

# FLOWSEAL<sup>MS</sup>



## Triple Offset Valves

**CRANE**  
THE VALVE EXPERTS

# FLOWSEAL MS

## Value Statement

For the harsh conditions of critical process applications, steam isolation, high cycle frequency, and temperature extremes, the Flowseal MS triple-offset metal-seated valve provides unmatched performance, reliability, and quality.

The superior design of the disc / shaft engagement and the precision machined sealing components combine with innovative design geometry to provide improved cycle life, lower operating torque, and reliable performance in extreme temperatures.

The bi-directional bubble-tight closure, even after extensive cycling, provides sealing integrity formerly associated only with soft-seated valves.

With more than 20 years of manufacturing experience, Flowseal MS valves have earned a reputation for proven performance in critical applications.

The Flowseal and Crane brands are recognized around the world for market leadership and customer support, rooted in more than 145 years of design and manufacturing excellence.

## Applications

MS valves are used in a broad spectrum of market sectors, including refining, chemical processing, power generation, marine, pulp and paper, petroleum production, and gas processing.

Applications include process liquids, process gases, flue gas, cryogenics, steam, condensate, petroleum products, thermal fluid, and water.

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*Sizes from 3" to 24"*  
*ASME Class 150-600*  
*Temp. range of -320° to 1000°F*  
*Carbon steel, stainless and high alloys*



# Zero Leakage Valves

## Features and Benefits

### ■ Triple Offset Design

Eliminates wear associated with sealing surface contact and maintains sealing integrity and high cycle life

### ■ Wide Angle Seat Design

Eliminates wedging and binding of the seat / disc engagement

### ■ Torque Seated Resilient Metal Seal Ring

Provides reliable zero leakage bi-directional shut-off closure from -320°F to 1000°F

