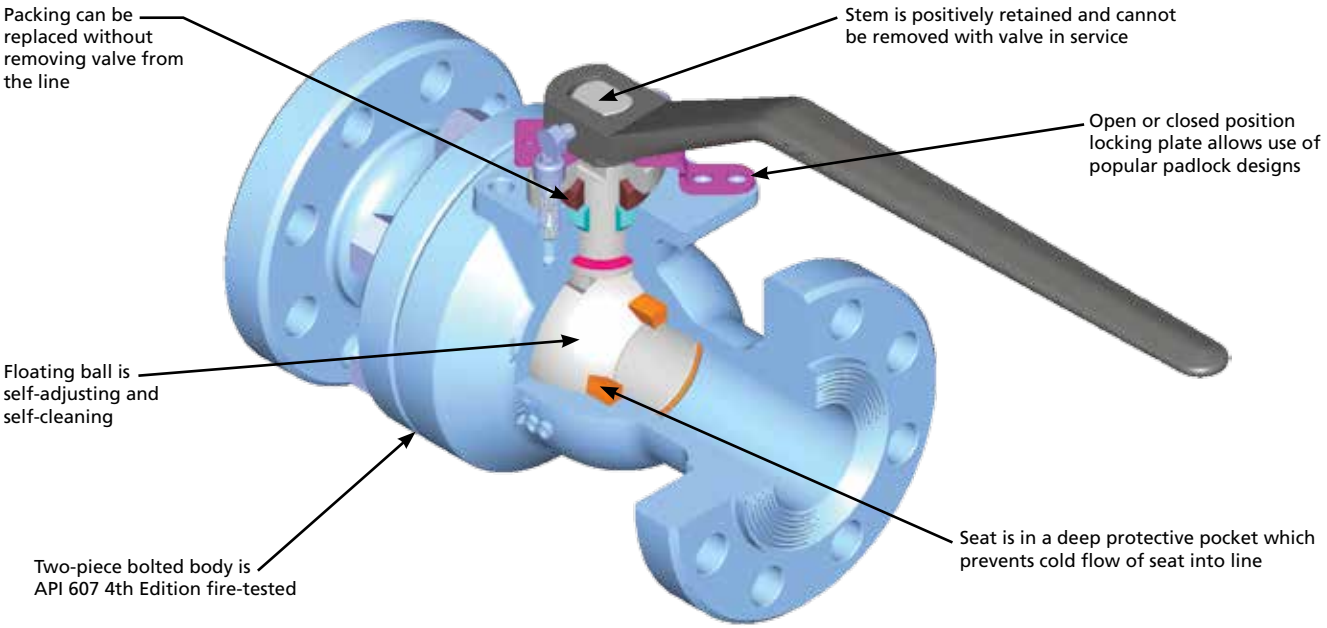
FEATURES AND BENEFITS

A premium quality floating ball valve that has proven itself in a wide variety of oilfield, chemical, petrochemical and hydrocarbon processing applications.

Threaded Valve Assembly 1/4" Full Port through 4" x 3" Reduced Port



Flanged Valve Assembly 1" Full Port through 4" x 3" Reduced Port



FEATURES AND BENEFITS (CONTINUED)

WKM DynaSeal 310 floating ball valves satisfy a wide range of applications and are available in a variety of standard and optional materials, in sizes from 1/4" (8 mm) to 4" x 3" (100 mm x 80 mm) and working pressures to 5000 psi. Engineered for heavy-duty, maintenance-free performance, the DynaSeal 310 ball valve is preferred for use in critical applications.

Sour Oil and Gas Service

WKM DynaSeal ball valves are suited to applications within gathering lines, manifolds and field processing units in sour oil and gas fields. They can be trimmed to conform with NACE MR0175/ISO 15156.

Deep-recessed Seats

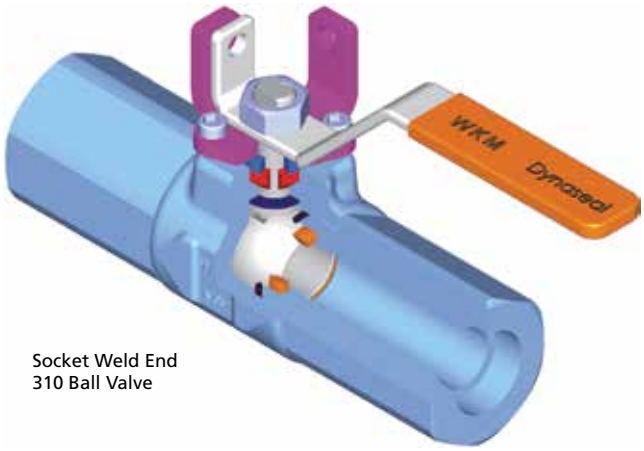
The WKM DynaSeal 310 seat is protected in a machined recess or deep pocket that surrounds and protects the seat. This design eliminates cold flow into the valve conduit and avoids potential seat damage from ball movement or flow media.

Trim 42 Seats

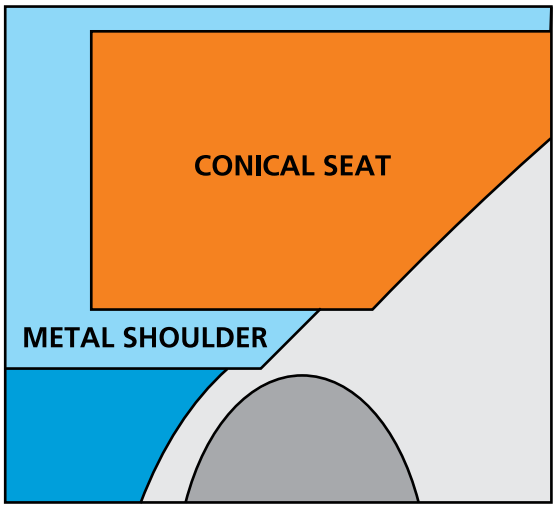
Seats are manufactured of filled TFE and rated to 1500 psi MOP. With working temperatures to 500° F (260° C) and low-torque operation, these seats satisfy even the most difficult of processing requirements.

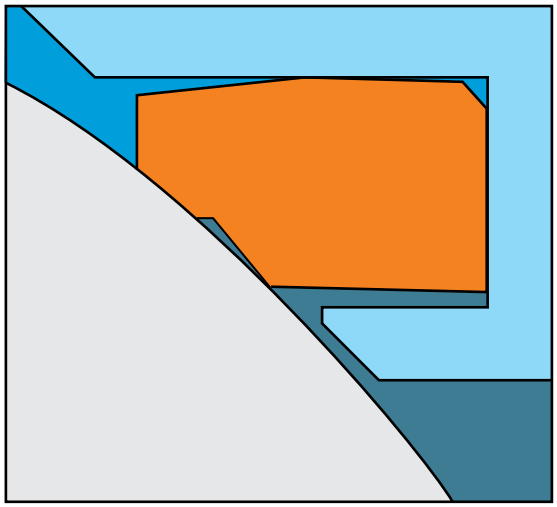
Trim 43 Seats

Seats are manufactured of acetal plastic and are rated to 3000 psi MOP and working temperatures to 220° F (104° C). These seats are designed to handle the most demanding applications. They can flex under pressure and provide a consistent range of low-torque operations. They also provide a full face seal against the ball and multiple seals against the top and back of the pocket to provide a positive seal.



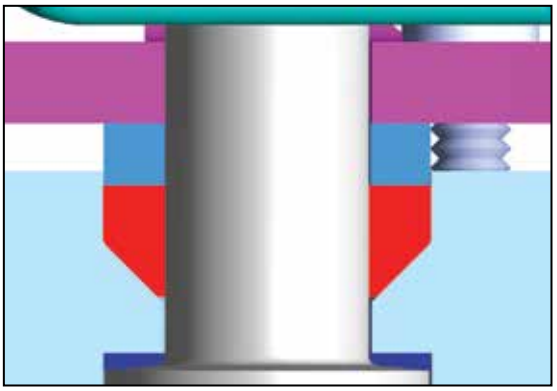
Socket Weld End
310 Ball Valve





Adjustable, Replaceable Packing

The in-line valve stem packing consists of PTFE impregnated graphite with an impervious metal barrier and a secondary tapered metal backup. The packing is field-adjustable and never requires lubrication. The packing and the stainless steel cap can be replaced without removing the valve from the line.

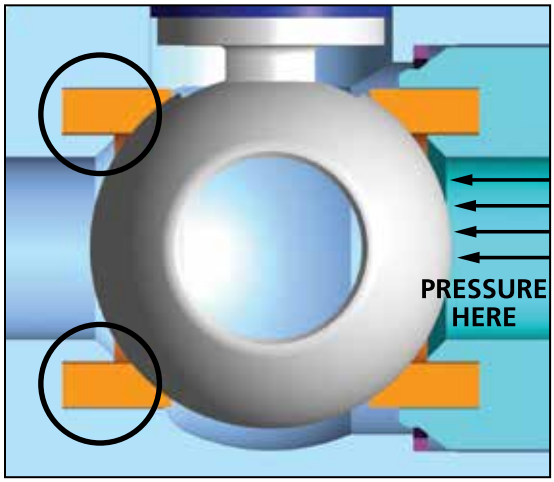


Positively Retained Stem

The stem is positively retained with a shoulder. It cannot be removed with the valve in service. There are no O-rings used in this design.

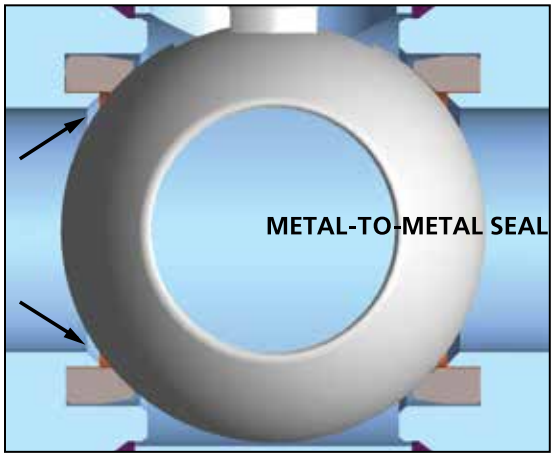
Floating Ball Design Delivers Tight Seal

The ground and polished ball is free to float and mates perfectly with the conical seats for a positive, leakproof seal. Self-cleaning and self-adjusting, the ball also is pressure activated – the higher the line pressure, the tighter the seal.



Fire-tested for Safety

All WKM DynaSeal 310 ball valves are qualified under API Standard 607. The pocketed seat and locked-in stem design contributes to its fire-tested characteristics. Should the soft seats be destroyed by fire, the ball floats down stream, providing a tight metal-to-metal seal against the lip of the seat pocket. If the tailpiece seals are destroyed, the metal-to-metal tailpiece-to-body connection retards external leakage.



Indicator Handle

The design of the handle permits installation on the stem in the correct position only, in alignment with the ball port. When the handle is aligned with the pipe, the valve is open. When the handle is perpendicular to the pipe, the valve is closed.

Locking Devices

Locking devices are standard on all 4" x 3" (100 mm x 80 mm) and smaller manually operated valves and permit locking in either the open or closed positions.

SPECIFICATIONS

Socket Weld Ends

Standards and Specifications

Sizes

- 1/4" (8 mm) full port
- 3/4" (20 mm) full port
- 1" (25 mm) reduced port
- 1-1/2" (40 mm) full port
- 2" (50 mm) reduced port

Working Pressure

- 3000 psi with trim 48

Operating Temperatures

- From -20° F to 220° F (-29° C to 104° C)

End Connections

- Socket weld ends

Standard Material

Body

- Carbon steel and carbon steel NACE MR0175/ ISO 15156

Ball/Stem

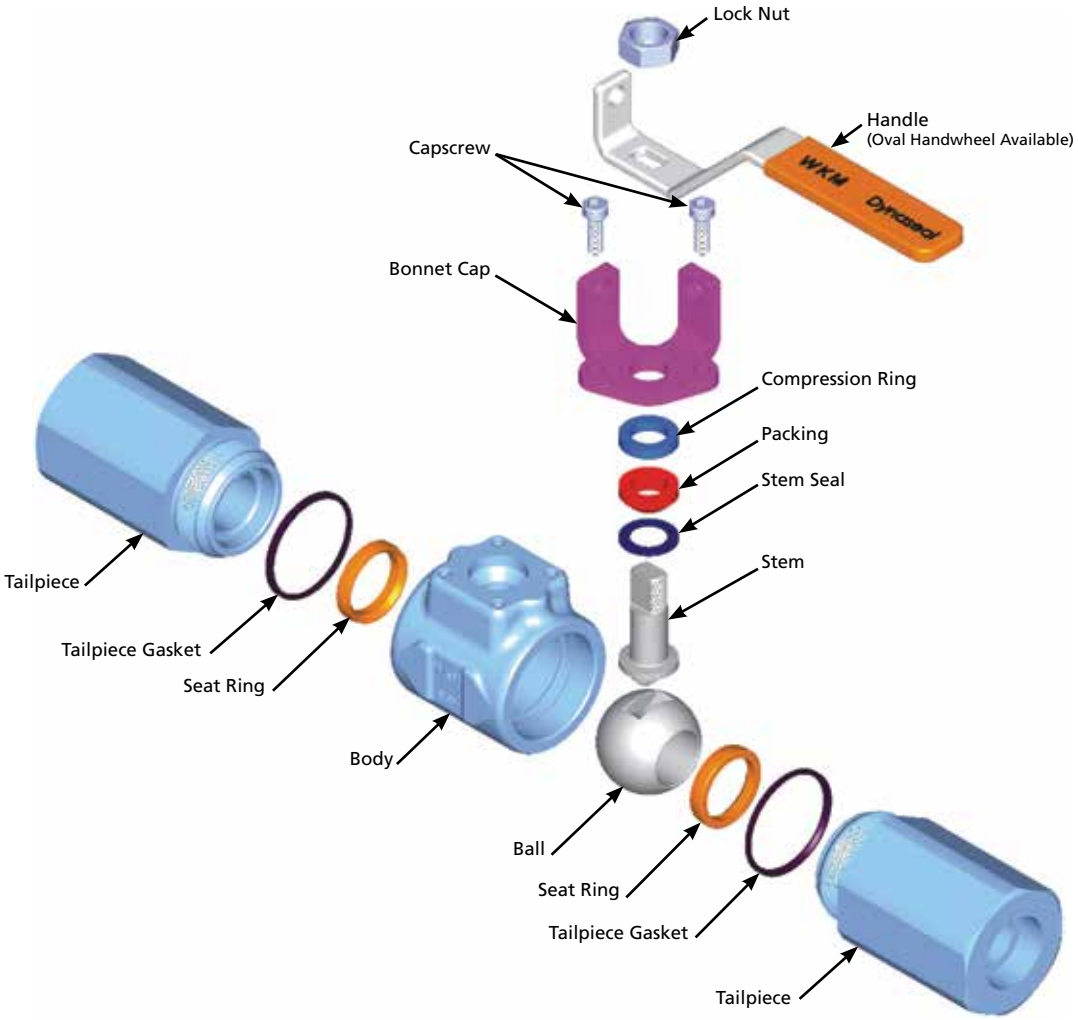
- Carbon steel or stainless steel

Seats

- Trim 48 (acetal plastic seats)

Industry Standards Compliance

- ASME B16.34
- MSS-SP-25, 55, 72
- API 607 Fire-test Specification



Standards and Specifications

- To 5000 psi in small sizes
- Trim 43 pressure range to 3000 psi in 1/4" (8 mm) to 3" x 2" (80 mm x 50 mm) threaded end valves

Operating Temperatures

- From -50° F to 600° F (-46° C to 316° C)

Standard Material

Body

- Carbon steel and stainless steel

Ball/Stem

- Carbon steel and stainless steel

Seat/Seal Trims

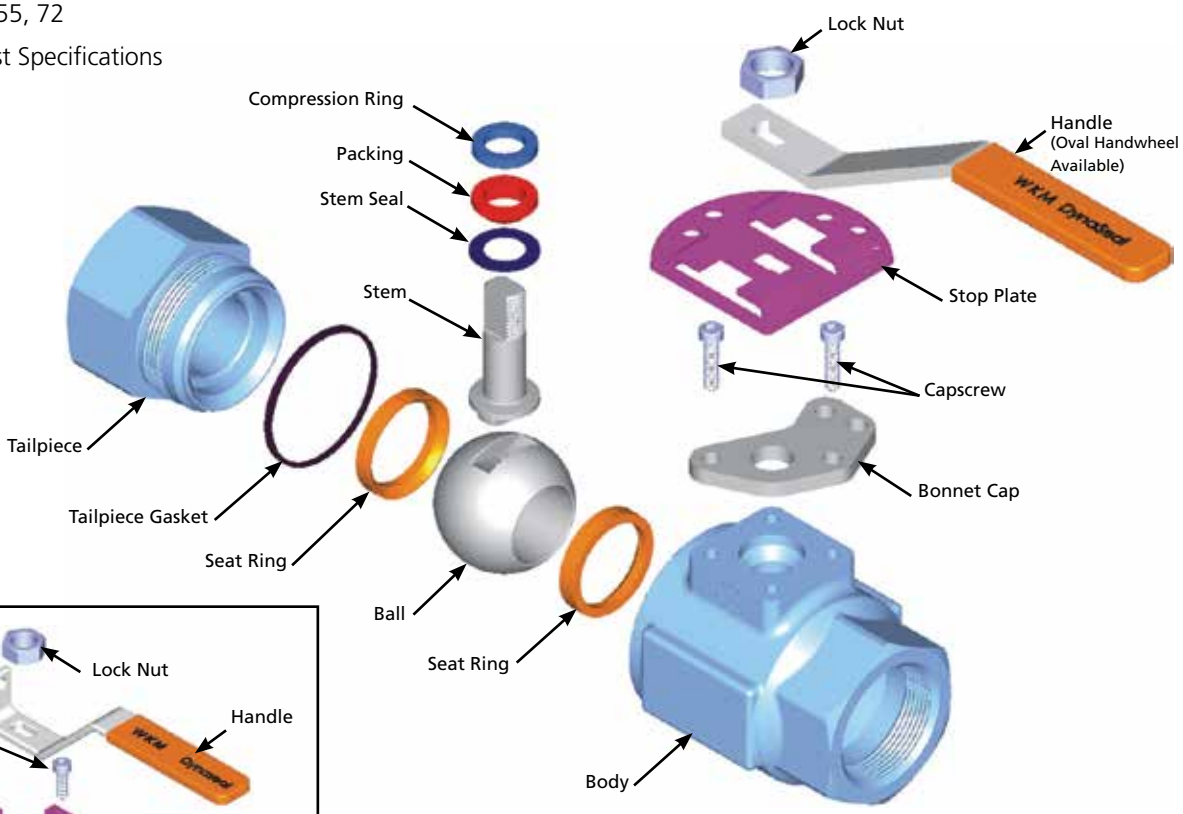
- TFE, filled TFE, acetal plastic, HPT-2 and 316 stainless steel with chromium carbide and FKM

