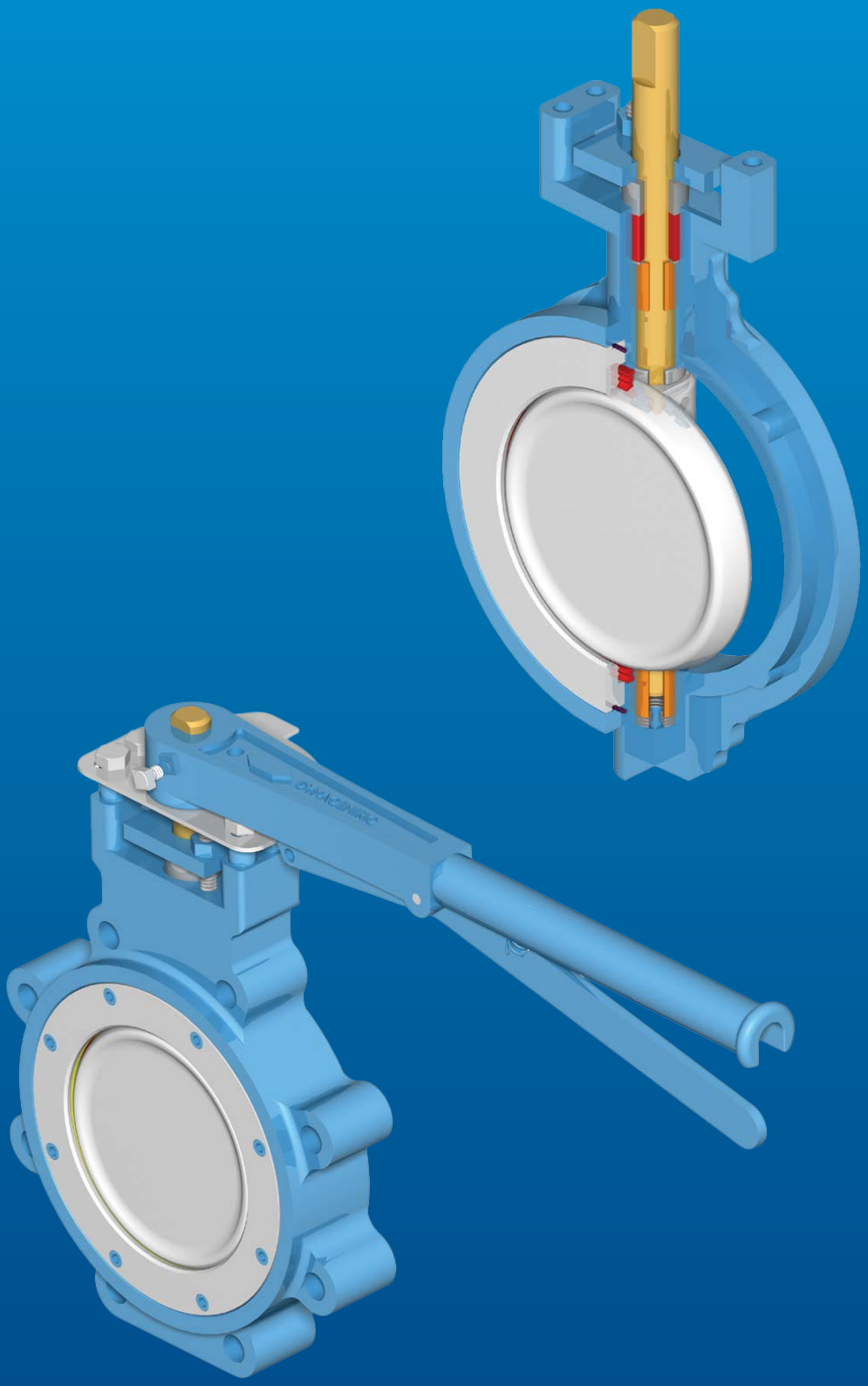
CAMERON
A Schlumberger Company

# High-Performance Butterfly WKM Valves

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



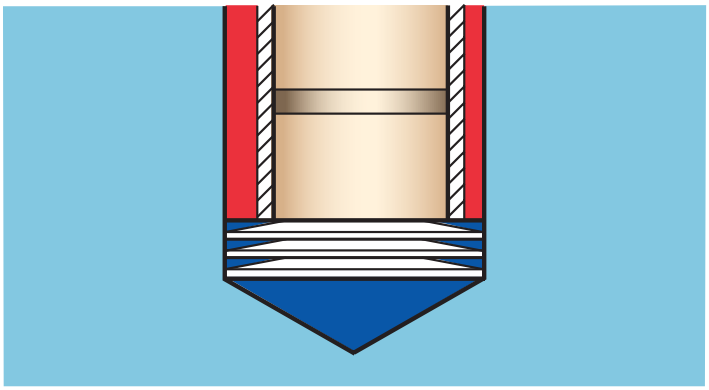
# Contents

# 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:

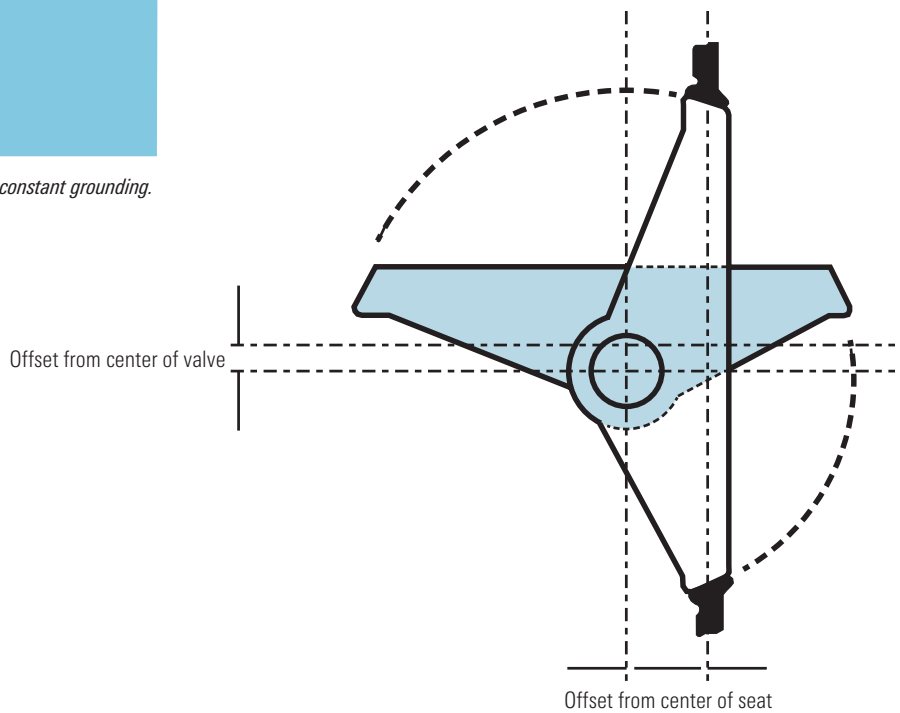