### ■ Bubble-Tight Closure

Ensures process efficiency with reduced cost of maintenance

### ■ Self-Centering Disc Design

Accommodates thermal cycling and temperature without binding

### ■ Robust Single-Piece Shaft

Minimizes shaft deflection which promotes bi-directional sealing

### ■ Optional Stellite Seat

Offers optimum resistance to erosion in abrasive and high velocity applications

### ■ No Plastics or Elastomers

Standard design provides fire safety

### ■ Bearing Protector Rings

Prevent solid particles from coming in contact with bearing surfaces

### ■ Blowout-Proof Shaft

Complies with API 609 to improve safety for operating personnel

### ■ API 609 Lug Body Dimensions

Flowseal MS is interchangeable with most double-offset high performance valves

### ■ Optional ASME B16.10 Flanged

Flowseal MS is interchangeable with Gate valve and Ball valve lay lengths

### ■ Quarter Turn Design

Reduces emissions and improves containment integrity, and is easily automated

### ■ Low Break and Operations Torque

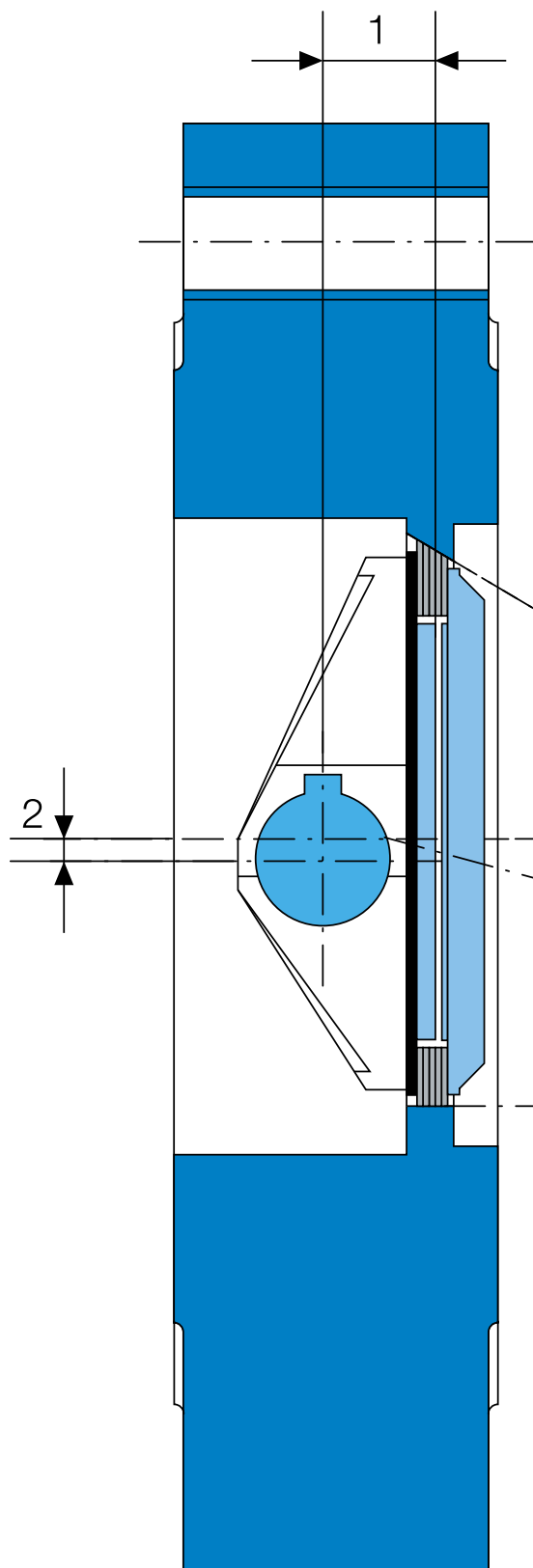
Enables simplified, cost-effective automation

### ■ Fire Tested

Meets API 607 Rev. 4



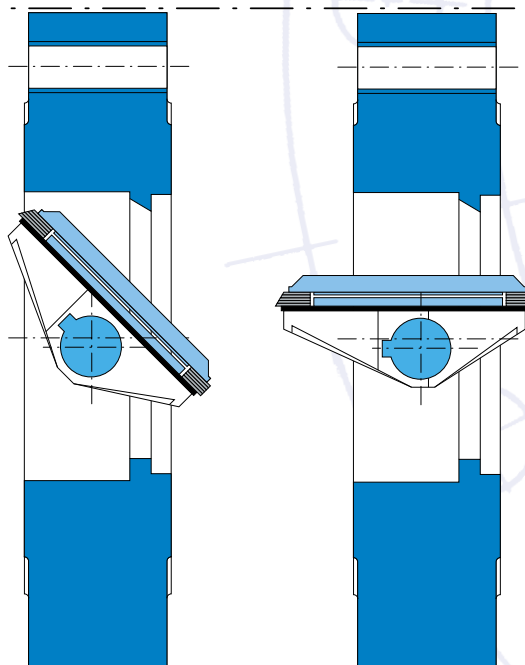
# Triple-Offset Design



As the name implies, there are three separate “offsets” designed into the triple-offset butterfly valve. Two of the offsets apply to the location of the shaft in respect to the centerline of the bore and the centerline of the disc / seat sealing surfaces.

The third offset in the design is the axis of the seat cone angle that is inclined from the centerline of the valve bore to minimize rubbing of the seat / seal contact surfaces during operation and to preserve sealing integrity over the cycle life of the valve. This wide angle seat also eliminates wedging or binding of the disc.

The Flowseal MS features unique designs in the disc / shaft engagement and in the precision machined seat and seal ring of identical eccentric shape. These features combined with the eccentric movement to provide longer cycle life, lower operating torque, and increased temperature capabilities. Additionally, the torque seated resilient metal seal ring assures bi-directional ZERO LEAKAGE performance.



# Cost of Ownership



- Valve Price
- Freight
- Size/Weight
- Installation



- Torque
- Automation
- Cycle Life
- Maintainability



- Zero Leakage
- Containment
- Firesafe
- Retrofit

In addition to purchase price, the true cost of ownership for any valve is determined by a variety of other considerations. Before buying any valve, the following factors must also be weighed.