Industry Compliance

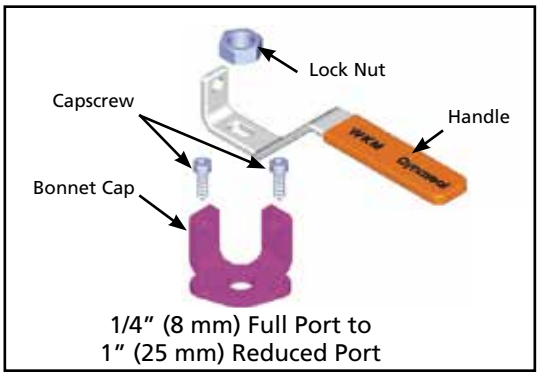
- ASME B16.5, B16.34
- MSS-SP-6, 25, 55, 72
- API 607 Fire-test Specifications
- GOST-R

Threaded Connections

Full Port Size		Reduced Port Size	
in.	(mm)	in.	(mm)
1/4	(8)	1/2	(15)
3/8	(10)	1	(25)
1/2	(15)	2	(50)
3/4	(20)	3	(80)
1	(25)	4	(100)
1-1/2	(40)		
2	(50)		
3	(80)		



Threaded Ends C5



1/4" (8 mm) Full Port to
1" (25 mm) Reduced Port

SPECIFICATIONS

Flanged Connections

Operating Temperatures

- From -50° F to 600° F (-46° C to 316° C)

Standard Material

Body

- Carbon steel and stainless steel

Ball/Stem

- Carbon steel and stainless steel

Seat/Seal Trims

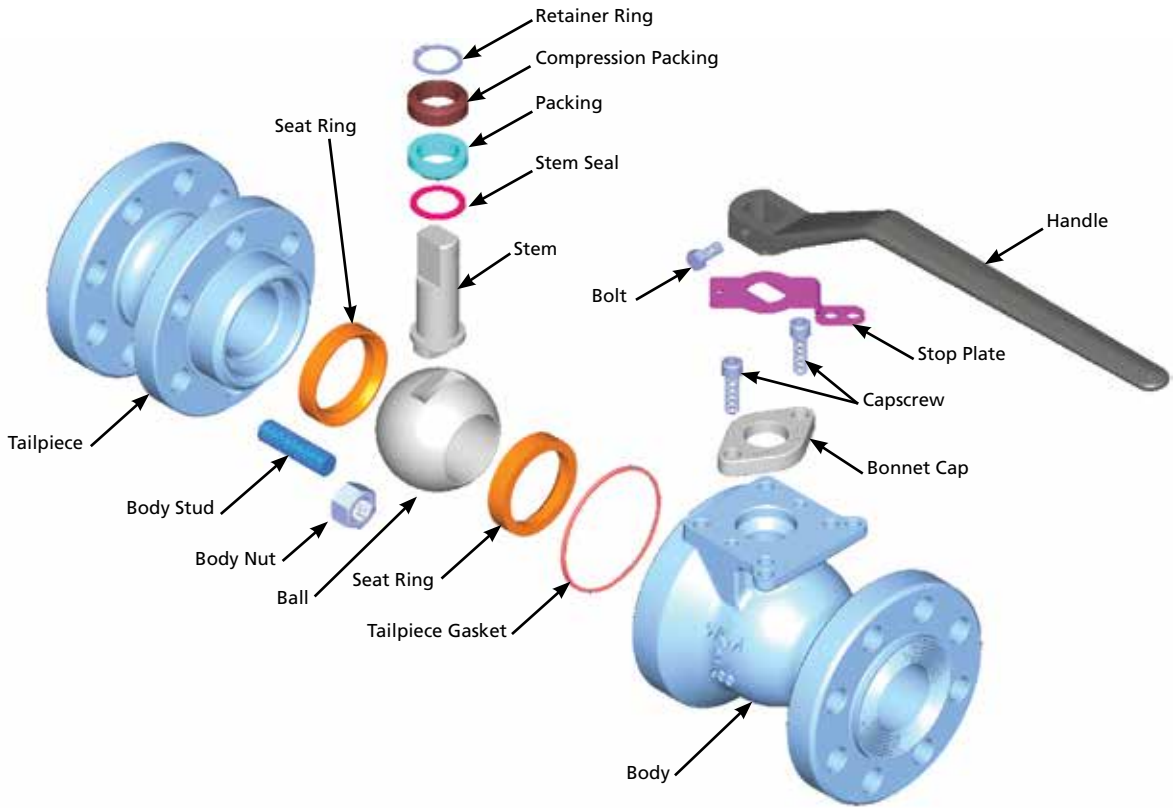
- TFE, filled TFE, acetal plastic, HPT-2 and 316 stainless steel with chromium carbide and FKM

Industry Compliance

- ASME B16.5, B16.34
- MSS-SP-6, 25, 55, 72
- API 607 Fire-test Specifications
- GOST-R

Flanged Connections ASME Pressure Class

Size			Class		
in.	(mm)		150	300	600
1	(25)	FP	•	•	•
1-1/2	(40)	FP	•	•	•
2 x 1-1/2	(50 x 40)	RP	•	•	•
2	(50)	FP	•	•	•
3 x 2	(80 x 50)	RP	•	•	•
3	(80)	FP	•	•	•
4 x 3	(100 x 80)	RP	•	•	•



Flanged Ends 310F

MATERIALS LIST – THREADED AND FLANGED ENDS

1/4" Full Port through 4" Reduced Port

Body / Tailpiece Material Code

Part	CS	CS2*	CS3*	S8*
Body	ASTM A105/A216 Gr. WCC	ASTM A105/A216 Gr. WCC	ASTM A350 LF2	316 SS/A351 CF8M
Studs	A193 Gr. B7	A193 Gr. B7M	A320 Gr. L7M	A193 Gr. B8
Nuts	A194 Gr. 2H	A194 Gr. 2HM	A194 Gr. 7ML	A194 Gr. 8
Body plug**	Carbon Steel	Carbon Steel	Carbon Steel	Stainless Steel
Tailpiece	ASTM A105/A216 Gr. WCC	ASTM A105/A216 Gr. WCC	ASTM A350 LF2	316 SS/A351 CF8M
Nameplate	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Bonnet cap	Carbon Steel	Carbon Steel	Carbon Steel	Stainless Steel
Packing adjusting screws	Alloy Steel-plated	18-8 SS	18-8 SS	18-8 SS

* CS2/CS3/S8 to be used for H_2S service with S2 internal trim only. Meets NACE MR0175/ISO 15156.
** When body drain is specified.

Seat Seal Material Code

Part	01	42	43	48***	07	18	60S
Seat	TFE	Filled TFE	Acetal Plastic	Acetal Plastic	FKM	Special Filled TFE	316/HVOF Nickel –
Tailpiece gasket	TFE	TFE	TFE	Filled TFE	TFE	Filled TFE	Graphite
Stem Seal	TFE	Filled TFE	Filled TFE	Filled TFE	Filled TFE	Filled TFE	Graphite
Packing	Graphite/TFE w/SS Cap						

*** Socket weld end valves only.

Ball / Stem Material Code

Part	CS	S1	S2*	60S
Ball	AISI 1213 CS Chrome Plate	316 Stainless Steel	316 Stainless Steel	316 QPQ Nitride
Stem	AISI 1213 Zinc Plate	316 Stainless Steel	Type 630	Type 630
Compression Ring	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel

* S2 trim (Type 630 stem and 316 SS ball) is required for H_2S service per NACE MR0175/ISO 15156 to be used with body/tailpiece codes CS2/CS3/S8.

Actuator Code

Part (Body)	CS	CS2	CS3	S1	S8
Lock Nut*	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel	Stainless Steel
Handle*	CS Zinc Plated	CS Zinc Plated	CS Zinc Plated	CS Zinc Plated	Stainless Steel
Handle Grip*	Vinyl	Vinyl	Vinyl	Vinyl	Vinyl
Wrench Handle**	Ductile Iron	Ductile Iron	Ductile Iron	Ductile Iron	Ductile Iron
Wrench Head Bolt and Nut**	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel
Stop Plate	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel

* 2" (50 mm) reduced port and smaller.
** 2" (50 mm) full port and larger.

DIMENSIONAL DATA – 4" REDUCED PORT AND SMALLER

1/4" Full Port through 4" Reduced Port: Flanged, Threaded and Socket Weld

B136/B138 Threaded

B100/B110 Class 150 Raised-face Flanges

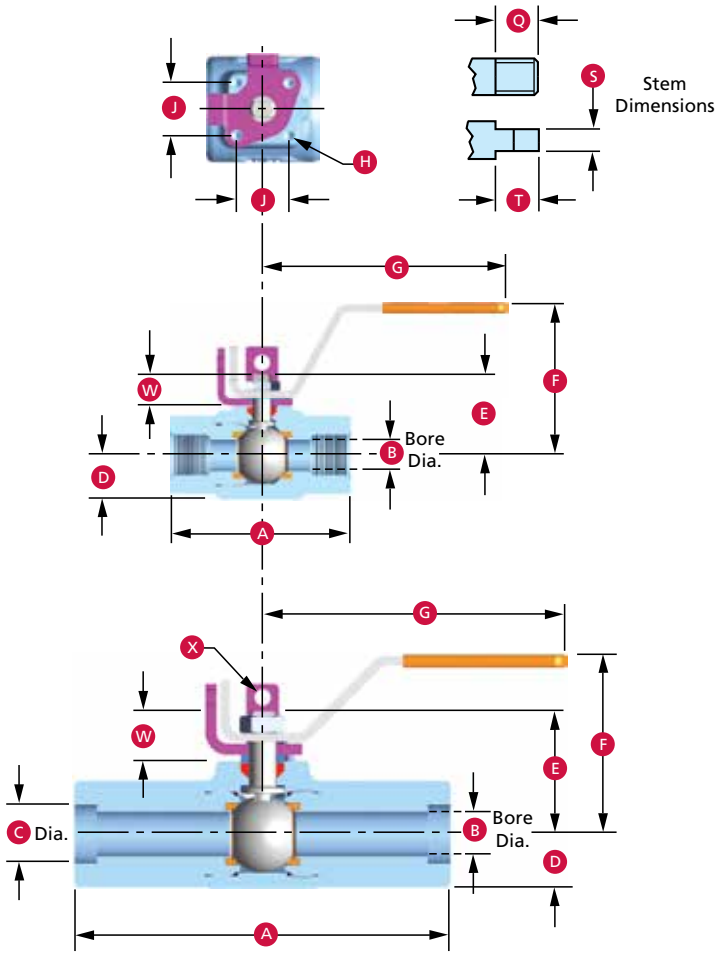
B120/B128 Class 300 Raised-face Flanges

B114/B182 Class 600 Raised-face Flanges

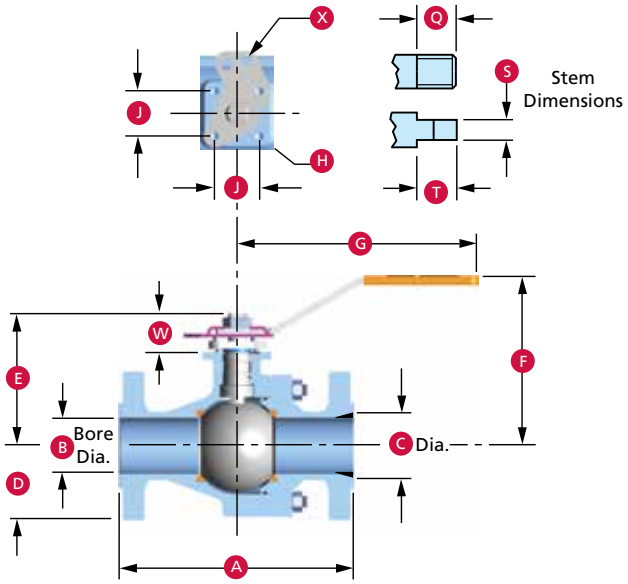
B170/B172 Class 600 Ring joint Flanges

B106/B103 Socket Weld

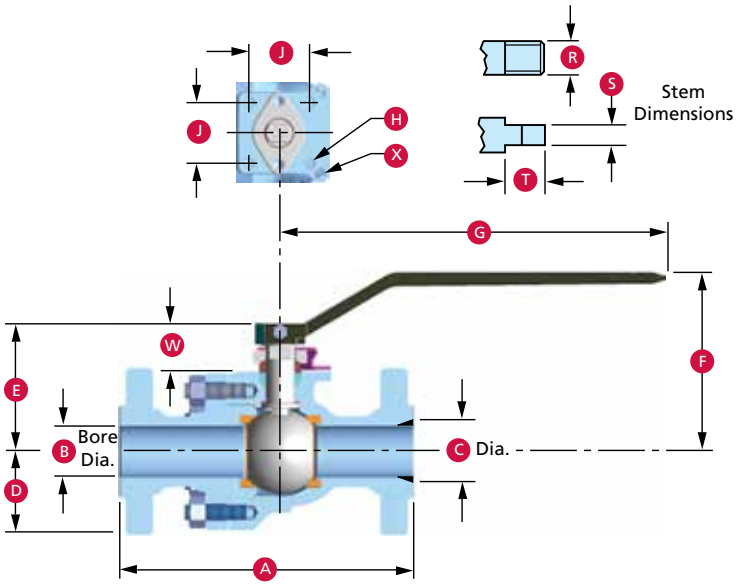
1" (25 mm) Reduced Port and Smaller



1" (25 mm) Full Port through 2" (50 mm) Reduced Port



2" (50 mm) Full Port through 4" (100 mm) Reduced Port



Threaded and Flanged Ends

Size	A					B	C	D				E	F	G	H*	J	Q*	R	S	T	W	X
in.	THD	150	300	600	600RJ			THD	150	300	600											
1/4 FP	3.00	–	–	–	–	0.38	–	0.69	–	–	–	1.4	2.8	4.3	#8-32 .26 DP	0.88	5/16-24	–	0.18	0.25	0.55	0.38
3/8 FP	3.25	–	–	–	–	0.38	–	0.69	–	–	–	1.4	2.8	4.3	#8-32 .26 DP	0.88	5/16-24	–	0.18	0.25	0.55	0.38
1/2 RP	3.75	–	–	–	–	0.38	–	0.69	–	–	–	1.4	2.8	4.3	#8-32 .26 DP	0.88	5/16-24	–	0.18	0.25	0.55	0.38
1/2 FP	4.00	–	–	–	–	0.50	–	0.81	–	–	–	1.8	3.5	5.7	#10-24 .26 DP	1.00	7/16-20	–	0.26	0.34	0.72	0.38
3/4 FP	4.25	–	–	–	–	0.75	–	1.06	–	–	–	1.9	3.5	5.7	#10-24 .26 DP	1.00	7/16-20	–	0.26	0.34	0.72	0.38
1 RP	4.50	–	–	–	–	0.75	–	1.06	–	–	–	1.9	3.5	5.4	#10-24 .26 DP	1.00	7/16-20	–	0.26	0.34	0.72	0.38
1 FP	4.50	5.0	6.50	8.5	8.50	1.00	–	1.32	2.12	2.44	2.44	2.8	4.1	7.0	1/4-20 .39 DP	1.25	5/8-18	–	0.36	0.63	1.25	0.38
1-1/2 FP	5.25	6.5	7.50	9.5	9.50	1.50	–	1.81	2.50	3.06	3.06	3.7	5.0	9.5	5/16-18 .45 DP	1.50	3/4-16	–	0.45	0.81	1.50	0.38
2 RP	6.25	7.0	8.50	11.5	11.62	1.50	2.0	1.81	3.00	3.25	3.25	3.7	5.0	9.5	5/16-18 .45 DP	1.50	3/4-16	–	0.45	0.81	1.50	0.38
2 FP	6.25	7.0	8.50	11.5	11.62	2.00	–	2.38	3.00	3.25	3.25	5.0	5.4	15.0	1/2-13 .50 DP	2.44	–	1.12	0.69	1.37	1.88	0.38
3 x 2 RP	9.00	8.0	11.12	14.0	14.12	2.00	3.0	2.38	3.75	4.12	4.12	5.0	5.4	15.0	1/2-13 .50 DP	2.44	–	1.12	0.69	1.37	1.88	0.38
3 FP	10.00	8.0	11.12	14.0	14.12	3.00	–	3.28	3.75	4.12	4.12	6.4	7.1	15.0	1/2-13 .50 DP	3.00	–	1.12	0.74	1.75	2.31	0.38
4 RP	10.25	9.0	12.00	17.0	17.12	3.00	4.0	3.28	4.50	5.00	5.38	6.4	7.1	15.0	1/2-13 .50 DP	3.00	–	1.12	0.74	1.75	2.31	0.38
Size mm																						
6 FP	76	–	–	–	–	10	–	18	–	–	–	35	70	108	#8-32 6.6 DP	22	5/16-24	–	5	6	14	10
10 FP	83	–	–	–	–	10	–	18	–	–	–	35	70	108	#8-32 6.6 DP	22	5-16-24	–	5	6	14	10
15 RP	95	–	–	–	–	10	13	18	–	–	–	35	70	108	#8-32 6.6 DP	22	5/16-24	–	5	6	14	10
15 FP	102	–	–	–	–	13	–	20	–	–	–	45	89	145	#10-24 6.6 DP	25	7/16-20	–	7	9	18	10
20 FP	108	–	–	–	–	19	–	27	–	–	–	48	89	145	#10-24 6.6 DP	25	7/16-20	–	7	9	18	10
25 RP	114	–	–	–	–	19	25	27	–	–	–	48	89	137	#10-24 6.6 DP	25	7/16-20	–	7	9	18	10
25 FP	114	127	165	216	216	25	–	34	54	62	62	71	107	178	1/4-20 9.9 DP	32	5/8-18	–	9	16	31	10
40 FP	133	165	190	241	241	38	–	46	64	78	78	94	127	241	5/16-18 11.4 DP	38	3/4-16	–	11	21	38	10
50 RP	159	178	216	292	295	38	51	46	76	83	83	94	127	241	5/16-18 11.4 DP	38	3/4-16	–	11	21	38	10
50 FP	159	178	216	292	295	51	–	60	76	83	83	127	137	381	1/2-13 12.7 DP	62	–	28	18	35	48	10
80 x 50 RP	229	203	283	356	359	51	76	60	95	105	105	127	137	381	1/2-13 12.7 DP	62	–	28	18	35	48	10
80 FP	254	203	283	356	359	76	–	83	95	105	105	163	180	381	1/2-13 12.7 DP	76	–	28	19	44	59	10
100 RP	260	229	305	432	435	76	102	83	114	127	137	164	180	381	1/2-13 12.7 DP	76	–	28	19	44	59	10