- chemical and petrochemical processing
- utilities
- pulp and paper
- oil and gas production
- fuel handling systems
- air conditioning and refrigeration
- marine.



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

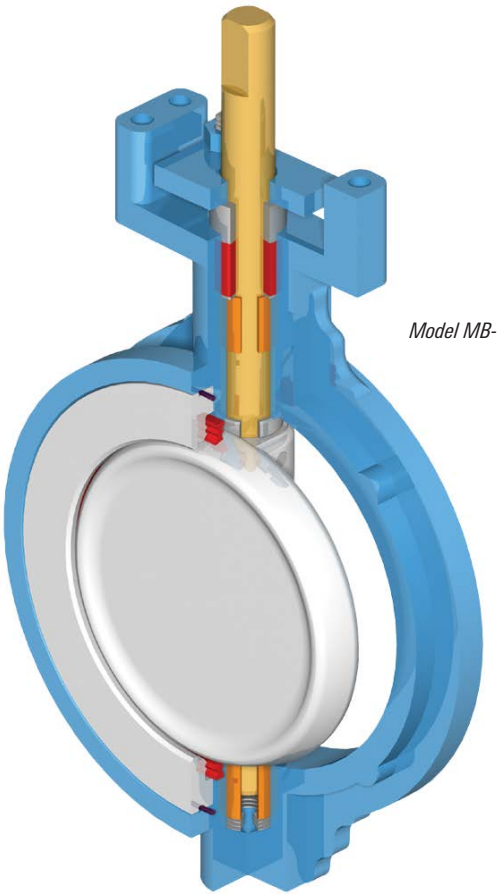
### Disc design reduces seat wear

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.