Size and weight of the valve determine not only the freight cost but also the size of skid, the extent of piping supports, and the installation cost related to both handling equipment and number of personnel required.

Lower operating torque permits the use of smaller gear operators or actuators. Quarter turn actuation is more versatile and more economical and has space saving benefits as well.

Triple-offset valves are known for high cycle life, unmatched by any other metal seated valve design, and for low maintenance costs.

Maintenance is often a hidden cost of ownership. Over the life of the valve, high maintenance costs can turn an inexpensive valve into a high cost proposition. Maintenance costs are only part of the problem which also includes higher process costs.

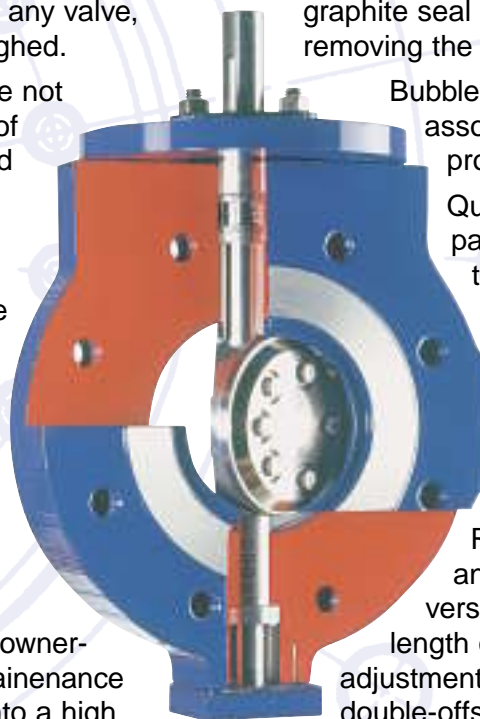
Complete disassembly of the valve is not necessary and when required the stainless / graphite seal ring can be replaced simply by removing the seal retainer on the disc.

Bubble tight closure eliminates the risks associated with product loss and other process cross contamination.

Quarter turn valves provide better packing performance, minimizing the risk of costly EPA violations and long life. Unibody construction eliminates body joint leakage risks of other designs.

All Flowseal MS valves are Fire Safe, eliminating the need for additional valve inventories.

Replacing high maintenance gate and ball valves is simplified with the versatility of MS valves. Three lay length options eliminate the cost of piping adjustments when replacing gate, ball, or double-offset butterfly valves. MS valves are manufactured to API 609, ASME B16.10, and ISO 5752 standards.





# Versatility

Versatility is a benefit of standard Flowseal MS valves. They provide reliable operation in a variety of pressure and temperature requirements and in critical applications such as flue gas and cryogenics. The versatility extends to three options for lay length dimensions which gives both cost savings and greater flexibility in piping design or retrofit opportunities.

- Lug pattern bodies designed to API 609 are cost effective and interchangeable with most high performance double-offset and other triple-offset rotary valves.
- Flanged short pattern bodies designed to ISO 5752 offer the most common lay length for triple-offset rotary valves.

- Flanged long pattern bodies designed to ASME B16.10 simplify replacement of gate valves and ball valves.
- Disc position is indicated by an integral marking of the shaft in alignment with a permanent reference mark on the valve body. This enables quick and easy retrofitting of actuators without removing the valve from the line and without risking an incorrect orientation or operating mode.
- Flowseal MS valves provide bi-directional tightness, pressure and a directional flow arrow indicates the preferred orientation for pressure-assisted closure.



**MODEL GG**  
**Double Flange Long Pattern**

GG: ASME B16.10  
Tables 1 & 2 (Gate)  
3" to 24"  
150/300 Class

*Other sizes, classes on request.*



**MODEL GA**  
**Lug Pattern**

GA: API 609  
Table 2  
3" to 24"  
150/300/600 Class

*Other sizes, classes on request.*

# Standards

MS valves are designed and manufactured in compliance with ASME, API and ISO Standards under Quality Assurance provisions of ISO 9001 and in compliance with PED requirements.