Socket Weld End

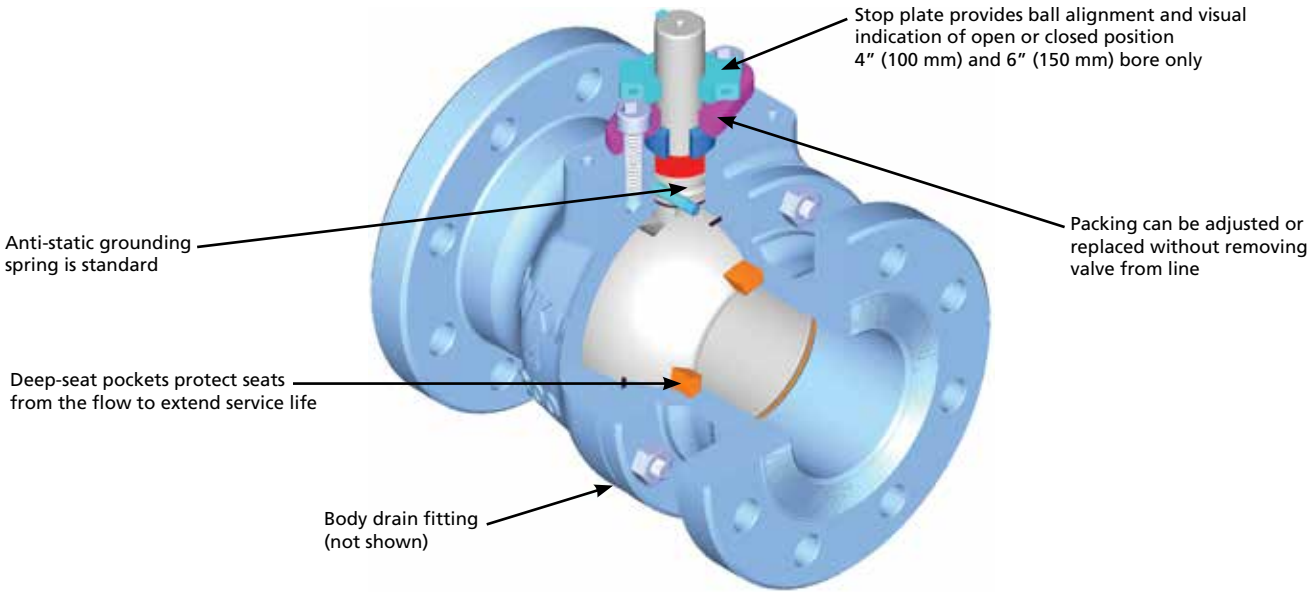
Size in.		A	B	C	D	E	F	G	H	J	Q*	S	T	W	X
1/4 FP	B103	7.00	0.38	1.41	0.62	1.41	2.84	4.25	#8-32 .25 DP	0.88	5/16-24	0.18	0.25	0.56	0.38
3/4 FP	B103	8.25	0.75	1.94	1.00	1.94	3.75	5.75	#10-24 .25 DP	1.00	7/16-20	0.26	0.34	0.75	0.38
1 RP	B106	8.25	0.75	1.94	1.00	1.94	3.75	5.75	#10-24 .25 DP	1.00	7/16-20	0.26	0.34	1.14	0.38
1-1/2 FP	B103	9.25	1.50	3.56	1.75	3.56	5.00	9.50	5/16-18 .44 DP	1.50	3/4-16	0.45	0.81	1.34	0.38
2 RP	B106	10.25	1.50	3.56	1.75	3.56	5.00	9.50	5/16-18 .44 DP	1.50	3/4-16	0.45	0.81	1.34	0.38
Size mm															
8 FP	B103	177.80	9.65	35.81	15.75	35.81	72.14	107.95	#8-32 6.4 DP	22.35	5/16-24	4.57	6.35	14.22	9.65
20 FP	B103	209.55	19.05	49.28	25.40	49.28	95.25	146.05	#10-24 6.4 DP	25.40	7/16-20	6.60	8.64	19.05	9.65
25 RP	B106	209.55	19.05	49.28	25.40	49.28	95.25	146.05	#10-24 6.4 DP	25.40	7/16-20	6.60	8.64	28.96	9.65
40 FP	B103	234.95	38.10	90.42	44.45	90.42	127.00	241.30	5/16-18 11.2 DP	38.10	3/4-16	11.43	20.57	34.04	9.65
50 RP	B106	260.35	38.10	90.42	44.45	90.42	127.00	241.30	5/16-18 11.2 DP	38.10	3/4-16	11.43	20.57	34.04	9.65

* American National Thread in inches.

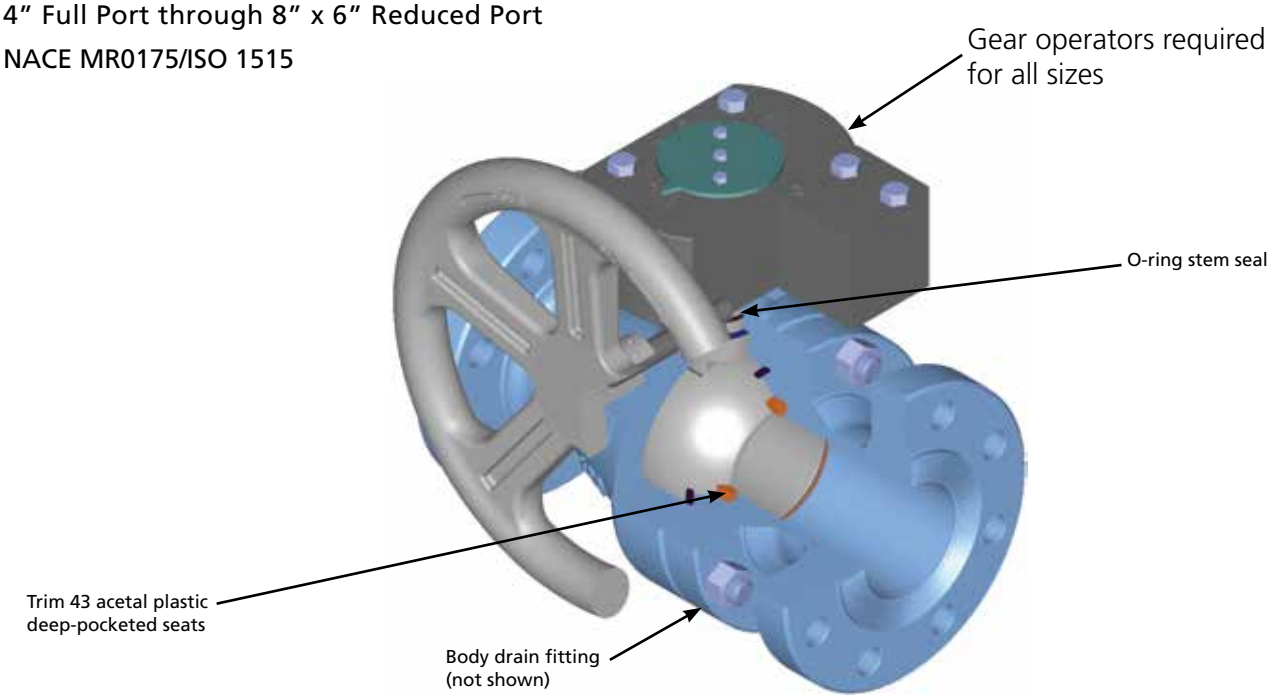
FEATURES AND BENEFITS

Handle can be installed in correct position only in alignment with the ball port. Handle aligned with piping shows valve is open. Handle perpendicular to piping shows valve is closed. 4" (100 mm) and 6" (150 mm) bore only.

310C ASME Classes 150 and 300
4" Full Port through 8" Reduced Port
NACE MR0175/ISO 15156



310F2 ASME Class 600
4" Full Port through 8" x 6" Reduced Port
NACE MR0175/ISO 1515



WKM DynaSeal 310 ball valves satisfy a wide range of applications. Available in a variety of standard and optional materials, they may be specified in sizes from 4" (100 mm) to 8" x 6" (200 mm x 150 mm) and ASME Class 150 and 300. ASME Class 600 is available in sizes 4" (100 mm) through 8" x 6" (200 mm x 150 mm). Engineered for heavy-duty, maintenance-free performance, the WKM DynaSeal 310 ball valve is commonly selected for a variety of applications in virtually any industry.

Chemical and Petrochemical Plants

There is a wide range of chemical and petrochemical applications for WKM DynaSeal 310 ball valves. They are serving in many plastic plants, handling such slurries as 40% vinyl chloride in high-pressure catalyst lines; and in processes, handling dry lading such as polyethylene and polystyrene powders.

There are hundreds of applications in such plants where WKM DynaSeal 310 ball valves are providing efficient service.

Refining

The WKM DynaSeal 310 ball valve is ideal for the refining industry. The many metal seats, seals and available trims offer the versatility needed to handle the wide variety of products used in the refining process.

High-temperature Service

Special high-temperature trims are available for WKM DynaSeal 310 ball valves, which provide for service to 600° F (316° C). This trim is designed for steam service, hot oil, heat transfer fluids, boiler feed water and similar applications.

Low-temperature Service

Standard trims accommodate temperatures to -20° F (-29° C). For temperatures to -50° F (-46° C), please consult factory.

Maintenance-free Performance

Under most conditions, the WKM DynaSeal 310 ball valve will provide years of trouble-free service with no maintenance required.

In some severe applications, such as handling extremely abrasive slurries at high temperature, it may be necessary to replace the seats occasionally.

Seat and seal kits are available, and replacement can be done easily with ordinary tools.

Sour Oil and Gas Service

WKM DynaSeal 310 ball valves have served for years in gathering lines, manifolds and field processing units in sour oil and gas fields. They can be trimmed to conform with NACE MR0175/ISO 15156.

Actuation-friendly

A variety of actuator types can be installed easily, including pneumatic, hydraulic, diaphragm, vane, electromechanical and electrohydraulic.

Fire-tested for Safety

All WKM DynaSeal 310 ball valves are qualified under API Standard 607. The pocketed seat and locked-in stem design contributes to its fire-tested characteristics. Should the soft seats be destroyed by fire, the ball floats down stream, providing a tight metal-to-metal seal against the lip of the seat pocket. If the tailpiece seals are destroyed, the metal-to-metal tailpiece-to-body connection retards external leakage.

WKM DynaSeal 310 ball valve with pneumatic actuator

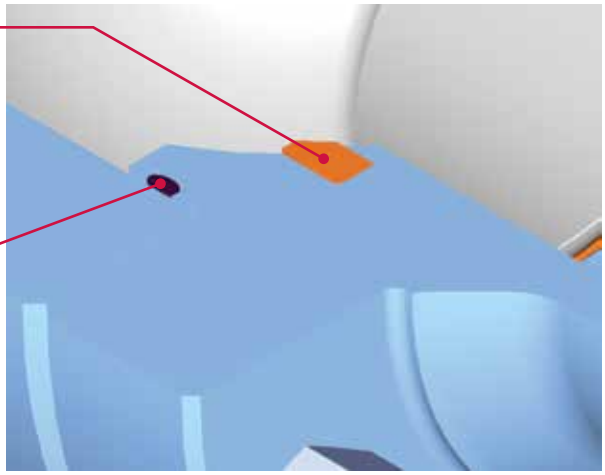
FEATURES AND BENEFITS (CONTINUED)

Deep-recessed Seats

The seat is recessed into a deep machined pocket that surrounds and protects the seat on all sides. This design eliminates cold flow into the valve conduit, where it can be damaged by the action of the ball or the flow medium. The result is long and extended service life.

Teflon Body Seal

A Teflon body seal is used between the valve body and tailpiece.

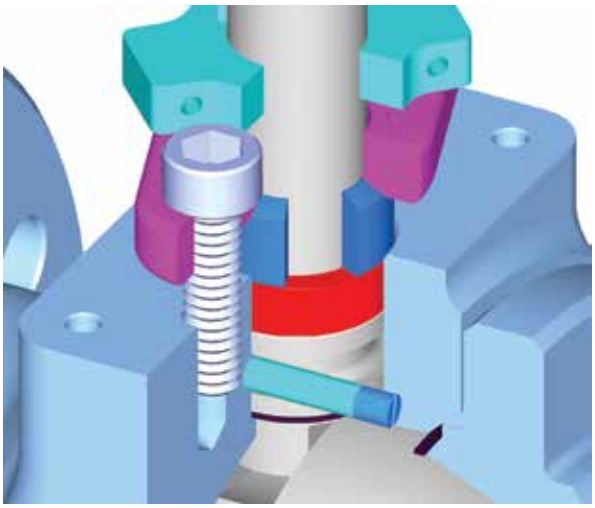


Adjustable, Replaceable Packing

The in-line valve stem packing through ASME class 300 consists of PTFE impregnated graphite with a metal barrier. The packing is field-adjustable and virtually never requires lubrication. The packing and the stainless steel cap can be replaced without removing the valve from line.

Fugitive Emissions

WKM DynaSeal 310 ball valves through ASME Class 300 can be supplied and certified to meet the requirements of fugitive emissions as regulated by The 1990 Amendment to The Clean Air Act to 100 ppm.



Positively Retained Stem

The stem is positively retained and cannot be removed with the valve in service.

Indicator Handle

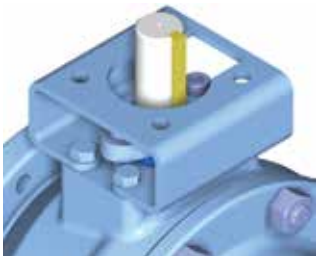
The design of the handle ASME class 300 permits installation on the stem in the correct position only, in alignment with the ball port. When the handle is aligned with the pipe, the valve is open. When the handle is perpendicular to the pipe, the valve is closed.

Floating Ball Design Delivers Tight Seal

The ground and polished ball is free to float and mates perfectly with the conical seats for a positive, leakproof seal. Self-cleaning and self-adjusting, the ball also is pressure activated – the higher the line pressure, the tighter the seal.