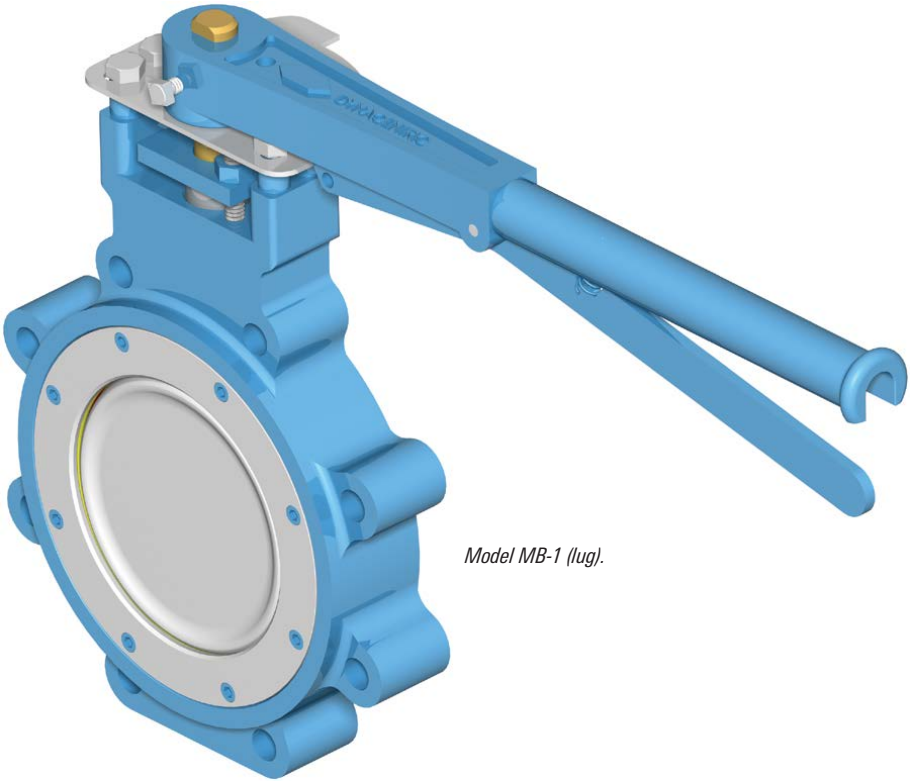



*Double offset design.*

# Body Styles

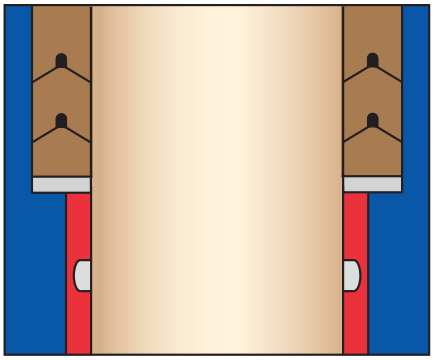


*Model MB-1 (wafer).*

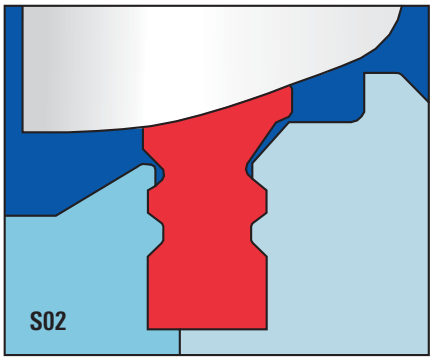


*Model MB-1 (lug).*

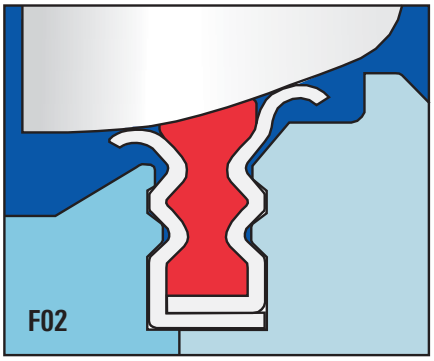
# Features and Benefits



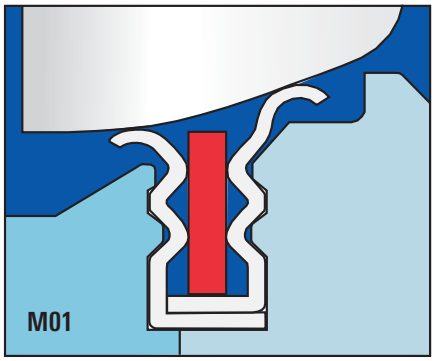