## MODEL GI Double Flange Short Pattern

GI: ISO 5752  
Table 4 Short  
3" to 24"  
150/300 Class

*Other sizes, classes on request.*

Design: ASME B16.34  
ASME Sec III and SEC VIII  
ASME B31.1 and B31.3  
API 609  
TRD 110, DIN 3840

Face to Face  
Dimensions: ASME B16.10  
ISO 5752  
API 609  
EN 558-1 (DIN 3202-3)

Flange Dimensions: ASME B16.5  
ASME B16.47  
DIN 2501  
ISO 7005

Testing: API 598 (Soft Seat)  
API 6D (Soft Seat)  
FCI 70-2 Class VI

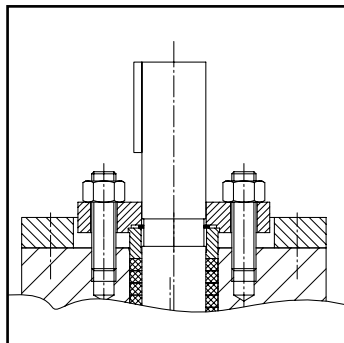
Fire Testing: API 607 Rev. 4

Marking: MSS SP-25  
EN 19

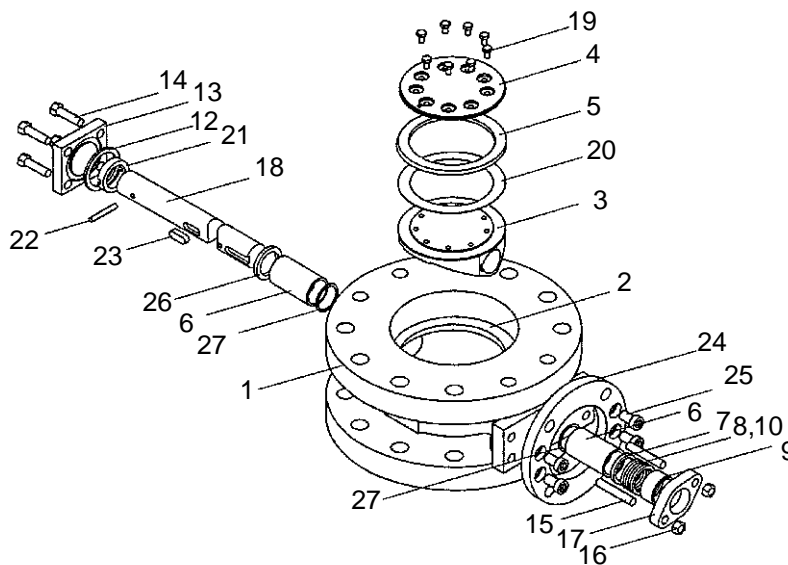
Quality Assurance: ISO 9001  
PED



# Materials & Cv Values



*Detail of API 609 blowout-proof shaft.*



## Parts/Materials List

Item	Component	Steel	Stainless Steel	Item	Component	Steel	Stainless Steel
1	Body	A216 WCB or eq	A351 CF8M	15	Gland Stud	SS Gr B8	SS GR B8
2	Seat	SS316Ti	SS CF8M	16	Gland Nut	SS Gr 8	SS Gr 8
3	Disc Assembly	WCB/ENP/SS316	SS CF8M	17	Gland Flange	Steel	SS316
4	Seal Ring Retainer	Steel	SS316	18	Shaft	SS A479-431	S31803
5	Laminated Seal Ring	SS321/Graphite	SS321/Graphite	19	Retainer Screw	SS Gr B8	SS Gr B8
6	Bearing	SS316 Cr PI	SS316 Cr PI	20	Retainer Gasket	Graphite	Graphite
7	Spacer	SS303	SS303	21	Shaft Retainer	SS303	SS303
8	Packing	Carbon Fibre	Carbon Fibre	22	Retainer Pin	SS303	SS303
9	Gland Follower	SS303	SS303	23	Disc Drive Key	SS303	SS303
10	Packing	Graphite	Graphite	24	Mounting Flange	Steel	Steel Ni PI
11	Bearing Protector	Graphite	Graphite	25	Mtg Flg Screw	Steel Zinc PI	SS Gr B8
12	Cover Gasket	SS316/Graphite	SS316/Graphite	26	Thrust Ring	SS440B	SS440B
13	Cover	Steel	SS316	27	Anti Seize Ring		SS440B
14	Cover Screw	SS Gr B8	SS GR B8				