Gear Mounting Brackets For:

4" FP to 8" RP
(100 mm FP to 200 mm RP)
ASME Classes 150/300



SPECIFICATIONS

ASME Classes 150 and 300

Operating Temperatures

- From -50° F to 600° F (-46° C to 316° C)

Standard Material

Body

- Carbon steel and stainless steel

Ball/Stem

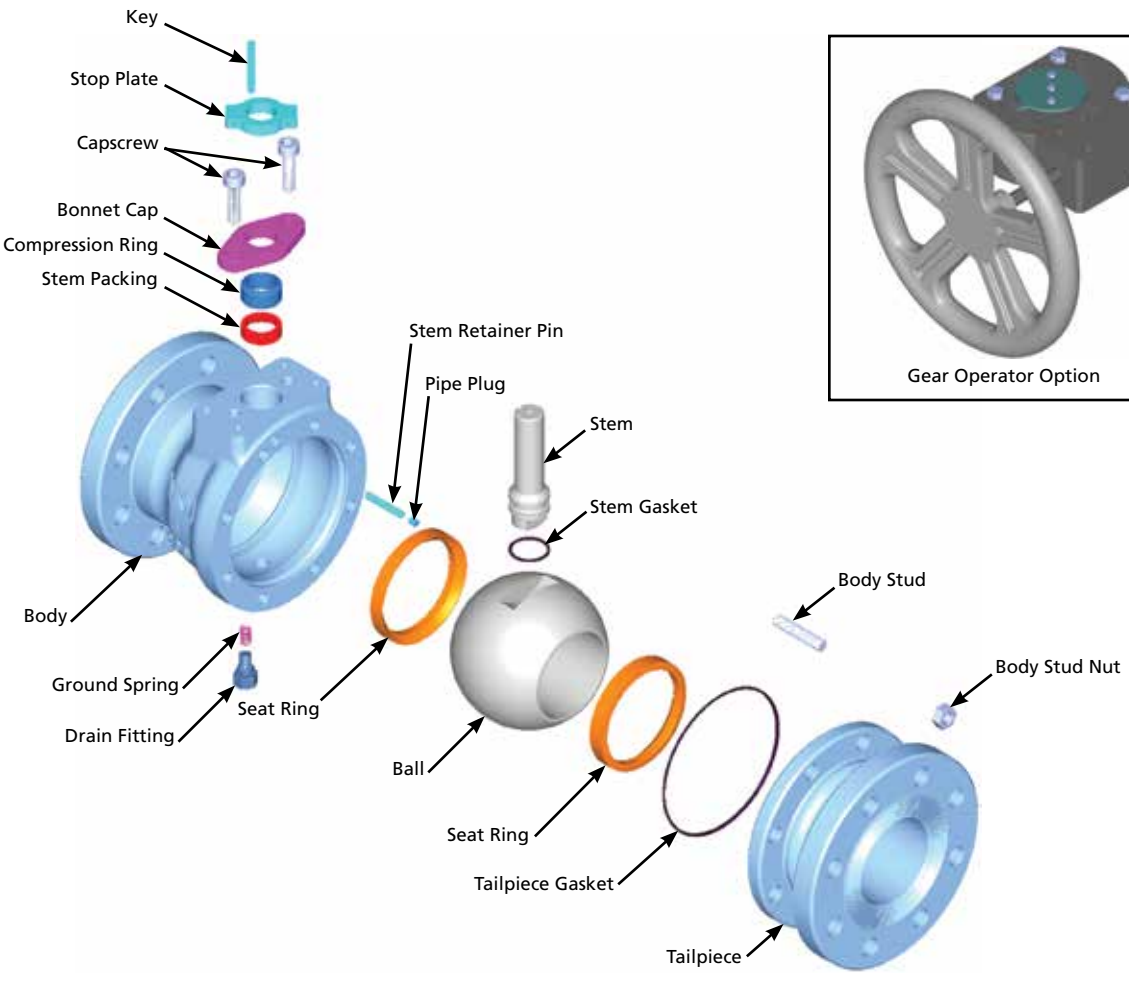
- Carbon steel and stainless steel

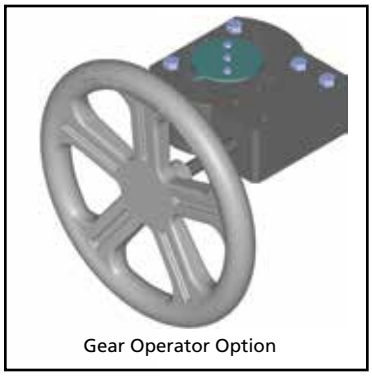
Industry Compliance

- ASME B16.5, B16.34
- MSS-SP-25, 55, 72
- API 607 Fire-test Specification
- GOST-R

ASME Pressure Class

Size			Class	
in.	(mm)		150	300
4	(100)	FP	•	•
6 x 4	(150 x 100)	RP	•	•
6	(150)	FP	•	•
8 x 6	(200 x 150)	RP	•	•




Gear Operator Option

SPECIFICATIONS

ASME Class 600

Operating Temperatures

- From -20° F to 220° F (-29° C to 104° C)

Standard Material

Body

- Carbon steel

Ball/Stem

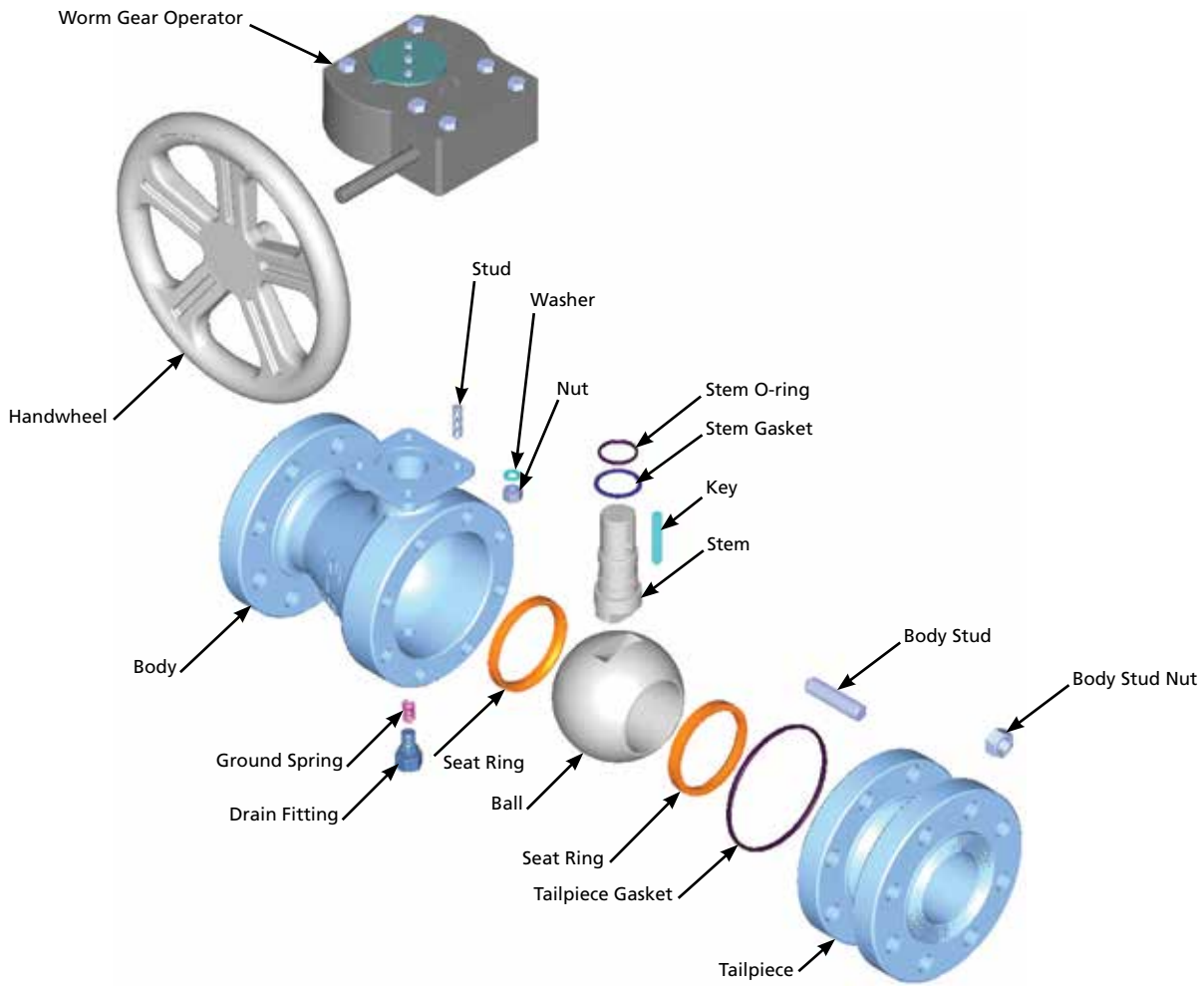
- Carbon steel and stainless steel

Industry Compliance

- ASME B16.5, B16.34
- MSS-SP-25, 55, 72
- API 607 Fire-test Specification
- GOST-R

ASME Pressure Class

Size			Class
in.	(mm)		600
4	(100)	FP	•
6 x 4	(150 x 100)	RP	•
6	(150)	FP	•
8 x 6	(200 x 150)	RP	•



MATERIALS LIST

4" Full Port through 8" Reduced Port

ASME Classes 150, 300 and 600

Body / Tailpiece Material Code

Part	CS	CS1*‡	CS2*	S1	S8*
Body	A216 Gr. WCC	A216 Gr. WCC	A216 Gr. WCC	A351 Gr. CF8M	A351 Gr. CF8M
Studs	A193 Gr. B7	A192 Gr. B7	A193 Gr. B7 †	A193 Gr. B7 Plated	A193 Gr. B8
Nuts	A194 Gr. 2H	A194 Gr. 2H	A194 Gr. 2H †	A194 Gr. 2H Plated	A194 Gr. B8
Body Drain Fitting	Carbon Steel	Carbon NACE	Stainless Steel	Stainless Steel	Stainless Steel
Tailpiece	ASTM A105/A216 Gr. WCC	ASTM A216 Gr. WCC	ASTM A105/A216 Gr. WCC	A351 Gr. CF8M	A351 CF8M
Packing Adjust Studs	A193 Gr. B7	N/A	A193 Gr. B7	A193 Gr. B7 Plated	A193 Gr. B8
Packing Adjust Nuts	A194 Gr. 2H	N/A	A194 Gr. 2H	A194 Gr. 2H Plated	A194 Gr. B8
Packing Adjusting Screws**	Alloy Steel	N/A	Alloy Steel	Alloy Steel Plated	Stainless Steel
Bonnet Cap	A216 Gr. WCC Plated	N/A	A216 Gr. WCC Plated	A216 Gr. WCC Plated	A351 Gr. CF8M

* CS1, CS2 and S8 to be used for H_2S service. Meets NACE MR0175/ISO 15156.
** Use only for 4" (100 mm) through 8" x 6" (200 mm x 150 mm) ASME Classes 150 and 300.
† 4" (100 mm) through 8" x 6" (200 mm x 150 mm) ASME Class 600 uses A193 Gr. B7M studs and A194 Gr. 2HM nuts.
‡ Available in 4" (100 mm) through 8" x 6" (200 mm x 150 mm) ASME Class 600 only.

Seat / Seal Material Code

Part	01	42	43*	18	28	60S
Seat	TFE	Filled TFE	–	Special Filled TFE	Filled TFE	Nickel Alloy HVOF
Tailpiece Gasket	TFE	TFE	FKM O-ring	Filled TFE	Filled TFE	Graphite
Stem Gasket	TFE	Filled TFE	Nylon Washer	Filled TFE	Filled TFE	Graphite
Packing	Graphite/TFE with SS Cap		FKM O-ring**	Graphite/TFE with SS Cap		

* Specify code 43 as standard trim for ASME class 600. Seal set consists of: acetal plastic seats, high-fluorine FKM O-ring for tailpiece and stem.
** ASME Class 600 valves have FKM O-ring stem seal.

Ball / Stem Material Code

Part	CS	S1	S2*	60S
Ball	ASTM A105 Hard Chrome Plate	316 SS	316 SS	316 SS w/QPQ Nitride
Grounding Spring	304 SS	304 SS	304 SS	304 SS
Stem	Carbon Steel ENP	316 SS	Type 630	Type 630
Compression Ring	304 SS	304 SS	304 SS	304 SS
Stem Retainer Pin	Carbon Steel	316 SS	316 SS	304 SS
Stem Retainer Pipe Plug	Carbon Steel	316 SS	316 SS	304 SS

Actuator Codes*

Part (Body)	Worm Gear – For All Body Material Codes
Mounting Bracket	Carbon Steel
Bolting	Carbon Steel
Set Screw	Carbon Steel
Stem Adapter	Carbon Steel
Actuator	As Selected
Handwheel	Carbon Steel

* 4" (100 mm) through 8" (200 mm) ASME Class 600 sold with worm gear option only.

Actuator Codes (Wrenches)**

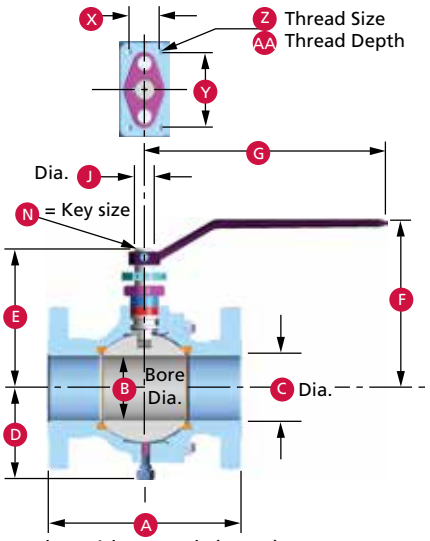
Part (Body)	Wrench – For All Body Material Codes
Wrench Head	Steel
Wrench Handle	Carbon Steel
Wrench Handle Pin	Carbon Steel
Capscrew	Alloy Steel
Stop Plate	Carbon Steel

** 4" (100 mm) through 8" x 6" (200 mm x 150 mm) ASME Class 150 and 300.

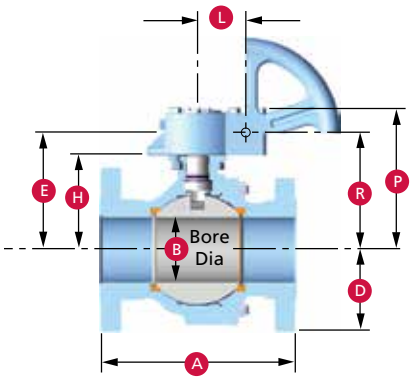
DIMENSIONAL DATA – 4" FULL PORT AND LARGER

4" Full Port through 8" Reduced Port

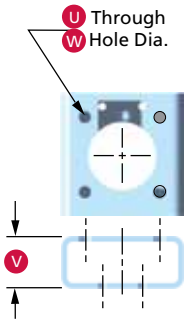
ASME Classes 150, 300 and 600



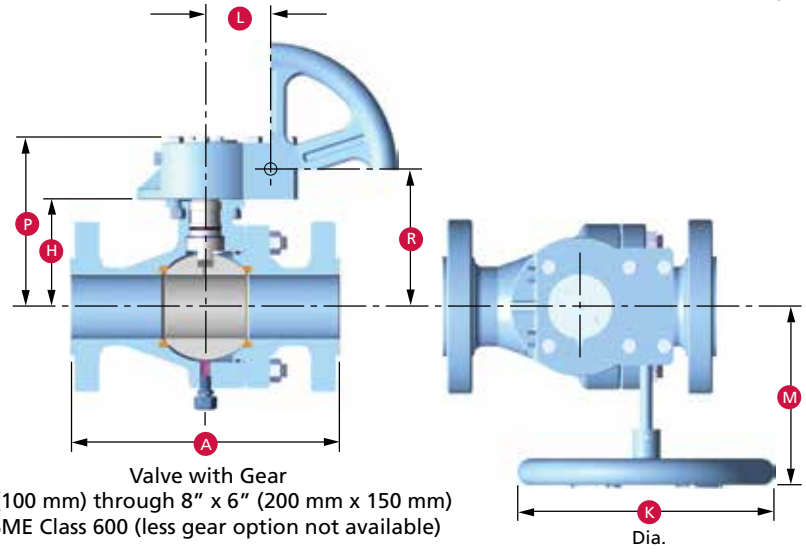
Valve with Wrench (Lever)
4" (100 mm) through
8" x 6" (200 mm x 150 mm)
ASME Classes 150/300



Valve with Gear
4" (100 mm) through 8" x 6" (200 mm x 150 mm)
ASME Classes 150/300



Mounting Bracket
4" FP to 8" RP
(100 mm FP to 200 mm RP)
ASME Classes 150/300



Valve with Gear
4" (100 mm) through 8" x 6" (200 mm x 150 mm)
ASME Class 600 (less gear option not available)

ASME Class 600

Full Port Dimensions

Size	in.	A	B	C	D	H	K	L	M	P	R
	4	17.00	4.00	4.00	6.52	6.81	16.00	2.50	9.72	9.79	8.18
	6	22.00	6.00	6.00	8.17	9.28	20.00	4.84	14.26	13.43	11.25
Size	mm										
	100	432	102	102	166	173	508	64	247	249	208
	150	559	152	152	208	236	610	123	362	341	286

Reduced Port Dimensions

Size	in.	A	B	C	D	H	K	L	M	P	R
	6 x 4	22.00	4.00	6.00	6.52	6.81	16.00	2.50	9.72	9.79	8.18
	8 x 6	26.00	6.00	8.00	8.17	9.28	20.00	4.84	14.26	13.43	11.25
Size	mm										
	150 x 100	559	102	152	166	173	508	64	247	249	208
	200 x 150	660	152	203	208	236	610	123	362	341	286

Full Port Dimensions

Size	A* Class																									
	150 RF		300 RF		300																					
	Long	Short	Long	Short	BW	B	C	D	E	F	G	H	J	K	L	M	N	P	R	U	V	W	X	Y	Z	AA
in.	B110	B113	B128	B134	B150																					
4	9.00	N/A	–	N/A	–	4.0	4.0	6.47	8.63	9.88	36.0	7.56	1.250	6.0	2.80	7.88	0.250	10.84	9.15	0.56	2.44	4.921	1.88	4.63	3/8-16NC	0.63
	–		12.00		12.00	4.0	4.0	6.47	8.63	9.88	36.0	7.56	1.250	6.0	2.80	8.12	0.250	10.84	9.15	0.56	2.44	4.921	1.88	4.63	3/8-16NC	0.63
6	15.50	10.50	–	N/A	–	6.0	6.0	8.20	11.38	12.63	48.0	9.44	1.500	12.0	2.80	10.95	0.375	12.72	11.03	0.56	2.44	4.921	1.88	4.63	3/8-16NC	0.63
	–	–	15.88		15.88	6.0	6.0	8.20	11.38	12.63	48.0	9.44	1.500	14.0	4.11	13.24	0.375	13.28	11.33	0.56	2.44	4.921	1.88	4.63	3/8-16NC	0.63

mm

Size	A* Class																									
	150 RF		300 RF		300																					
	Long	Short	Long	Short	BW	B	C	D	E	F	G	H	J	K	L	M	N	P	R	U	V	W	X	Y	Z	AA
	B110	B113	B128	B134	B150																					
100	229	N/A	–	N/A	–	102	102	164	219	251	914	192	31.75	150	71	200	6.35	275	232	14	62	124.99	48	118	3/8-16NC	16
	–		305		305	102	102	164	219	251	914	192	31.75	150	71	206	6.35	275	232	14	62	124.99	48	118	3/8-16NC	16
150	394	267	–	N/A	–	152	152	208	289	321	1219	240	38.1	356	71	278	9.53	323	280	14	62	124.99	48	118	3/8-16NC	16
	–	–	403		403	152	152	208	289	321	1219	240	38.1	300	104	336	9.53	337	280	14	62	124.99	48	118	3/8-16NC	16

Reduced Port Dimensions

Size	A* Class																									
	150 RF		300 RF																							
	Long	Short	Long	Short	B	C	D	E	F	G	H	J	K	L	M	N	P	R	U	V	W	X	Y	Z	AA	
in.	B100	B102	B120	B122																						
6 x 4	N/A	10.5	–	N/A	4.0	6.0	6.45	8.63	9.88	36.0	7.56	1.25	6.0	2.8	7.88	0.25	10.84	9.15	0.56	2.44	4.921	1.88	4.63	3/8-16NC	0.63	
		–	15.88		4.0	6.0	6.45	8.63	9.88	36.0	7.56	1.25	6.0	2.8	8.12	0.25	10.84	9.15	0.56	2.44	4.921	1.88	4.63	3/8-16NC	0.63	
8 x 6	18.0	11.5	N/A	–	6.0	8.0	8.2	11.38	12.63	48.0	9.44	1.5	14.0	2.8	10.95	0.375	12.72	11.03	0.56	2.44	4.921	1.88	4.63	3/8-16NC	0.63	
	–	–		16.50	6.0	8.0	8.2	11.38	12.63	48.0	9.44	1.5	16.0	4.11	11.11	0.375	13.28	11.33	0.56	2.44	4.921	1.88	4.63	3/8-16NC	0.63	

mm

Size	A* Class																									
	150 RF		300 RF																							
	Long	Short	Long	Short	B	C	D	E	F	G	H	J	K	L	M	N	P	R	U	V	W	X	Y	Z	AA	
	B100	B102	B120	B122																						
150 x 100	N/A	267	–	N/A	102	152	164	219	251	914	192	31.75	150	71	200	6.35	275	232	14	62	124.99	48	118	3/8-16NC	16	
		–	403		102	152	164	219	251	914	192	31.75	150	71	206	6.35	275	232	14	62	124.99	48	118	3/8-16NC	16	
200 x 150	457	292	N/A	–	152	203	208	289	321	1219	240	38.1	356	71	278	9.53	323	280	14	62	124.99	48	118	3/8-16NC	16	
	–	–		419	152	203	208	289	321	1219	240	38.1	406	104	282	9.53	337	288	14	62	124.99	48	118	3/8-16NC	16	

* Center line-to-face dimension is half of dimension A, except:
4" (100 mm) ASME class 150 Full Port – stem is offset 1/2" (12.7 mm) towards body end and 6" (150 mm).
ASME class 150 Full Port Long Pattern – stem is offset 2-1/2" (63.5 mm) towards body end.