*Positively retained stem.*




*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®.

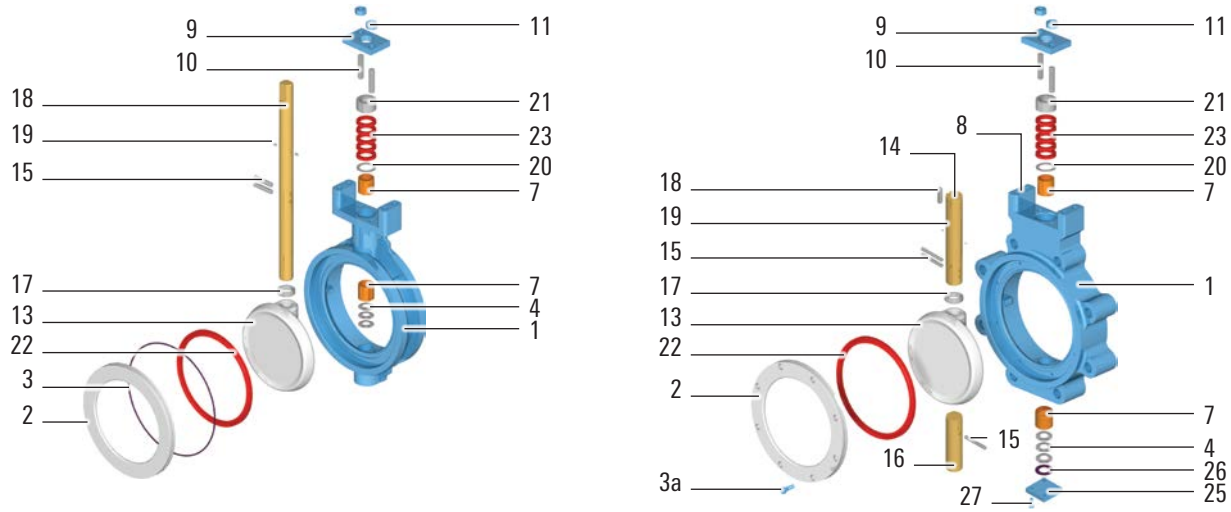
‡‡ Requires F02 seal group.

§§ 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 |

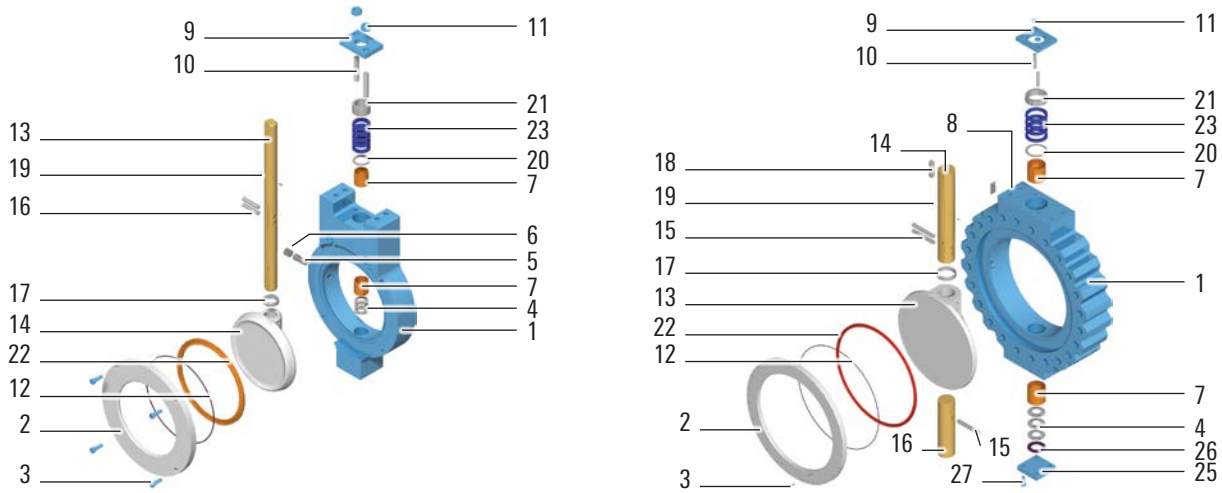
Typical valve construction shown—some sizes may vary.