## Cv Values

Valve Size		Opening Angle							
inch	mm	90°	80°	70°	60°	50°	40°	30°	20°
3	80	120	16	95	70	52	37	25	14
4	100	230	223	182	133	99	71	48	28
5	125	400	388	316	232	172	124	84	48
6	150	660	640	521	383	284	205	139	79
8	200	1500	1455	1185	870	645	465	315	180
10	250	2400	2328	1896	1392	1032	744	504	288
12	300	3600	3492	2844	2088	1548	1116	756	432
14	350	5500	5335	4345	3190	2365	1705	1155	660
16	400	7600	7372	6004	4408	3268	2356	1596	912
18	450	10300	9991	8137	5974	4429	3193	2163	1236
20	500	13000	12480	10010	7540	5590	4030	2730	1560
24	600	20200	19594	15958	11716	8686	6262	4242	2424

*Subject to change without notice.*



# Ratings and Torque Values

## Pressure/Temperature Ratings

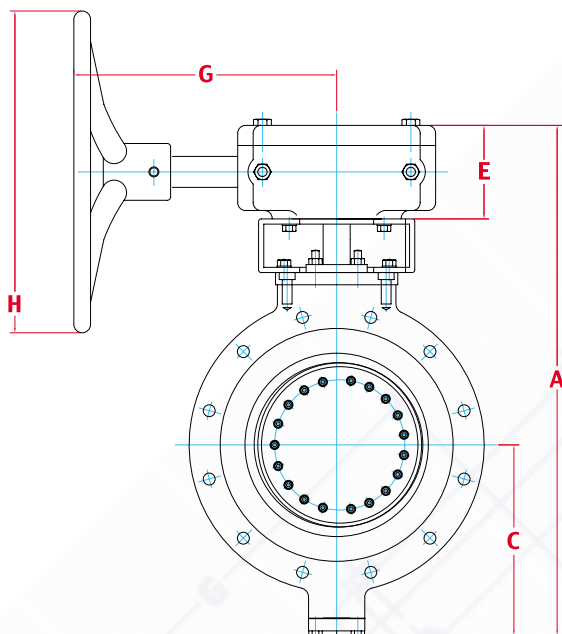
Temperature °F	Working Pressure psig								
	Class 150				Class 300				Class 600
	A216 WCB	A516 Gr.60	A351 CF8M	A240 Type 321	A216 WCB	A516 Gr.60	A351 CF8M	A240 Type 321	A216 WCB
-20 to 100	285	235	275	275	740	620	720	720	1480
200	260	215	240	235	675	560	620	610	1350
300	230	210	215	210	655	550	560	545	1315
400	200	200	195	190	635	530	515	495	1270
500	170	170	170	170	600	500	480	460	1200
600	140	140	140	140	550	455	450	435	1095
650	125	125	125	125	535	450	445	430	1075
700	110	110	110	110	535	450	430	420	1065
750	95	95	95	95	505	445	425	415	1010
800	80	80	80	80	410	370	415	415	825
850	—	—	65	65	—	—	405	410	535
900	—	—	50	50	—	—	395	405	345
950	—	—	35	35	—	—	385	385	205
1000	—	—	20	20	—	—	365	355	105