PRESSURE/TEMPERATURE FOR ALL DYNASEAL 310 FLOATING BALL VALVES

WKM DynaSeal 310 ball valves are rated for high performance and long life. The ratings shown here are based on tests that indicate good seat performance and acceptable wear. This rating is determined by the lower of the valve's pressure or seat rating. The seat rating is the maximum differential pressure to which the valve should be subjected on a continuous basis. Seal codes 01, 42 and 07 are suitable for vacuum service to 20 microns, absolute (minimum temperature 0° F (-18° C)).

Seal Code 01

Temp		Valve Port Size in. (mm)				
		1/4 to 3/4	1 to 1-1/2	2	3 to 4	6 to 12
° F	° C	(80 to 20)	(25 to 40)	(50)	(80 to 100)	(150 to 300)
-50 to 100	-46 to 38	1500	1000	750	600	285
200	93	1500	1000	750	600	285
250	121	1400	900	700	550	150
300	149	1100	650	500	425	50
350	177	600	375	300	250	–
400	204	100	100	100	100	–

Seal Code 42

Temp		Valve Port Size in. (mm)		
		1/4 to 1-1/2	2	3
° F	° C	(8 to 40)	(50)	(80)
-50 to 100	-46 to 38	1500	1500	740
200	93	1400	1325	740
250	121	1250	1150	740
300	149	1090	975	740
350	177	930	800	590
400	204	770	640	450
450	232	610	475	325
500	260	450	300	200

Seal Codes 43 and 48

Temp		Valve Port Size in. (mm)				
		1/4 to 1-1/2	2	3	4	6
° F	° C	(8 to 40)	(50)	(80)	(100)	(150)
-50 to 100	-46 to 38	3000	3000	1500	1500	1500
200	93	3000	3000	1500	1500	1500
220	104	3000	3000	1375	1375	1375

Seal Code 07*

Temp		Valve Port Size in. (mm)		
		1/4 to 1-1/2	2	3
° F	° C	(8 to 40)	(50)	(80)
-20 to 100	-29 to 38	740*	500*	285*
350	177	500	350	200
400	204	250	190	100

* Block-and-bleed range.

Seal Codes 42 and 28

Temp		Valve Port Size in. (mm)	
		4	6
° F	° C	(100)	(150)
-50 to 100	-46 to 38	740	740
250	121	740	675
300	149	740	550
350	177	590	410
400	204	400	300
450	232	325	175
500	260	200	65

Seal Code 18

Temp		Valve Port Size in. (mm)			
		1/4 to 1-1/2	2	3	4 to 6
° F	° C	(8 to 40)	(50)	(80)	(100 to 150)
-50 to 100	-46 to 38	*	*	*	*
200	93	*	*	*	*
250	121	1775	1250	*	*
300	149	1650	1175	740	600
350	177	1575	1075	700	500
400	204	1500	1000	650	400
450	232	1300	875	600	300
500	260	1075	725	550	200
550	288	850	600	500	100
600	316	350	100	75	0
625	329	100	0	0	0

* On application.

Seal Code 23

Temp		Valve Port Size in. (mm)	
		1/4 to 3/8	1/2 to 3/4
° F	° C	(8 to 10)	(15 to 20)
-50 to 100	-46 to 38	5000	3750
200	93	3250	2000
225	107	2500	1500

Seal Code 60S and 92H

Follows B16.34 rating for body material shown on pages 27 and 28.

Flanged Valves

Data are maximum working pressure ratings for the valve body assembly at various temperatures. Practical pressure limitations according to actual service conditions are determined by the seal and tailpiece gasket materials. These pressure/temperature ratings are in conformance with ASME B16.5 and B16.34.

Maximum Working Pressures – psig

	Body Material Codes					
Temp ° F	CS, CS2 and CS3			S1 and S8		
Valve Class	150	300	600	150	300	600
-20 to 100	285	740	1480	275	720	1440
150	272	707	1415	255	670	1340
200	260	675	1350	235	620	1240
250	245	665	1332	225	590	1180
300	230	655	1315	215	560	1120
350	215	645	1292	205	537	1073
400	200	635	1270	195	515	1025
450	185	617	1235	182	497	990
500	170	600	1200	170	480	955
550	155	575	1147	155	465	928
600	140	550	1095	140	450	900

Maximum Working Pressures – bars (1 bar = 14.5 psi)

	Body Material Codes					
Temp ° C	CS, CS2 and CS3			S1 and S8		
Valve Class	20PN	50PN	100PN	20PN	50PN	100PN
-29 to 38	20	51	102	19	50	100
66	19	49	98	18	46	92
93	18	47	93	16	43	85
121	17	46	92	16	41	81
149	16	45	91	15	39	77
177	15	44	89	14	37	74
204	14	44	88	13	36	71
232	13	43	85	13	34	68
260	12	41	83	12	33	66
288	11	40	79	11	32	64
316	10	38	75	10	31	62

BODY ASSEMBLIES (CONTINUED)

Threaded Valves

Body Trim Code S8 and CS3 are suitable for service to -50° F (-46° C). All other trims are limited to operating temperatures no lower than -20° F (-29° C). These pressure/temperature ratings are in conformance with ASME B16.5, B16.34.

Maximum Working Pressures – psig

Temp ° F	Body Material Codes									
Valve Bore	CS, CS2 and CS3					S1 and S8				
Size in.	1/4 to 3/8	1/2 to 3/4	1 to 1-1/2	2	3	1/4 to 3/8	1/2 to 3/4	1 to 1-1/2	2	3
-20 to 100	5000	3750	3000	2000	1500	5000	3750	3000	2000	1500
150	4779	3583	2867	1912	1434	4650	3487	2790	1861	1396
200	4557	3416	2734	1824	1368	4301	3224	2580	1722	1292
250	4494	3368	2696	1800	1350	4092	3068	2455	1639	1229
300	4431	3320	2658	1775	1333	3884	2912	2330	1556	1167
350	4355	3264	2613	1744	1310	3725	2794	2236	1491	1117
400	4278	3209	2567	1713	1287	3566	2677	2141	1426	1068
450	4161	3120	2496	1665	1252	3442	2583	2066	1377	1031
500	4043	3031	2425	1618	1216	3317	2489	1992	1328	995
550	3868	2900	2320	1548	1163	3225	2419	1936	1291	966
600	3694	2768	2215	1478	1110	3134	2349	1880	1254	938

Maximum Working Pressures – bars (1 bar = 14.5 psi)

Temp ° C	Body Material Codes									
Valve Bore	CS, CS2 and CS3					S1 and S8				
Size mm	8 to 10	15 to 20	25 to 40	50	80	8 to 10	15 to 20	25 to 40	50	80
-29 to 38	345	259	207	138	103	345	259	207	138	103
66	330	247	198	132	99	321	240	192	128	96
93	314	236	189	126	94	297	222	178	119	89
121	310	232	186	124	93	282	212	169	113	85
149	306	229	183	122	92	268	201	161	107	80
177	300	225	180	120	90	257	193	154	103	77
204	295	221	177	118	89	246	185	148	98	74
232	287	215	172	115	86	237	178	143	95	71
260	279	209	167	112	84	229	172	137	92	69
288	267	200	160	107	80	222	167	134	89	67
316	255	191	153	102	77	216	162	130	86	65

WEIGHTS

Valve Size		End Connection	Full Port Weight		Reduced Port Weight	
in.	(mm)		lb	kg	lb	kg
1/4	(6)	Threaded	1.50	0.68	–	–
3/8	(10)	Threaded	1.50	0.68	–	–
1/2	(15)	Threaded	1.50	0.68	1.50	0.68
3/4	(20)	Threaded	3.25	1.47	–	–
1	(25)	Threaded	5.00	2.30	3.00	1.36
		150 (20 PN) Flanged	8.50	3.86	6.3	2.86
		300 (50 PN) Flanged	12.00	5.44	–	–
		600 (100 PN) Flanged	32.00	14.50	–	–
1-1/2	(40)	Threaded	12.00	5.44	–	–
		150 (20 PN) Flanged	17.00	7.71	–	–
		300 (50 PN) Flanged	24.00	10.90	–	–
		600 (100 PN) Flanged	32.00	14.50	–	–
2	(50)	Threaded	23.00	10.40	12.50	5.67
		150 (20 PN) Flanged	33.00	15.00	23.00	10.40
		300 (50 PN) Flanged	38.00	17.20	25.00	11.30
		600 (100 PN) Flanged	47.00	21.30	33.00	15.00
3	(80)	Threaded	56.00	25.40	36.00	16.30
		150 (20 PN) Flanged	64.00	29.00	51.00	23.10
		300 (50 PN) Flanged	81.00	36.70	76.00	35.00
		600 (100 PN) Flanged	87.00	39.50	81.00	36.70
4	(100)	Threaded	–	–	67.00	30.40
		150 (20 PN) Flanged	–	–	80.00	36.30
		300 (50 PN) Flanged	–	–	127.00	57.60
		600 (100 PN) Flanged	–	–	130.00	59.00

Valve Size		End Connection	Full Port Weight		Reduced Port Weight	
in.	(mm)		lb	kg	lb	kg
4	(100)	150 (L) Flanged	113	51	–	–
	WGA	300 (L) Flanged	144	65	–	–
		600 Flanged	257	117	–	–
6	(150)	150 (L) Flanged	162	73	–	–
		150 (S) Flanged	144	65	125	57
		300 (L) Flanged	273	124	193	88
6	(150)	150 (L) Flanged	176	80	–	–
	WGA	150 (S) Flanged	158	72	133	60
		300 (L) Flanged	313	142	223	101
		600 Flanged	545	247	363	165
8	(200)	150 (L) Flanged	–	–	217	98
		150 (S) Flanged	–	–	197	89
		300 (S) Flanged	–	–	293	133

(S) Short pattern.
(L) Long pattern.

WEIGHTS (CONTINUED)

Valve Size			Male x Female Threaded Ends			
			Full Port Weights		Reduced Port Weights	
in.	(mm)	MOP	lb	kg	lb	kg
1/2	(15)	3000	–	–	3	1.36
1/2	(15)	5000	–	–	3	1.36
3/4	(20)	3000	6	2.72	–	–
3/4	(20)	3750	6	2.72	–	–
1	(25)	3000	–	–	7	3.18
1	(25)	3750	–	–	7	3.18
			Socket Weld Ends			
1/4	(8)	3000	2	0.91	–	–
3/4	(20)	3000	6	2.72	–	–
1	(25)	3000	–	–	6	2.72
1-1/2	(40)	3000	19	8.62	–	–
2	(50)	3000	–	–	21	9.53

FLOW CHARACTERISTICS (C_V)*

Valve Size and Port Size		Threaded	Valve Pressure Class		
in.	(mm)	End Valves	150	300	600
1/4 x 1/4	(8 x 8)	9	–	–	–
3/8 x 3/8	(10 x 10)	9	–	–	–
1/2 x 3/8	(15 x 10)	5	–	–	–
1/2 x 1/2	(15 x 15)	16	16	14	–
3/4 x 1/2	(20 x 15)	–	10	10	–
3/4 x 3/4	(20 x 20)	45	–	–	–
1 x 3/4	(25 x 20)	20	35	34	–
1 x 1	(25 x 25)	93	88	77	68
1-1/2 x 1-1/2	(40 x 40)	248	223	208	184
2 x 1-1/2	(50 x 40)	80	102	101	99
2 x 2	(50 x 50)	491	464	421	362
3 x 2	(80 x 50)	107	117	133	133
3 x 3	(80 x 80)	1099	1228	1042	928
4 x 3	(100 x 80)	322	359	410	406
4 x 4	(100 x 100)	–	2118	2446	–
6 x 4	(150 x 100)	–	390	391 (S)	–
6 x 6	(150 x 150)	–	5403	6644 (S) / 5468 (L)	–
8 x 6	(200 x 150)	–	1215	1219 (S) / 1215 (L)	–

* Flow of water in US gallons per minute per 1 psi pressure drop across a fully open valve.
(S) Short pattern.
(L) Long pattern.

STEM TORQUES (in-lb)

Seat Seal Code 01

Valve Bore Size		Differential Pressure				
in.	(mm)	0 to 285	500	740	1000	1500
1/4 to 3/8	(8 to 10)	36	36	36	36	42
1/2	(15)	60	60	60	72	72
3/4	(20)	90	90	90	120	180
1	(25)	120	150	180	225	–
1-1/2	(40)	240	330	420	520	–
2	(50)	500	640	810	–	–
3	(80)	1200	1800	2400	–	–

Seat Seal Code 42**

Valve Bore Size		Differential Pressure				
in.	(mm)	0 to 285	500	740	1000	1500
1/4 to 3/8	(8 to 10)	36	36	36	36	42
1/2	(15)	60	60	60	72	72
3/4	(20)	90	90	90	120	180
1	(25)	120	150	180	225	300
1-1/2	(40)	240	330	420	520	720
2	(50)	500	640	810	1090	1440
3	(80)	1200	1800	2400	–	–

** Multiply trim 42 torque by two for seat seal code 60S and 92H.

Seat Seal Codes 43 and 48

Valve Bore Size		Differential Pressure								
in.	(mm)	0 to 285	500	740	1000	1500	2000	2250	2500	3000
1/4 to 3/8	(8 to 10)	48	48	48	50	55	60	70	85	100
1/2	(15)	58	60	64	70	90	120	140	165	215
3/4	(20)	90	95	105	125	175	230	260	295	370
1	(25)	225	245	260	280	320	400	455	520	700
1-1/2	(40)	390	410	450	510	700	920	1050	1200	1550
2	(50)	860	960	1075	1210	1500	1830	2000	2200	2600
3	(80)	1450	1635	1885	2220	3050	–	–	–	–

Seat Seal Code 18

Valve Bore Size		Differential Pressure					
in.	(mm)	0 to 285	500	740	1000	1500	2250
1/4 to 3/8	(8 to 10)	60	60	60	60	72	84
1/2	(15)	60	60	60	70	84	108
3/4	(20)	128	128	145	160	215	360
1	(25)	274	284	312	360	405	580
1-1/2	(40)	520	580	680	810	980	1390
2	(50)	910	1042	1240	1500	1765	2300
3	(80)	1200	1800	2400	2900	3420	–

Seat Seal Code 07

Valve Bore Size		Liquid	Dry Gas	
in.	(mm)	0 to 285	0 to 285	740
1/4 to 3/8	(8 to 10)	36	42	113
1/2	(15)	60	82	220
3/4	(20)	90	150	404
1	(25)	180	336	606
1-1/2	(40)	420	840	2260
2	(50)	900	1200	3230
3	(80)	2400	3600	9690

STEM TORQUES (in-lb) (CONTINUED)

Seat Seal Code 23

Valve Bore Size		Differential Pressure													
in.	(mm)	0 to 285	500	740	1000	1500	2000	2250	2500	3000	3500	3750	4000	4500	5000
1/4 to 3/8	(8 to 10)	60	60	60	60	60	65	70	85	100	115	125	130	150	165
1/2	(15)	70	70	70	82	110	125	140	180	220	276	310	–	–	–
3/4	(20)	108	108	125	140	190	260	340	420	560	695	800	–	–	–

Seat Seal Code 01

Valve Bore Size		Differential Pressure		
in.	(mm)	0 to 285	500	740
4	(100)	2090	3300	4200
6	(150)	4400	8200	11,200

Seat Seal Codes 28 and 42

Valve Bore Size		Differential Pressure		
in.	(mm)	0 to 285	500	740
4	(100)	2400	3300	4200
6	(150)	5400	8200	11,200

NOTE: The torque values listed for 285 psi and greater are based on valves controlling the flow of clean lubricating liquid at ambient temperature.
For valves at pressures less than 285 psi, use the value for 285 psi.
Interpolation may be used for any pressure above 285 psi, but less than maximum pressure listed.
Running torque values will average two-thirds of these values.
For running torque values less than breakaway torque values at 285 psi, use breakaway torque values.
Re-seating torque is equal to breakaway torque.
For operating temperatures between -20° F and -50° F (-29° C and -46° C), multiply these values by 1.20.
These torque values do not contain service or safety factors.
Actuator selection should be made based on experience and appropriate service and safety factors.