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<br>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

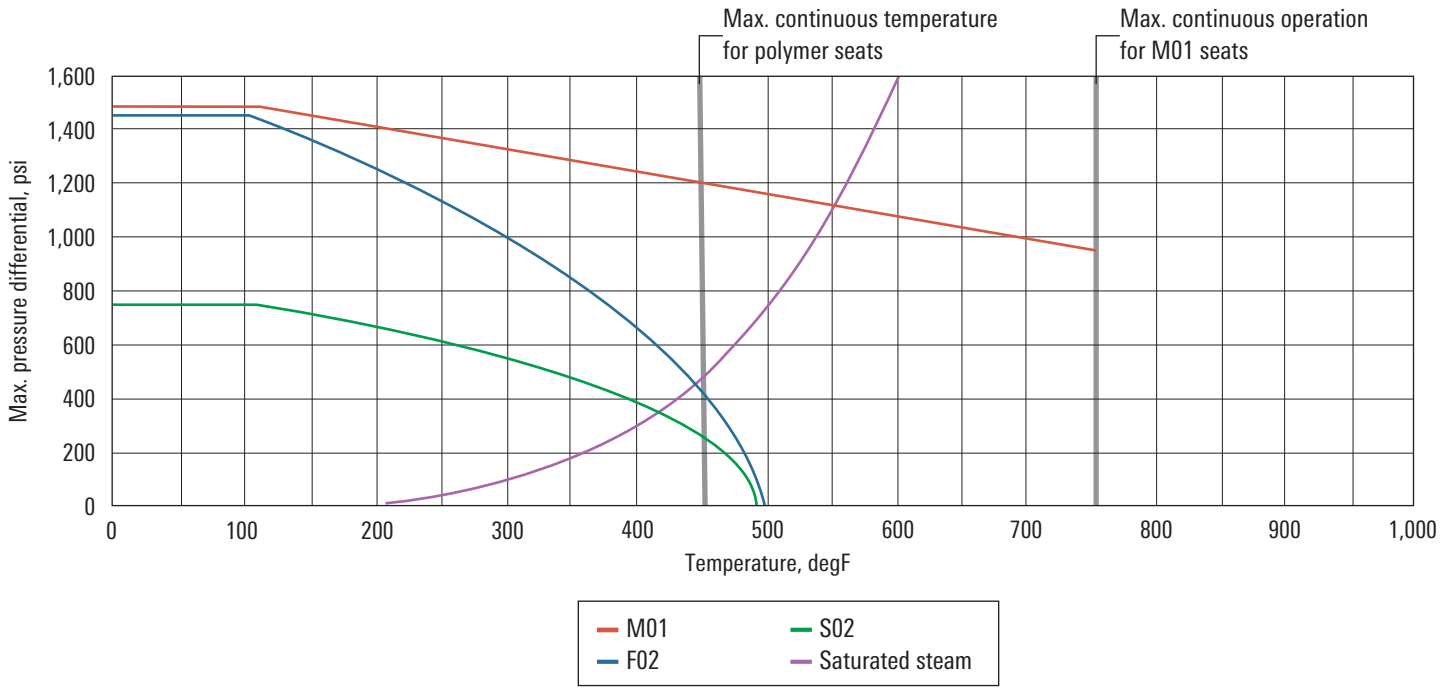
This chart is an abbreviated guide to the chemical resistance and pressure temperature limitations of seat seal materials used in high-performance butterfly WKM valves. Complete ratings curves are also shown. For additional information, please consult your Cameron representative.

| 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.