## Torque Values (ft. lbs.)

Maximum Working Pressure												
Valve Size		100	200	300	400	500	600	700	725	914	1088	1450
inch	mm											
3"	80	25	42	59	75	92	109	126	170	214	254	339
4"	100	45	75	104	133	162	191	220	308	388	462	616
5"	125	77	122	168	213	259	304	350	—	—	—	—
6"	150	139	249	332	416	500	583	667	620	782	931	1,241
8"	200	148	295	443	590	738	886	1,033	918	1,156	1,376	1,835
10"	250	260	482	705	928	1,150	1,373	1,596	1,578	1,989	2,368	3,157
12"	300	468	732	997	1,262	1,526	1,791	2,056	1,842	2,322	2,764	3,686
14"	350	746	1,197	1,648	2,098	2,549	3,000	3,451	2,387	3,009	3,582	4,775
16"	400	772	1,434	2,096	2,757	3,419	4,081	4,742	2,553	3,217	3,829	5,105
18"	450	1,070	1,808	2,546	3,284	4,022	4,760	5,498	—	—	—	—
20"	500	1,507	2,423	3,339	4,255	5,171	6,087	7,003	—	—	—	—
24"	600	2,636	4,092	5,548	7,003	8,459	9,915	11,370	—	—	—	—

The torques shown above are actuator sizing torques. They include a safety factor and can be used for all applications irrespective of whether the flow is in the preferred direction (from shaft side) or reverse direction.

# Dimensions



OTHER DIMENSIONS* INCHES (mm)					
	A	C	E	G	H
3"	15.5 (394)	5.1 (130)	4 (102)	9.5 (241)	12 (305)
4"	16.5 (419)	5.7 (145)	4 (102)	9.5 (241)	12 (305)
6"	18.8 (478)	7.1 (180)	4 (102)	9.5 (241)	12 (305)
8"	25.5 (648)	8.2 (208)	4 (102)	12 (305)	18 (457)
10"	29.5 (749)	9.5 (241)	4 (102)	13 (330)	18 (457)
12"	32.5 (826)	11.5 (292)	5 (127)	13 (330)	18 (457)
14"	35.5 (902)	12.5 (318)	5 (127)	13.5 (343)	18 (457)
16"	43 (1092)	15.2 (386)	7.5 (191)	13.5 (343)	24 (610)
18"	48 (1219)	17.2 (437)	7.5 (191)	18 (457)	24 (610)
20"	56 (1422)	18.5 (470)	7.5 (191)	21 (533)	24 (610)
24"	59 (1499)	21.2 (538)	7.5 (191)	21 (533)	30 (762)

\* Subject to change without notice.  
Other sizes and classes on request.

SIZE	END TO END INCHES (mm)						
	GA LUG API 609 CL 150	GA LUG API 609 CL 300	GA LUG API 609 CL 600	GI FLANGED ISO 5752 CL 150	GI FLANGED ISO 5752 CL 300	GG FLANGED B16.10 CL 150	GG FLANGED B16.10 CL 300
3"	1.88 (48)	1.88 (48)	2.13 (54)	4.5 (114)	4.5 (114)	8 (203)	11.12 (202)
4"	2.12 (54)	2.12 (54)	2.52 (64)	5 (127)	5 (127)	9 (229)	12 (305)
6"	2.25 (57)	2.31 (59)	3.07 (78)	5.5 (140)	5.5 (140)	10.5 (267)	15.88 (403)
8"	2.5 (64)	2.88 (73)	4.02 (102)	6 (152)	6 (152)	11.5 (292)	16.5 (419)
10"	2.81 (71)	3.25 (82)	4.61 (117)	6.5 (165)	6.5 (165)	13 (330)	18 (457)
12"	3.19 (81)	3.62 (92)	5.51 (140)	7 (178)	7 (178)	14 (356)	19.75 (502)
14"	3.62 (92)	4.62 (117)	6.10 (155)	7.5 (191)	7.5 (191)	15 (381)	30 (762)
16"	4 (102)	5.25 (133)	7.01 (178)	8.5 (216)	8.5 (216)	16 (406)	33 (838)
18"	4.5 (114)	5.88 (150)	— —	8.75 (225)	8.75 (225)	17 (432)	36 (914)
20"	5 (127)	6.25 (159)	— —	9 (229)	9 (229)	18 (457)	39 (991)
24"	6.06 (154)	7.12 (181)	— —	10.5 (267)	10.5 (267)	20 (508)	45 (1143)