WKM DynaSeal 210 and 310 Floating Ball Valves

MATERIAL SELECTION GUIDE

A selection of body, stem and seat/seal materials for WKM DynaSeal valves are 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. Therefore, it sometimes becomes necessary to sacrifice value in another property. As a result, 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 corrosive 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)
"D" – Not recommended

Lading	STD BDY CS	STD BDY S1	STD BDY CS2	STD BDY S8	SPL BDY CS3	SPL 01	STD 42	SPL 18	SPL 07	STD 43	STD INT CS	STD INT S1	SPL INT S2	SPL INT ML
ACETALDEHYDE	C	A	C	A	C	A	A	A	D	B	C	A	C	A
ACETATE SOLVENTS	A	A	A	A	A	A	A	A	D	B	A	A	A	A
ACETIC ACID (30%)	C	A	C	A	C	A	A	A	B	D	C	A	C	A
ACETIC ACID (AERATED)	D	A	D	A	D	A	A	A	D	D	D	A	D	A
ACETIC ACID (AIR-FREE)	D	A	D	A	D	A	A	A	D	D	D	B	D	A
ACETIC ACID (CRUDE)	C	A	C	A	C	A	A	A	D	D	C	A	C	A
ACETIC ANHYDRIDE	D	B	D	B	D	A	A	A	D	D	D	B	D	A
ACETONE	A	A	A	A	A	A	A	A	D	B	A	A	A	A
ACETYLENE (DRY ONLY)	A	A	A	A	A	A	A	A	A	D	A	A	A	A
ACRYLONITRILE	A	A	A	A	A	A	A	A	C	C	A	A	A	A
ALCOHOL-AMYL	B	A	B	A	B	A	A	A	B	B	B	A	B	A
ALCOHOL-BUTYL	B	A	B	A	B	A	A	A	A	C	B	A	B	A
ALCOHOL-ETHYL	B	A	B	A	B	A	A	A	C	B	B	A	B	A
ALCOHOL-METHYL (METHANOL)	B	A	B	A	B	A	A	A	D	C	B	A	B	A
ALUMINUM CHLORIDE (DRY)	B	A	B	A	B	A	A	A	A	D	B	A	B	A
ALUMINUM SULFATE (ALUMS)	C	A	C	A	C	A	A	A	A	B	C	A	C	A
ALUMS	C	A	C	A	C	A	A	A	A	C	C	A	C	A
AMINES	A	A	A	A	A	A	A	A	B	C	A	A	A	A
AMINES-BASED CORROSION INHIBITOR	A	A	A	A	A	A	A	A	–	B	A	A	A	A
AMINES RICH	D	A	A	A	A	A	A	A	–	C	D	A	A	A
AMMONIA (AQUEOUS)	A	A	A	A	A	A	A	A	D	D	A	A	A	B
AMMONIA ANHYDROUS	A	A	A	A	A	A	A	A	D	D	A	A	A	B
AMMONIA SOLUTIONS	B	A	B	A	B	A	A	A	D	D	B	A	B	B
AMMONIUM BICARBONATE	C	B	C	B	C	A	A	A	B	D	C	B	C	B
AMMONIUM CARBONATE	B	B	B	B	B	A	A	A	B	D	B	B	B	B
AMMONIUM CHLORIDE	D	C	D	C	D	A	A	A	A	B	D	C	D	B
AMMONIUM HYDROXIDE (28%)	C	B	C	B	C	A	C	C	B	C	C	B	C	D
AMMONIUM HYDROXIDE CONCENTRATED	C	B	C	B	C	A	C	C	D	D	C	B	C	D
AMMONIUM MONOPHOSPHATE	D	B	D	B	D	A	A	A	B	B	D	B	D	C
AMMONIUM NITRATE	D	A	D	A	D	A	A	A	C	C	D	A	D	D
AMMONIUM PHOSPHATE (DIBASIC)	D	B	D	B	D	A	A	A	A	C	D	B	D	C
AMMONIUM PHOSPHATE (TRIBASIC)	D	B	D	B	D	A	A	A	A	C	D	B	D	C
AMMONIUM SULFATE	C	B	C	B	C	A	A	A	A	A	C	B	C	C
AMYL ACETATE	C	B	C	B	C	A	A	A	D	B	C	B	C	B
ANILINE	A	B	A	B	A	A	A	A	C	C	A	B	A	B
ANILINE DYES	C	A	C	A	C	A	A	A	B	C	C	A	C	A
ANTIMONY TRICHLORIDE	D	D	D	D	D	A	A	A	A	D	D	D	D	B
APPLE JUICE	D	B	D	B	D	A	A	A	A	A	D	B	D	A
ARSENIC ACID	D	B	D	B	D	A	A	A	A	A	D	B	D	D
ASPHALT EMULSION	A	A	A	A	A	A	A	A	A	B	A	A	A	A
ASPHALT LIQUID	A	A	A	A	A	A	A	A	A	B	A	A	A	A
BARIUM CARBONATE	B	B	B	B	B	A	A	A	A	A	B	B	B	B
BARIUM CHLORIDE	C	C	C	C	C	A	A	A	A	A	C	C	C	B
BARIUM HYDROXIDE	C	B	C	B	C	A	A	A	A	A	C	B	C	B
BARIUM SULFATE	B	B	B	B	B	A	A	A	A	A	B	B	B	A
BARIUM SULFIDE	B	B	B	B	–	A	A	A	A	A	C	B	–	B

(-) – Not tested. VTFEP – Virgin TFE packing.
NOTE: All ladings at ambient temperatures except as noted.

MATERIAL SELECTION GUIDE (CONTINUED)

Lading	STD BDY CS	STD BDY S1	STD BDY CS2	STD BDY S8	SPL BDY CS3	SPL 01	STD 42	SPL 18	SPL 07	STD 43	STD INT CS	STD INT S1	SPL INT S2	SPL INT ML
BEER (ALCOHOL INDUSTRY)	C	A	C	A	C	A	A	A	A	A	C	A	C	A
BEER (BEVERAGE INDUSTRY)	C	A	C	A	C	A	A	A	A	A	C	A	C	A
BEET SUGAR LIQUIDS	B	A	B	A	B	A	A	A	A	A	B	A	B	A
BENZALDEHYDE	A	A	A	A	A	A	A	A	D	A	A	A	A	A
BENZENE (BENZOL)	B	A	B	A	B	A	A	A	A	B	B	A	B	A
BENZOIC ACID	D	B	D	B	D	A	A	A	A	C	D	B	D	B
BORAX LIQUORS	C	B	C	B	C	A	A	A	A	A	C	B	C	A
BORIC ACID	D	A	D	A	D	A	A	A	A	A	D	A	D	A
BRINES	C	B	C	B	C	A	A	A	A	A	C	B	C	A
BROMINE (DRY)	D	D	D	D	D	A	A	A	A	C	D	D	D	A
BROMINE (WET)	D	D	D	D	D	A	A	A	B	D	D	D	D	B
BUNKER OILS (FUEL OILS)	B	A	B	A	B	A	A	A	A	A	B	A	B	A
BUTADIENE	B	A	B	A	B	A	C	D	A	B	B	A	B	C
BUTANE	A	A	A	A	A	A	A	A	A	A	B	A	B	A
BUTTERMILK	D	A	D	A	D	A	A	A	A	A	D	A	D	D
BUTYLENE	A	A	A	A	A	A	A	A	A	B	A	A	A	A
BUTYRIC ACID	D	B	D	B	D	A	A	A	B	C	D	B	D	B
CALCIUM BISULFITE	D	B	D	B	D	A	A	A	B	D	D	B	D	B
CALCIUM CARBONATE	D	B	D	B	D	A	A	A	A	A	D	B	D	B
CALCIUM CHLORIDE	C	B	C	B	C	A	A	A	A	A	C	B	C	A
CALCIUM HYDROXIDE (20%)	B	B	B	B	B	A	A	A	A	A	B	B	B	A
CALCIUM HYPOCHLORITE	D	C	D	C	D	A	A	A	A	D	D	A	D	C
CALCIUM SULFATE	C	B	C	B	C	A	A	A	A	A	C	B	C	B
CARBON BISULFIDE	B	B	B	B	B	A	A	A	A	D	B	B	B	A
CARBON DIOXIDE (DRY)	A	A	A	A	A	A	A	A	D	A	A	A	A	A
CARBON DIOXIDE (WET)	D	B	D	B	–	A	A	A	D	A	D	A	A	A
CARBON TETRACHLORIDE (DRY)	B	A	B	A	B	A	A	A	A	B	B	A	B	A
CARBON TETRACHLORIDE (WET)	D	B	D	B	D	A	A	A	A	C	D	B	D	B
CARBONATED WATER	B	A	B	A	B	A	A	A	A	A	B	A	B	A
CARBONIC ACID	D	B	D	B	D	A	A	A	A	B	D	B	D	A
CASTOR OIL	B	A	B	A	B	A	A	A	A	A	B	A	B	A
CHINA WOOD OIL (TUNG)	C	A	C	A	C	A	A	A	A	A	C	A	C	A
CHLORINATED SOLVENTS (DRY)	C	B	C	B	C	A	A	A	A	B	C	B	C	B
CHLORINE (WET)	D	D	D	D	D	A	A	A	A	D	D	D	D	C
CHLORINE GAS (DRY)	B	B	B	B	B	A	A	A	A	D	B	B	B	B
CHLOROACETIC ACID	D	C	D	C	D	A	A	A	D	D	D	D	D	B
CHLOROBENZENE (DRY)	B	A	B	A	B	A	A	A	A	B	B	A	B	A
CHLOROFORM (DRY)	B	A	B	A	B	A	A	A	A	B	B	A	B	A
CHLOROSULPHONIC ACID (DRY)	B	B	B	B	B	A	A	A	D	D	B	B	B	A
CHLOROSULPHONIC ACID (WET)	D	D	D	D	D	A	A	A	D	D	D	D	D	C
CHROME ALUM	B	A	B	A	B	A	A	A	A	C	B	A	B	B
CHROMIC ACID	D	C	D	C	D	A	A	A	A	D	D	C	D	B
CITRUS JUICES	D	B	D	B	D	A	A	A	A	A	D	B	D	A
COCONUT OIL	C	B	C	B	C	A	A	A	A	A	C	B	C	B
COFFEE EXTRACTS (HOT)	C	A	C	A	C	A	A	A	A	A	C	A	C	A
COKE OVEN GAS	B	A	B	A	B	A	A	A	A	D	B	A	B	B
COOKING OIL	B	A	B	A	B	A	A	A	A	B	B	A	B	A
COPPER ACETATE (10%)	C	B	C	B	C	A	A	A	D	A	C	B	C	B
COPPER CHLORIDE	D	D	D	D	D	A	A	A	A	A	D	D	D	C
COPPER NITRATE	D	B	D	B	D	A	A	A	A	A	D	B	D	C
COPPER SULFATE	D	C	D	C	D	A	A	A	A	B	D	C	D	B
CORN OIL	C	B	C	B	C	A	A	A	A	A	C	B	C	B
CORROSION INHIBITOR – AMINE BASED	A	A	A	A	A	A	A	A	–	B	A	A	A	A
COTTONSEED OIL	C	B	C	B	C	A	A	A	A	A	C	B	C	B
CREOSOTE OIL	B	B	B	B	B	A	A	A	A	C	B	B	B	A
CRESYLIC ACID	B	B	B	B	B	A	A	A	A	C	B	B	B	B
CRUDE OIL SOUR	B	A	B	A	B	A	A	A	A	B	B	A	B	A
CRUDE OIL SWEET	B	A	B	A	B	A	A	A	A	A	B	A	B	A
CUTTING OILS, WATER EMULSIONS	B	A	B	A	B	A	A	A	A	B	B	A	B	–
CYCLOHEXANE	A	A	A	A	A	A	A	A	A	A	A	A	A	A
DIACETONE ALCOHOL	A	A	A	A	A	A	A	A	D	C	A	A	A	A
DIESEL FUEL	A	A	A	A	A	A	A	A	A	A	A	A	A	A

(-) – Not tested. VTFEP – Virgin TFE packing.
NOTE: All ladings at ambient temperatures except as noted.

Lading	STD BDY CS	STD BDY S1	STD BDY CS2	STD BDY S8	SPL BDY CS3	SPL 01	STD 42	SPL 18	SPL 07	STD 43	STD INT CS	STD INT S1	SPL INT S2	SPL INT ML
DIETHYLAMINE	A	A	A	A	A	A	A	A	HF	C	A	A	A	A
DIPHTALIC ANHYDROUS	–	–	–	–	–	–	A	–	–	–	–	–	–	–
DOWTHERMS (A-E)	B	A	B	A	B	A	A	A	A	B	B	A	B	A
DRILLING MUD	B	A	B	A	B	A	A	A	A	A	B	A	B	A
DRIP COCKS, GAS	B	A	B	A	B	A	A	A	A	A	B	A	B	A
DRY CLEANING FLUIDS	B	A	B	A	B	A	A	A	A	B	B	A	B	B
EPSOM SALT	C	B	C	B	C	A	A	A	A	A	C	B	C	B
ETHANE	A	A	A	A	A	A	A	A	A	A	A	A	A	A
ETHANOLAMINE	A	A	A	A	A	A	A	A	D	C	A	A	A	A
ETHERS	B	A	B	A	B	–	A	A	D	A	B	A	B	B
ETHYL ACETATE	B	B	B	B	B	A	A	A	D	C	B	B	B	B
ETHYL ACRYLATE	A	A	A	A	A	A	A	A	B	C	A	A	A	A
ETHYL CHLORIDE (DRY)	B	A	B	A	B	A	A	A	A	B	B	A	B	B
ETHYL CHLORIDE (WET)	B	B	B	B	B	A	A	A	A	B	B	B	B	B
ETHYLENE (LIQUID OR GAS)	A	A	A	A	A	A	–	–	A	B	A	A	A	A
ETHYLENE GLYCOL	B	B	B	B	B	A	A	A	A	A	B	B	B	B
ETHYLENE OXIDE	B	B	B	B	B	A	A	A	D	B	B	B	B	B
FATTY ACIDS	D	B	D	B	D	A	A	A	A	B	D	B	D	B
FERRIC CHLORIDE	D	D	D	D	D	A	A	A	A	A	D	D	D	C
FERRIC NITRATE	D	C	D	C	D	A	A	A	A	A	D	C	D	C
FERRIC SULFATE	D	B	D	B	D	A	A	A	A	A	D	B	D	B
FERROUS CHLORIDE	D	D	D	D	D	A	A	A	A	A	D	D	D	C
FERROUS SULFATE	D	B	D	B	D	A	A	A	A	A	D	B	D	B
FERROUS SULFATE (SAT)	C	A	C	A	C	A	A	A	–	C	C	A	C	A
FERTILIZER SOLUTIONS	B	B	B	B	B	A	A	A	D	D	B	B	B	B
FISH OILS	B	A	B	A	B	A	A	A	A	A	B	A	B	A
FLUORINE (DRY)	B	A	B	A	B	C	C	C	C	C	B	A	B	A
FLUOROSILICIC ACID	D	C	D	C	D	A	–	–	A	C	D	C	D	C
FOOD FLUIDS – PASTES	C	A	C	A	C	A	A	A	A	A	C	A	C	A
FORMALDEHYDE (COLD)	A	A	A	A	A	A	A	A	D	A	A	A	A	A
FORMALDEHYDE (HOT)	D	B	D	B	D	A	A	A	D	B	D	B	D	B
FORMIC ACID (COLD)	D	B	D	B	D	A	A	A	C	D	D	B	D	B
FORMIC ACID (HOT)	D	D	D	D	D	A	A	A	C	D	D	D	D	B
FREON 12 (DRY)	B	A	B	A	B	A	A	A	B	B	B	A	B	A
FRUIT JUICES	D	A	D	A	D	A	A	A	A	A	D	A	D	A
FUEL JET JP-4	A	A	A	A	A	A	A	A	A	A	A	A	A	A
FUEL JET JP-5 100F	A	A	A	A	A	A	A	A	B	A	A	A	A	A
FUEL JET JP-6 100F	A	A	A	A	A	A	A	A	B	A	A	A	–	A
FUEL OIL	B	A	B	A	B	A	A	A	A	A	B	A	B	A
FUEL RP-1	A	A	A	A	A	A	A	A	A	A	A	A	A	A
FURFURAL	A	B	A	B	A	A	A	A	D	B	A	B	A	A
GALLIC ACID	D	B	D	B	D	A	A	A	A	C	D	B	D	B
GAS (MANUFACTURED)	B	B	B	B	B	A	A	A	A	A	B	B	B	A
GAS ODORIZERS (VTFEP)	B	A	B	A	B	A	A	A	A	–	B	A	B	B
GAS, NATURAL	B	A	B	A	B	A	A	A	A	A	B	A	B	A
GASOLINE, AVIATION	A	A	A	A	A	A	A	A	A	A	A	A	A	A
GASOLINE, SOUR	B	A	B	A	B	A	A	A	A	B	B	A	B	A
GASOLINE, LEADED, LOW OCTANE	A	A	A	A	A	A	A	A	A	A	A	A	A	A
GASOLINE, UNLEADED, LOW OCTANE	A	A	A	A	A	A	A	A	A	A	A	A	A	A
GELATIN	D	A	D	A	D	A	A	A	A	A	D	A	D	A
GLUCOSE	B	A	B	A	B	A	A	A	A	A	B	A	B	A
GLUE	A	A	A	A	A	A	A	A	A	A	A	A	A	A
GLYCERINE – GLYCEROL	B	A	B	A	B	A	A	A	A	A	B	A	B	A
GLYCOLS	B	B	B	B	B	A	A	A	A	A	B	B	B	B
GREASE	A	A	A	A	A	A	A	A	A	A	A	A	A	B
HEPTANE	A	A	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	A	A
HEXANOL, TERTIARY	A	A	A	A	A	A	A	A	A	B	A	A	A	A
HYDRAULIC OIL PHOSPHATE ESTER	A	A	A	A	A	A	A	A	A	B	A	A	A	A
HYDRAULIC OIL PETROLEUM BASE	A	A	A	A	A	A	A	A	A	A	A	A	A	A
HYDROBROMIC ACID	D	D	D	D	D	A	A	A	A	D	D	D	D	C
HYDROCHLORIC ACID 37% AIR FREE	D	D	D	D	D	A	A	A	B	D	D	D	D	B
HYDROCYANIC ACID	D	B	D	B	D	A	–	–	B	D	D	B	D	A

(-) – Not tested. VTFEP – Virgin TFE packing.
NOTE: All ladings at ambient temperatures except as noted.