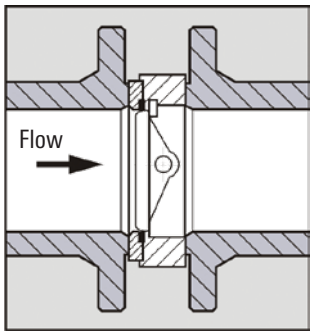
### Body materials

- 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.

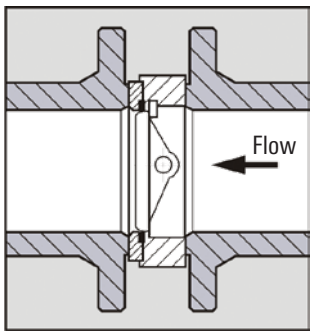
An appropriate safety factor is included for normal wet operating torque.



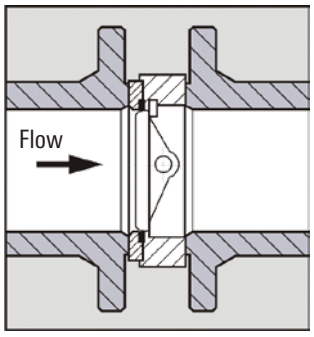

*Seat alignment in upstream flow.*

| 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.*

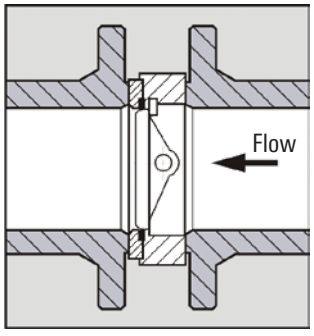



*Seat alignment in upstream flow.*

**Torque Values**

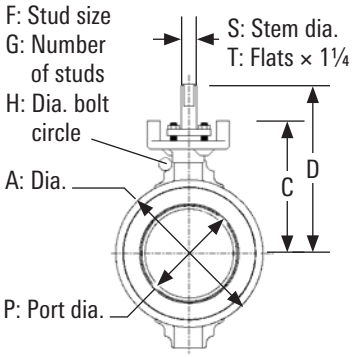
| Size, in [mm] | 2½ [65] | 3 [80] | 4 [100] | 5 [125] | 6 [150] | 8 [200] | 10 [250] | 12 [300] | 14 [350] | 16 [400] | 18 [450] | 20 [500] | 24 [600] | 30 [750] | 36 [900] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **F0 and M0 seats upstream—valve torque, lbf.in** | | | | | | | | | | | | | | | |
| 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 | – | – |

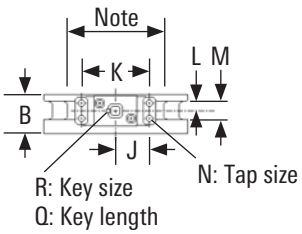
For severe service, an additional safety factor should be added:
Dry gas or slurry: 1.25
Emergency shutdown: 1.60
Low temperature: 1.20
High temperature between 600 and 700 degF [316 and 371 degC]: 1.30



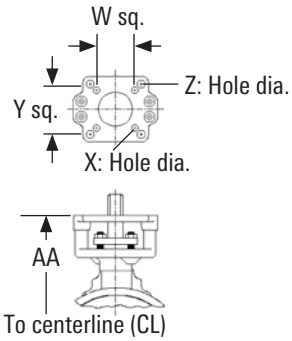

*Seat alignment in downstream flow.*

# Dimensional Data

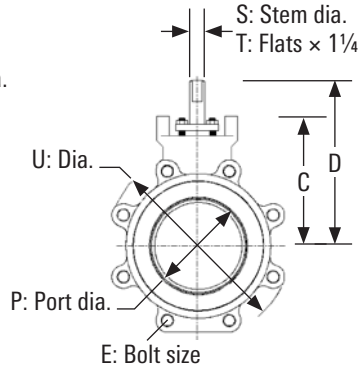



Note: Minimum pipe ID required for disc swing clearance. See (BB) for applicable pipe schedule.