WEIGHTS* POUNDS (kg)							
	GA LUG API 609 CL 150	GA LUG API 609 CL 300	GA LUG API 609 CL 600	GI FLANGED ISO 5752 CL 150	GI FLANGED ISO 5752 CL 300	GG FLANGED B16.10 CL 150	GG FLANGED B16.10 CL 300
3"	55 (25)	55 (25)	TBA (TBA)	62 (28)	71 (32)	69 (31)	78 (35)
4"	66 (30)	66 (30)	TBA (TBA)	71 (32)	90 (41)	77 (35)	97 (44)
6"	86 (39)	88 (40)	TBA (TBA)	103 (47)	141 (64)	124 (56)	176 (80)
8"	151 (69)	166 (75)	TBA (TBA)	183 (83)	238 (108)	219 (219)	300 (136)
10"	200 (91)	223 (101)	TBA (TBA)	276 (125)	348 (158)	270 (123)	442 (201)
12"	238 (108)	302 (137)	TBA (TBA)	331 (150)	443 (201)	380 (173)	550 (250)
14"	289 (131)	360 (164)	TBA (TBA)	427 (194)	592 (269)	530 (241)	960 (436)
16"	411 (187)	529 (240)	TBA (TBA)	651 (296)	851 (387)	660 (300)	1240 (564)
18"	680 (309)	877 (399)	— —	760 (345)	1057 (480)	890 (405)	1575 (716)
20"	863 (392)	1072 (487)	— —	887 (403)	1211 (550)	1080 (491)	1980 (900)
24"	1380	TBA (TBA)	— —	1296	TBA (TBA)	1690 (768)	TBA (TBA)

# Flowseal MS Ordering Information

## Valve Identification System

Every Flowseal MS triple-offset butterfly valve has an identification plate giving full details of the valve. The numbering system used on the identification plate is explained in the following chart.

## Example

The model number below describes a Flowseal MS butterfly valve, nominal diameter 3". ASME pressure Class 150, API 609 Table 2 lug-type carbon steel body, nickel-plated carbon steel disc, shaft type 431, no options, bare shaft.

**GA 2 0080 M1 – 1 S 1 S 00 A**

**1 2 3 4 5 6 7 8 9 10 11**

### 1. Design Type

GA	API 609 Table 2, lugged
GI	ISO 5752 Table 4 short, flanged
GG	ASME B16.10 Table 1/8, Table 2/12

### 2. Identity Code

2	Current Manufacturing Series (factory assigned)
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### 3. Size

0080	3" (DN80)
0100	4" (DN100)
0150	6" (DN150)
0200	8" (DN200)
0250	10" (DN250)
0300	12" (DN300)
0350	14" (DN350)
0400	16" (DN400)
0450	18" (DN450)
0500	20" (DN500)
0600	24" (DN600)

### 4. Nominal Pressure

M	ASME 150
N	ASME 300
R	ASME 600

### 5. Seal Ring

1	Laminated, 321 SS/Graphite (STD)
X	Special

### 6. Packing Material

1	Graphite (standard)
2	Low emission packing
X	Special

### 7. Body Material

S	Carbon steel
F	316 Stainless steel
T	CS/Stellite
H	SS/Stellite
X	Special

### 8. Shaft Material

1	Type 431 – Standard
2	UNS S31803 – NACE
3	A453 GR606 – Cryogenic
4	17-4 PH
X	Special

### 9. Disc Material

S	CS, ENP
F	316 SS
X	Special

### 10. Special Features

00	None
XX	Special

### 11. Operation

A	Bare shaft (specify actuation separately)
G	Gear
X	Special





## **FLOWSEAL**

**A Crane Co. Company**

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**CRANE**

**THE VALVE EXPERTS**

**CV-504 0804**