MATERIAL SELECTION GUIDE (CONTINUED)

Lading	STD BDY CS	STD BDY S1	STD BDY CS2	STD BDY S8	SPL BDY CS3	SPL 01	STD 42	SPL 18	SPL 07	STD 43	STD INT CS	STD INT S1	SPL INT S2	SPL INT ML
HYDROFLUORIC ACID	D	D	D	D	D	A	C	C	D	D	D	D	D	B
HYDROFLUOSILICIC ACID	D	C	D	C	D	A	A	A	A	D	D	C	D	B
HYDROGEN GAS (COLD)	B	A	B	A	B	A	A	A	B	A	B	A	B	A
HYDROGEN PEROXIDE 30% (DILUTE)	D	B	D	B	D	A	A	A	B	D	D	B	D	B
HYDROGEN PEROXIDE 90%	D	B	D	B	D	A	A	A	B	D	D	D	B	D
HYDROGEN SULFIDE (DRY)	D	D	A	A	A	A	A	A	A	A	D	D	A	A
HYDROGEN SULFIDE (WET)	D	D	B	A	B	A	B	A	A	A	D	D	A	A
HYPO (SODIUM THIOSULFATE)	D	A	D	A	D	A	A	A	A	B	D	A	D	B
HYPOCHLORITES, SODIUM	D	C	D	C	D	A	A	A	A	D	D	C	D	B
ILLUMINATING GAS	A	A	A	A	A	A	A	A	–	A	A	A	A	A
INK	D	A	D	A	D	A	A	A	–	A	D	A	D	B
IODINE (WET)	D	D	D	D	D	A	A	A	B	B	D	D	D	D
ISO-OCTANE	A	A	A	A	A	A	A	A	A	A	A	A	A	A
ISODOFORM (DRY)	B	B	B	B	B	A	A	A	–	–	B	B	B	B
SOPROPYL ALCOHOL	B	B	B	B	B	A	A	A	B	B	B	B	–	B
ISOPROPYL ETHER	A	A	A	A	A	A	A	A	D	C	A	A	A	A
KEROSENE	B	A	B	A	B	A	A	A	A	A	B	A	B	A
KETCHUP	D	A	D	A	D	A	A	A	A	A	D	A	D	B
KETONES	A	A	A	A	A	A	A	A	D	A	A	A	A	A
LACQUERS (SOLVENTS)	C	A	C	A	C	A	A	A	D	C	C	A	C	A
LACTIC ACID (CONC. COLD)	D	A	D	A	D	A	A	A	A	B	D	B	D	D
LACTIC ACID (CONC. HOT)	D	B	D	B	D	A	A	A	A	D	D	B	D	D
LACTIC ACID (DILUTE COLD)	D	A	D	A	D	A	A	A	A	A	D	A	D	C
LACTIC ACID (DILUTE HOT)	D	A	D	A	D	A	A	A	A	D	D	B	D	D
LARD OIL	C	A	C	A	C	A	A	A	A	A	C	A	C	B
LEAD ACETATE	D	B	C	B	C	A	A	A	D	C	D	B	D	B
LINOLEIC ACID	B	A	B	A	B	A	A	A	C	C	B	A	B	B
LINSEED OIL	A	A	A	A	A	A	A	A	A	A	A	A	A	B
LIQUEFIED PET GAS (LPG)	B	A	B	A	B	A	A	A	A	A	B	A	B	B
LITHIUM BROMIDE	D	A	D	A	D	D	A	A	–	–	D	A	–	A
LUBRICATING OIL	A	A	A	A	A	A	A	A	A	A	A	A	A	B
MAGNESIUM BISULFATE (10%)	C	A	C	A	C	A	A	A	A	A	C	A	C	B
MAGNESIUM CHLORIDE	C	D	C	D	C	A	A	A	A	C	C	D	C	B
MAGNESIUM HYDROXIDE	B	A	B	A	B	A	A	A	A	A	B	A	B	A
MAGNESIUM HYDROXIDE (HOT)	B	A	B	A	B	A	A	A	B	A	B	A	B	A
MAGNESIUM SULFATE	B	B	B	B	B	A	A	A	A	C	B	B	B	B
MALEIC ACID	B	C	B	C	B	A	A	A	A	C	B	C	B	B
MALEIC ANHYDRIDE	D	A	D	A	D	–	A	A	–	–	D	A	B	A
MALIC ACID	D	A	D	A	D	A	A	A	A	C	D	A	D	B
MAYONNAISE	D	A	D	A	D	A	A	A	A	A	D	A	D	B
MERCAPATANS	A	A	A	A	A	A	A	A	A	–	A	A	A	D
MERCURIC CHLORIDE	D	D	D	D	D	A	A	A	A	A	D	D	D	D
MERCURIC CYANIDE (10%)	D	B	D	B	D	A	A	A	–	B	D	B	D	D
MERCURY	A	A	A	A	A	A	A	A	A	A	A	A	A	C
METHANE	A	A	A	A	A	A	A	A	A	A	A	A	A	A
METHYL ACETATE	A	A	A	A	A	A	A	A	D	B	A	A	A	A
METHYL ACETONE	A	A	A	A	A	A	A	A	D	C	A	A	A	A
METHYL CELLOSOLVE	B	B	B	B	B	A	A	A	D	B	B	B	B	B
METHYL CHLORIDE (DRY)	B	A	B	A	B	A	A	A	A	–	B	A	B	A
METHYL ETHYL KETONE	A	A	A	A	A	A	A	A	D	A	A	A	A	A
METHYL FORMATE	B	B	B	B	B	A	A	A	–	B	B	B	B	B
METHYLAMINE	B	B	B	B	B	A	A	A	–	C	B	B	B	B
METHYLENE CHLORIDE (DRY)	B	B	B	B	B	A	A	A	B	B	B	B	B	B
MILK	D	A	D	A	D	A	A	A	A	A	D	A	D	A
MINE WATERS (ACID)	D	B	D	B	D	A	A	A	B	C	D	B	D	B
MINERAL SPRITS	B	B	B	B	B	A	A	A	A	A	B	B	B	B
MINERAL OIL	B	A	B	A	B	A	A	A	A	A	B	A	B	A
MIXED ACIDS (COLD)	C	A	C	A	C	A	A	A	–	D	C	A	C	B
MOLASSES, CRUDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A
MOLASSES, EDIBLE	A	A	A	A	A	A	A	A	A	A	A	A	A	A
MTBE 100% MAX	B	A	B	A	B	A	B	A	D	B	B	A	A	A
MTBE 40% MAX	A	A	A	A	A	D	A	A	D	B	–	A	A	A
MURIATIC ACID	D	D	D	D	D	A	A	A	A	D	D	D	D	B

(-) – Not tested. VTFEP – Virgin TFE packing.
NOTE: All ladings at ambient temperatures except as noted.

Lading	STD BDY CS	STD BDY S1	STD BDY CS2	STD BDY S8	SPL BDY CS3	SPL 01	STD 42	SPL 18	SPL 07	STD 43	STD INT CS	STD INT S1	SPL INT S2	SPL INT ML
MUSTARD	B	A	B	A	B	A	A	A	A	A	B	A	B	A
NAPHTHA	B	A	B	A	B	A	A	A	A	A	B	A	B	B
NAPHTHALENE	A	A	A	A	A	A	A	A	A	B	A	A	A	B
NICKEL AMMONIUM SULFATE (20%)	D	A	D	A	D	A	A	A	A	A	D	A	D	D
NICKEL CHLORIDE	D	B	D	B	D	A	A	A	A	D	D	B	D	B
NICKEL NITRATE (30%)	D	B	D	B	D	A	A	A	A	C	D	B	D	B
NICKEL SULFATE	D	C	D	C	D	A	A	A	A	C	D	C	D	B
NICOTINIC ACID	B	A	B	A	B	A	A	A	–	C	B	A	B	A
NITRIC ACID (10%) (VTFEP)	D	A	D	A	D	A	B	B	A	D	D	A	D	D
NITRIC ACID (100%) (VTFEP)	A	A	A	A	A	A	B	B	D	D	A	A	A	D
NITRIC ACID (30%) (VTFEP)	D	A	D	A	D	A	B	B	A	D	D	A	D	D
NITRIC ACID (80%) (VTFEP)	D	A	D	A	D	A	B	B	C	D	D	A	D	D
NITRIC ACID ANHYDROUS/AQUEOUS (VTFEP)	A	A	A	A	A	A	B	B	D	D	A	A	A	D
NITROBENZENE	B	B	B	B	B	A	A	A	B	C	B	B	B	B
NITROGEN	A	A	A	A	A	A	A	A	A	A	A	A	A	A
NITROUS ACID (10%)	D	B	D	B	D	A	A	A	A	D	D	B	D	D
NITROUS GASES	B	A	B	A	B	A	A	A	A	B	B	A	B	D
NITROUS OXIDE	A	B	A	B	A	A	A	A	A	A	A	B	A	D
OIL, COTTONSEED	C	B	C	B	C	A	A	A	A	A	C	B	C	B
OIL, PETROLEUM (REFINED)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
OIL, PETROLEUM (SOUR) H_2S AND CO_2	D	D	A	A	A	A	A	A	B	A	A	A	A	A
OIL, WATER MIXTURES	B	A	B	A	B	A	A	A	B	A	B	A	B	A
OIL, ANIMAL	A	A	A	A	A	A	A	A	A	A	A	A	A	A
OIL, FISH	B	A	B	A	B	A	A	A	A	A	B	A	B	A
OIL, FUEL	B	A	B	A	B	A	A	A	A	A	B	A	B	A
OIL, LUBE	A	A	A	A	A	A	A	A	A	A	A	A	A	B
OIL, MINERAL	B	A	B	A	B	A	A	A	A	A	B	A	B	A
OLEIC ACID	B	A	B	A	B	A	A	A	A	A	B	A	B	B
OLEUM	B	B	B	B	B	A	A	A	A	D	B	B	B	D
OLIVE OIL	B	A	B	A	B	A	A	A	D	B	B	A	B	A
OXALIC ACID	D	D	D	D	D	A	A	A	B	C	D	D	D	B
OXYGEN	B	A	B	A	B	A	A	A	A	C	B	A	B	A
OZONE (DRY)	A	A	A	A	A	A	A	A	A	C	A	A	A	A
OZONE (WET)	C	A	C	A	C	A	A	A	A	C	C	A	C	A
PAINTS AND THINNERS	A	A	A	A	A	A	A	A	A	B	A	A	A	A
PALM OIL	C	B	C	B	C	A	A	A	A	A	C	B	C	A
PALMITIC ACID	C	A	C	A	C	A	A	A	A	B	C	A	C	B
PARAFFIN	B	A	B	A	B	A	A	A	A	B	B	A	B	A
PARAFORMALDEHYDE	B	B	B	B	B	A	A	A	C	A	B	A	B	B
PENTANE	B	A	B	A	B	A	A	A	A	A	B	A	B	B
PERCHLOROETHYLENE	B	B	B	B	B	A	A	A	A	B	B	B	B	A
PETROLATUM	C	B	C	B	C	A	A	A	A	A	C	B	C	A
PHENOL (CARBOLIC ACID)	B	A	B	A	B	A	A	A	A	B	B	A	B	A
PHENOL RESIN	C	A	C	A	C	A	D	A	A	D	C	A	A	A
PHOSGENE (DRY) (VTFEP)	A	A	A	A	A	–	A	A	B	–	A	A	A	A
PHOSGENE (WET) (VTFEP)	D	A	D	A	D	B	A	A	A	–	D	A	A	A
PHOSPHORIC ACID (10%) COLD	D	B	D	B	D	A	A	A	A	D	D	B	D	B
PHOSPHORIC ACID (10%) HOT	D	D	D	D	D	A	A	A	A	D	D	D	D	C
PHOSPHORIC ACID (50%) COLD	D	B	D	B	D	A	A	A	A	D	D	B	D	C
PHOSPHORIC ACID (50%) HOT	D	D	D	D	D	A	A	A	A	D	D	D	D	C
PHOSPHORIC ACID (85%) COLD	B	A	B	A	B	A	A	A	A	D	B	A	B	A
PHOSPHORIC ACID (85%) HOT	C	A	C	A	C	A	A	A	A	D	C	A	C	A
PHTHALIC ACID	C	B	C	B	C	A	A	A	A	C	C	A	C	A
PHTHALIC ANHYDRIDE	C	B	C	B	C	A	A	A	A	B	C	B	C	C
PICRIC ACID	C	B	C	B	C	A	A	A	A	D	C	B	C	A
PINE OIL	B	A	B	A	B	A	A	A	A	A	B	A	B	A
PINEAPPLE JUICE	C	A	C	A	C	A	A	A	A	A	C	A	C	A
POLY ESTER RESIN (VTFEP)	–	A	–	A	–	–	–	–	–	–	–	A	A	A
POLYETHYLENE FLUFF	B	A	B	A	B	–	–	–	–	–	–	A	A	A
POLYETHYLENE LIQUID	B	A	–	A	–	–	–	–	A	–	B	A	A	A
POLYURETHANE	A	A	A	A	A		A	A	D	D	A	A	A	A
POTASSIUM BISULFITE (10%)	D	B	D	B	D	A	A	A	A	A	D	D	B	A

(-) – Not tested. VTFEP – Virgin TFE packing.
NOTE: All ladings at ambient temperatures except as noted.

MATERIAL SELECTION GUIDE (CONTINUED)