Optional flange mounting bracket (actuator code—FG)



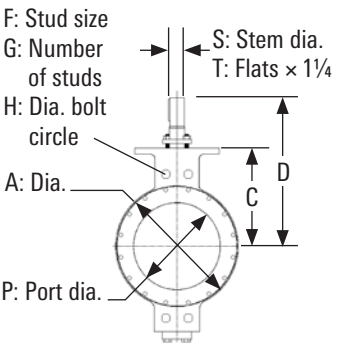

**Series B5100, Class 150, 285-psi Cold Working Pressure (CWP)†**

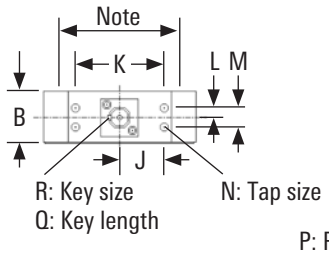
| in [mm] | A | B | C | D | E | F | G‡ | H | J | K | L | M | N | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2½ [65] | – | 1.87 [48] | 5.81 [148] | 7.94 [202] | ⅝–11 | – | 4 | 5.50 [140] | 2.00 [51] | 4.00 [102] | 0.44 [11] | 0.88 [22] | ⅜–16 | 2.09 [53] |
| 3 [80] | 5.00 [127] | 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] | – |

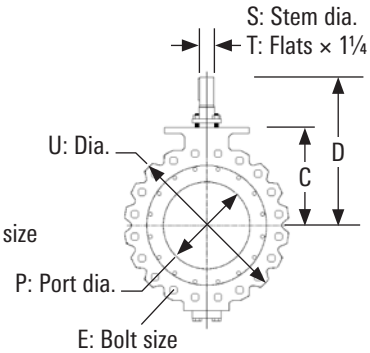
† Pressure ratings are in accordance with ASME B16.34 for Group 1.1 carbon steel valves. Pressure ratings vary with different body materials.

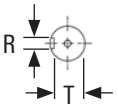
‡ Installation manual is available with complete flange bolt and stud information.



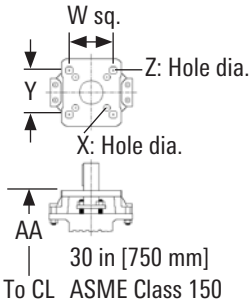




Note: Minimum pipe ID required for disc swing clearance. See (BB) for applicable pipe schedule.




Optional flange mounting bracket (actuator code—FG)




**Series A5100, Class 150, 285-psi CWP†**

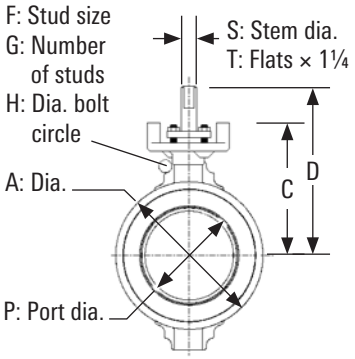
| in [mm] | A | B | C | D | E | F | G‡ | H | J | K | L | M | N | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 [750] | 34.50 [876] | 7.63 [194] | 22.88 [581] | 30.94 [786] | 1¼–8 | 1¼–8 | 28 | 36.00 [914] | 6.00 [152] | 12.00 [3050] | 1.50 [38] | 3.00 [76] | ¾–10 | 27.90 [709]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

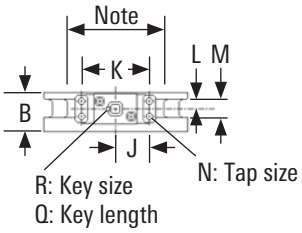
| | | | | | | | | | | | | Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in [mm] | Q | R | S | T | U | W | X | Y | Z | AA | BB | Lug Body, lbm [kg] | Wafer Body, lbm [kg] |
| 30 [750] | 4.00 [102] | 0.875 × 0.625 [22 × 16] | 3.500 [89] | 3.156 | 38.75 [984] | 9.47 | 0.81 | 3.92 | 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.

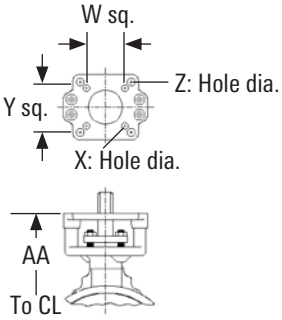
‡ Installation manual is available with complete flange bolt and stud information.

# Dimensional Data

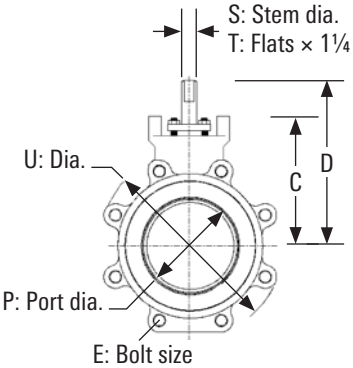



Note: Minimum pipe ID required for disc swing clearance. See (BB) for applicable pipe schedule.




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.

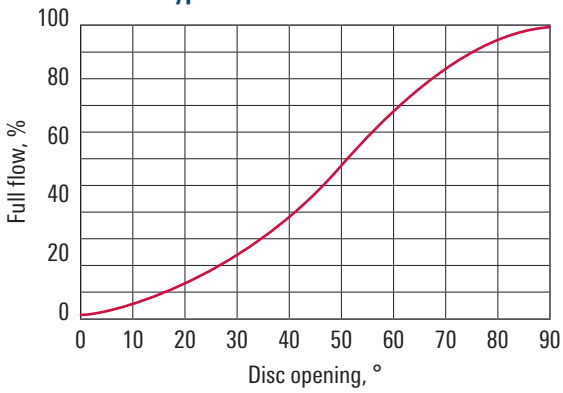
The usable range for high-performance butterfly valves is between 20° and 70° opening, resulting in a ratio of 10:1.

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**



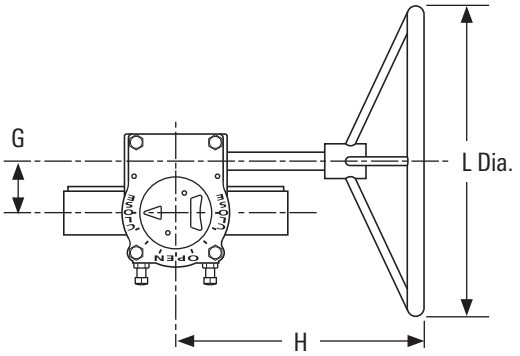

| Valve Size | Disc Angle, Degrees Open | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **in [mm]** | **20** | **30** | **40** | **50** | **60** | **70** | **80** | **90** |
| **Series 5100 Class 150** | | | | | | | | |
| 2½ [65] | 8 | 17 | 31 | 46 | 66 | 82 | 97 | 103 |
| 3 [80] | 14 | 31 | 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 |

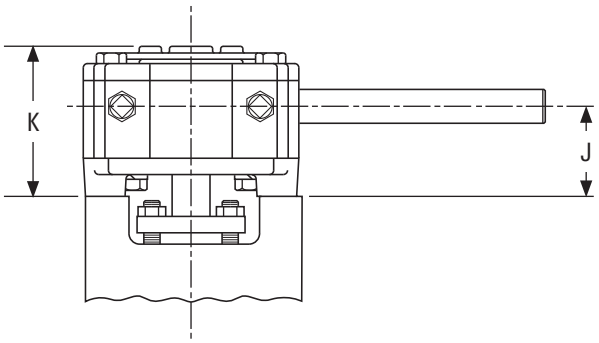
# Manual Actuators

### Worm gear actuators

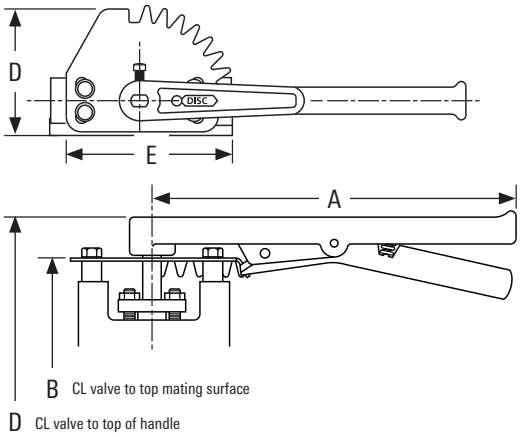
Worm gear actuators are available as optional equipment for high-performance butterfly WKM valves sizes 2½ through 8 in [65 through 200 mm]. All larger size valves require worm gear actuators or power actuation.

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

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