Lading	STD BDY CS	STD BDY S1	STD BDY CS2	STD BDY S8	SPL BDY CS3	SPL 01	STD 42	SPL 18	SPL 07	STD 43	STD INT CS	STD INT S1	SPL INT S2	SPL INT ML
POTASSIUM BROMIDE	D	B	D	B	D	A	A	A	–	A	D	B	D	B
POTASSIUM CARBONATE	C	A	C	A	C	A	A	A	A	A	C	A	C	B
POTASSIUM CHLORATE	B	A	B	A	B	A	A	A	A	A	B	A	B	B
POTASSIUM CHLORIDE	C	A	C	A	C	A	A	A	A	A	C	A	C	B
POTASSIUM CYANIDE	B	B	B	B	B	A	A	A	A	C	B	B	B	B
POTASSIUM DICHROMATE	B	A	B	A	B	A	A	A	A	C	B	A	B	B
POTASSIUM DIPHOSPHATE	A	A	A	A	A	A	A	A	A	A	A	A	A	B
POTASSIUM FERRICYANIDE	B	A	B	A	B	A	A	A	A	A	B	B	B	B
POTASSIUM FERROCYANIDE	B	A	B	A	B	A	A	A	A	A	B	A	B	A
POTASSIUM HYDROXIDE 70% (COLD)	B	B	B	B	B	A	B	B	D	C	B	B	B	A
POTASSIUM HYDROXIDE 70% (HOT)	A	A	A	A	A	A	B	B	D	C	A	A	A	A
POTASSIUM HYDROXIDE-DILUTE (COLD)	B	B	B	B	B	A	A	A	C	A	B	B	B	A
POTASSIUM HYDROXIDE-DILUTE (HOT)	B	A	B	A	B	A	B	B	D	B	B	B	B	A
POTASSIUM IODIDE	C	B	C	B	C	A	A	A	A	A	C	B	C	A
POTASSIUM NITRATE	B	A	B	A	B	A	A	A	A	A	B	A	B	A
POTASSIUM PERMAGANATE	A	A	A	A	A	A	A	A	A	C	A	A	A	B
POTASSIUM SULFATE	B	A	B	A	B	A	A	A	A	C	B	A	B	B
POTASSIUM SULFIDE (10%)	C	B	C	B	C	A	A	A	A	A	C	B	C	D
POTASSIUM SULFITE (10%)	D	A	D	A	D	A	A	A	A	A	D	A	D	D
PRODUCER GAS	B	A	B	A	B	A	A	A	A	A	B	A	B	A
PROPANE	A	A	A	A	A	A	A	A	A	A	A	A	A	A
PROPLENE	–	A	–	A	–	–	–	–	A	–	–	A	A	A
PROPYL ALCOHOL	A	A	A	A	A	A	A	A	A	A	A	A	A	A
PROPYLENE GYLCOL	A	A	A	A	A	A	A	A	A	A	A	A	A	A
PYROGALLIC ACID	B	B	B	B	B	A	A	A		D	B	B	B	B
QUENCH OIL (WATER SOLUBLE)	A	A	A	A	A	A	A	A	B	B	A	A	A	–
RESINS-ROSINS	C	A	C	A	C	A	A	A		B	C	A	C	A
ROAD TAR	A	A	A	A	A	A	A	A	A	B	A	A	A	A
ROOF PITCH	A	A	A	A	A	A	A	A	A	B	A	A	A	A
RUBBER LATEX EMULSIONS	B	A	B	A	B	A	A	A	A	A	B	A	B	–
RUBBER SOLVENT	A	A	A	A	A	A	A	A	D	B	A	A	A	A
SALAD OIL	C	B	C	B	C	A	A	A	A	A	C	B	C	B
SALICYLIC ACID	D	A	D	A	D	A	A	A	A	B	D	A	D	A
SALT	C	B	C	B	C	A	A	A	A	A	C	B	C	A
SEAWATER	D	A	D	A	D	A	A	A	A	A	D	A	D	A
SHELLAC (BLEACHED)	A	A	A	A	A	A	A	A	D	B	A	A	A	A
SHELLAC (ORANGE)	A	A	A	A	A	A	A	A	D	B	A	A	A	A
SILICONE OILS	A	A	A	A	A	A	A	A	A	A	A	A	A	A
SILVER NITRATE	D	B	D	B	D	A	A	A	A	B	D	B	D	D
SOAP SOLUTIONS (STEARATES)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
SODIUM ACETATE	B	B	B	B	B	A	A	A	D	B	B	B	B	B
SODIUM ALUMINATE	C	A	C	A	C	A	A	A	A	A	C	A	C	A
SODIUM BICARBONATE	C	B	C	B	C	A	A	A	A	A	C	B	C	B
SODIUM BISULFATE (10%)	D	A	D	A	D	A	A	A	A	A	D	A	D	B
SODIUM BISULFITE (10%)	D	D	D	D	D	A	A	A	A	A	D	D	D	B
SODIUM BORATE	C	D	C	D	C	A	A	A	A	A	C	D	C	B
SODIUM BROMIDE (10%)	C	B	C	B	C	A	A	A	A	A	C	B	C	B
SODIUM CARBONATE	B	B	B	B	B	A	A	A	A	A	B	B	B	A
SODIUM CHLORATE	C	B	C	B	C	A	A	A	A	A	C	B	C	B
SODIUM CHLORIDE	C	B	C	B	C	A	A	A	A	A	C	B	C	A
SODIUM CHROMATE	B	B	B	B	B	A	A	A	A	D	B	B	B	B
SODIUM CYANIDE (10%)	A	A	A	A	A	A	A	A	A	B	A	A	A	B
SODIUM FLUORIDE	D	B	D	B	D	A	A	A	A	A	D	B	D	A
SODIUM HYDROXIDE 20% (COLD)	A	A	A	A	A	A	A	A	B	A	A	A	A	A
SODIUM HYDROXIDE 20% (HOT)	C	B	C	B	C	A	B	B	C	B	C	B	C	A
SODIUM HYDROXIDE 50% (COLD)	B	B	B	B	B	A	C	C	C	A	B	B	B	A
SODIUM HYDROXIDE 50% (HOT)	B	B	B	B	B	A	C	C	C	B	B	B	B	A
SODIUM HYDROXIDE 70% (COLD)	C	B	C	B	C	A	C	C	C	C	C	B	C	B
SODIUM HYDROXIDE 70% (HOT)	B	B	B	B	B	A	D	D	C	C	B	B	B	B
SODIUM HYPOCHLORIDE	D	D	D	D	D	A	A	A	A	D	D	D	D	D
SODIUM METAPHOSPHATE	A	B	A	B	A	A	A	A	A	A	A	B	A	B
SODIUM METASILICATE (HOT)	D	A	D	A	D	A	A	A	–	A	D	A	D	A

(-) – Not tested. VTFEP – Virgin TFE packing.
NOTE: All ladings at ambient temperatures except as noted.

Lading	STD BDY CS	STD BDY S1	STD BDY CS2	STD BDY S8	SPL BDY CS3	SPL 01	STD 42	SPL 18	SPL 07	STD 43	STD INT CS	STD INT S1	SPL INT S2	SPL INT ML
SODIUM METASILICATE (COLD)	C	A	C	A	C	A	A	A	–	A	C	A	C	A
SODIUM NITRATE	B	B	B	B	B	A	A	A	–	C	B	B	B	B
SODIUM PERBORATE	B	B	B	B	B	A	A	A	A	A	B	B	B	B
SODIUM PEROXIDE	C	B	C	B	C	A	A	A	A	B	C	B	C	B
SODIUM PHOSPHATE (DIBASIC)	B	B	B	B	B	A	A	A	A	A	B	B	B	B
SODIUM PHOSPHATE (TRIBASIC)	B	B	B	B	B	A	A	A	A	A	B	B	B	B
SODIUM SILICATE	A	A	A	A	A	A	A	A	A	A	A	A	A	B
SODIUM SILICATE (HOT)	B	B	B	B	B	A	A	A	A	A	B	B	B	B
SODIUM SULFATE NA_2S0_4	B	A	B	A	B	A	A	A	A	A	B	A	B	A
SODIUM SULFIDE (HOT)	C	B	C	B	C	A	A	A	A	A	C	B	C	B
SODIUM SULFIDE NA_2S0_2	B	B	B	B	B	A	A	A	A	A	B	B	B	A
SODIUM THIOSULFATE	D	B	D	B	D	A	A	A	A	A	D	B	D	B
SOUR GAS AND OIL	D	D	A	A	A	A	A	A	A	A	D	D	A	A
SOYBEAN OIL	C	A	C	A	C	A	A	A	A	A	C	A	C	A
STANNIC CHLORIDE	D	D	D	D	D	A	A	A	A	B	D	D	D	C
STANNOUS CHLORIDE	D	C	D	C	D	A	A	A	A	D	D	C	D	C
STARCH	A	A	A	A	A	A	A	A	A	A	A	A	A	A
STEAM (212° F)	B	A	B	A	B	B	C	A	D	D	B	A	A	A
STEARIC ACID	C	A	C	A	C	A	A	A		B	C	A	C	B
STODDARD SOLVENT	B	B	B	B	B	A	A	A	A	A	B	B	B	B
STYRENE	A	A	A	A	A	B	D	D	D	B	A	A	A	A
SUGAR LIQUIDS	B	A	B	A	B	A	A	A	A	A	B	A	B	A
SULFATE, BLACK LIQUORS	C	B	C	B	C	A	A	A	B	B	C	B	C	B
SULFATE, GREEN LIQUORS	C	B	C	B	C	A	A	A	A	B	C	B	C	B
SULFATE, WHITE LIQUORS	D	B	D	B	D	A	A	A	A	B	D	B	D	B
SULFURIC ACID (0 to 7%) (VTFEP)	D	B	D	B	D	A	A	A	A	D	D	B	D	B
SULFURIC ACID (100%) H_2S0_4 (VTFEP)	B	B	B	B	B	A	A	A	B	D	B	B	B	D
SULFURIC ACID (20%) (VTFEP)	D	D	D	D	D	A	A	A	A	D	D	D	D	B
SULFURIC ACID (50%) (VTFEP)	D	D	D	D	D	A	A	A	A	D	D	D	D	B
SULFUROUS ACID	D	D	D	D	D	A	A	A	A	D	D	D	D	D
SULPHUR	B	A	B	A	B	A	A	A	A	C	B	A	B	A
SULPHUR DIOXIDE (DRY)	B	A	B	A	B	A	A	A	A	A	B	A	B	A
SULPHUR TRIOXIDE (DRY)	B	B	B	B	B	A	A	A	A	B	B	B	B	B
SYNTHESIS GAS	B	B	B	B	B	A	A	A	A	A	B	B	B	A
TALL OIL	B	B	B	B	B	A	A	A	A	A	B	B	B	A
TANNIC ACID	B	B	B	B	B	A	A	A	A	A	B	B	B	B
TAR – TAR OIL	A	A	A	A	A	A	A	A	A	B	A	A	A	A
TARTARIC ACID	D	B	D	B	D	A	A	A	A	B	D	B	D	B
TETRAETHYL LEAD	C	B	C	B	C	A	A	A	A	B	C	B	C	A
TITANIUM TETRACHLORIDE T1-CL4	–	–	–	–	–	–	–	A	–	–	–	–	–	–
TITANIUM TRICHLORIDE T1-CL3	–	–	–	–	–	–	–	A	–	–	–	–	–	–
TOLUENE – TOLUOL	A	A	A	A	A	A	A	A	A	B	A	A	A	A
TOMATO JUICE	C	A	C	A	C	A	A	A	A	A	C	A	C	A
TRANSFORMER OIL	A	A	A	A	A	A	A	A	A	A	A	A	A	A
TRIBUTYL PHOSPHATE	A	A	A	A	A	A	A	A	D	B	A	A	A	A
TRICHLOROETHYLENE	B	B	B	B	B	A	A	A	B	B	B	B	B	A
TUNG OIL	B	A	B	A	B	A	A	A	A	A	B	A	B	C
TURPENTINE	B	A	B	A	B	A	A	A	A	A	B	A	B	B
UREA	C	B	C	B	C	A	A	A	–	–	C	B	C	A
VARNISH	C	A	C	A	C	A	A	A	B	B	C	A	C	A
VEGETABLE OIL, EDIBLE	B	A	B	A	B	A	A	A	A	A	B	A	B	B
VEGETABLE OIL, NON-EDIBLE	B	A	B	A	B	A	A	A	A	A	B	A	B	B
VINEGAR	D	A	D	A	D	A	A	A	A	A	D	A	D	A
WATER, DISTILLED (AREATED)	D	A	D	A	D	A	A	A	A	A	D	A	D	A
WATER, FRESH	C	A	C	A	C	A	A	A	A	A	C	A	C	A
WATER, SEA	D	A	D	A	D	A	A	A	A	A	D	A	D	A
WAX, EMULSIONS	A	A	A	A	A	A	A	A	A	A	A	A	A	–
WAXES	A	A	A	A	A	A	A	A	A	A	A	A	A	A
WHISKEY AND WINE	D	A	D	A	D	A	A	A	A	A	D	A	D	A
XYLENE (DRY)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
ZINC CHLORIDE	D	D	D	D	D	A	A	A	A	C	D	D	D	B
ZINC HYDROSULFITE	A	A	A	A	A	A	A	A	A	D	A	A	A	B
ZINC SULFATE	D	B	D	B	D	A	A	A	A	D	D	B	D	B

(-) – Not tested. VTFEP – Virgin TFE packing.
NOTE: All ladings at ambient temperatures except as noted.

Services for Valves and Actuation

WE BUILD IT. WE BACK IT.

Global Network and Local Support

Cameron is well-positioned to deliver total valve 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.

Easily Accessible Parts and Spare Valves

- OEM spare valves, actuators, and parts (including non-Cameron brands)
- Handling, storage, packaging, and delivery
- Dedicated stocking program

Comprehensive Services Portfolio

- Parts and spare valves
- Repair
- Field services
- Preventative maintenance
- Equipment testing and diagnostics
- Remanufacturing
- Asset preservation
- Customer property management
- Training and recertification services
- Warranty

Customized Total Valve Care℠ (TVC) Programs

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

Trademark Information

WKM is a registered trademark of Cameron. CAMSERV and DynaSeal are trademarks of Cameron.

This document contains references to registered trademarks or product designations that are not owned by Cameron.

Trademark	Owner	Common Name	Comparable Cameron Abbreviated Name (in trim charts)
Celcon	Hoechst Celanese Corporation		
Teflon	E.I. DuPont De Nemours & Company	Poly Tetra Fluoro Ethylene	PTFE
Viton	DuPont Dow Elastomers L.L.C.	Fluoroelastomer	FKM
17-4PH	Armco Advanced Materials Corp.	17-4PH Stainless Steel	Type 630
		Electroless Nickel Plating	ENP

CAMERON

3250 Briarpark Drive, Suite 300
Houston, TX 77042
USA
Toll Free 1.800.323.9160

Learn more about WKM at:
www.c-a-m.com/valves

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.

CAMERON
A Schlumberger Company

WKM Valves–
Triple Offset Valves

High-quality, bidirectional valves for critical applications in demanding markets

WKM Valves—Triple Offset Valves

The TOV completes our reliable, performance-proven, quarter-turn butterfly valve portfolio. The true triple offset geometry of this valve allows for bubble-tight sealing to create a valve that delivers fully bidirectional zero-leakage shutoff per API Standard 598.

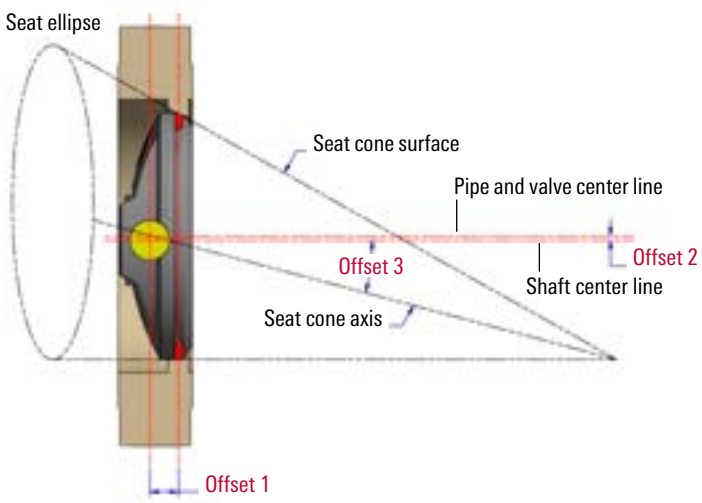
Backed by our world-class engineering, manufacturing, and sourcing expertise, the TOV provides a trusted solution ideal for crucial applications. Operators around the world rely on our dedication to high-quality standards, competitive manufacturing processes, and world-class support for total valve life cycle support.

Advantages

- True triple offset geometry
- Fully bidirectional zero-leakage shutoff per API 598
- Field-replaceable metal seat
- Life cycle tested as a bubble-tight bidirectional valve
- Standard bearing seals
- Self-centering disc
- Available in a wide range of configurations: lug and short (ISO) and long pattern
- Carbon and stainless steel standard; other materials on request

Compliance and Specifications
API Standard 609
ASME B16.34
ASME B16.5
API Standard 598
ISO-5752 flange dimension
ASME B16.47 for Series A mating pipe flange dimensions for valve sizes 26 in and larger, Classes 150, 300, and 600
ASME B16.10
MSS-SP-55
ISO 5211
API Standard 607, latest edition for fire testing
Fugitive-emissions testing per API Spec 641 and ISO 15848-1

Triple Offset Geometry



Offset 1 provides full 360° uninterrupted sealing.

Offset 2 provides eccentric rotation of the disc that swings the seal ring completely off the seat upon opening.

Offset 3 moves the centerline of the cone rotation laterally from the centerline of the disc rotation, enabling the cone to seal without rubbing.

Major Markets

Power and steam
- District heating
- Bitumen

Petrochemicals (refining and chemicals)
- Coking
- Reformers—cracking
- Tank switching
- Ethylene
- Butadiene
- Isocyanates—plastics

Midstream
- Tank and terminal
- Tank switching
- Long pattern for gate valve replacement
- Storage for all types of hydrocarbons and chemicals
- Liquid transfer

Upstream production
- Process equipment
- Separation—molecular sieve
- Switching
- Floating production platforms
- Manifolds
- Slurry, oil sands, and SAGD methods
- Secondary recovery

Applications

Oil and gas
- Critical isolation
- Steam piping and condensate
- Offshore platforms
- Cooling water systems
- Seawater
- Produced fluids processing systems

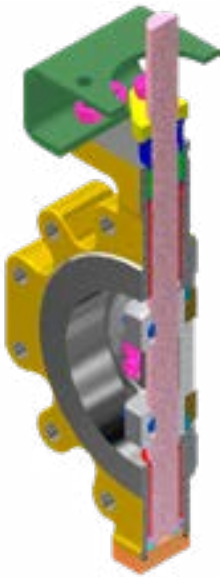
Refining and petrochemical processing
- Hydrocarbon processing
- Hydrogen
- Oxygen
- Thermal fluids
- Hot gases
- Sulfur (tail gas)
- Chemical solvents
- Chlorinated solvents
- Flare gas

Liquefied natural gas
- LNG storage
- LNG production

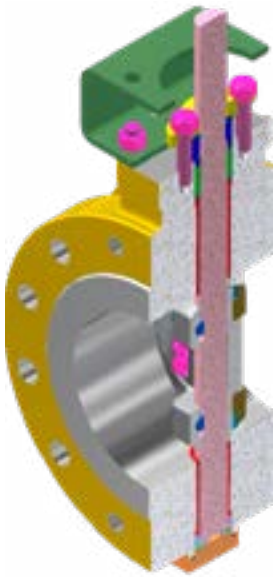
Power and district heating
- Steam isolation
- Hot water control systems
- Geothermal steam

Midstream
- Tank isolation
- Manifold system isolation
- Metering systems
- SCADA systems

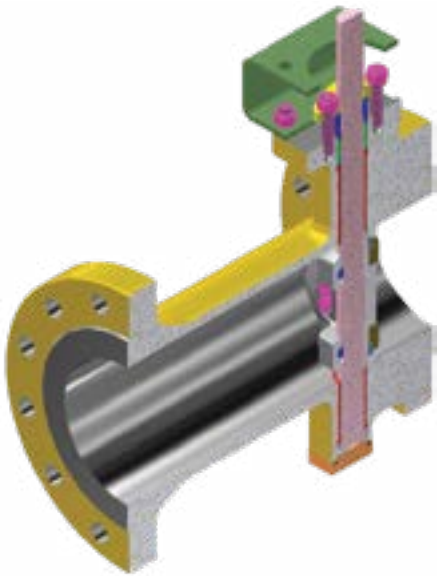
Flange Connections



Lug pattern per API 609



Short pattern per ISO 5752/API 609



Long pattern per ASME B16.10 and API 609

WKM Valves—Triple Offset Valves

products.slb.com/wkmtov

CAMERON
A Schlumberger Company