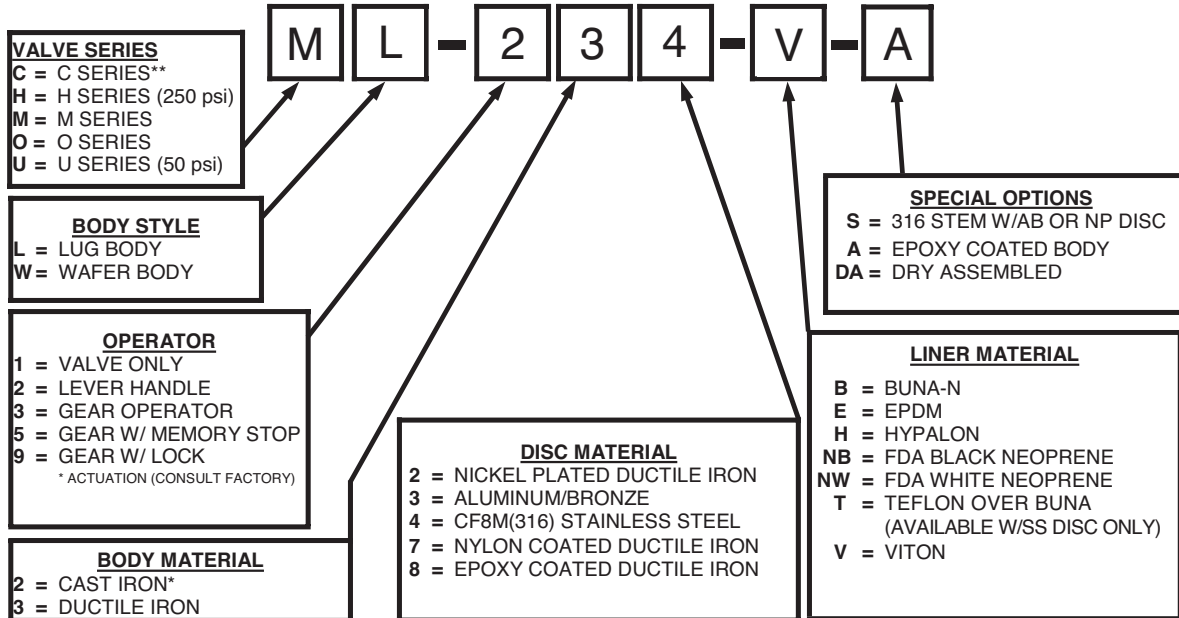


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### FIGURE NUMBER COMPOSITION

#### HOW TO ORDER A MILWAUKEE BUTTERFLY VALVE

THE FIGURE NUMBER BELOW IS: M SERIES VALVE, LUG PATTERN, LEVER HANDLE, DI BODY, SS DISC, VITON LINER, EPOXY COATED BODY



\* MILWAUKEE VALVE RESERVES THE RIGHT TO UPGRADE TO DI BODY WITHOUT NOTICE FOR NO ADDITIONAL COST.

\*\* C-SERIES IS AVAILABLE ONLY IN CAST IRON WAFER OR LUG BODY WITH AL/BRZ DISC, EPDM LINER, LEVER OR GEAR OPERATOR.

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 ⚠ State of California Prop 65 **WARNING:** Cancer and Reproductive Harm. For more information visit [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov).



**Ultra Pure**  
BY MILWAUKEE VALVE  
**CLA23E 2"-12"**

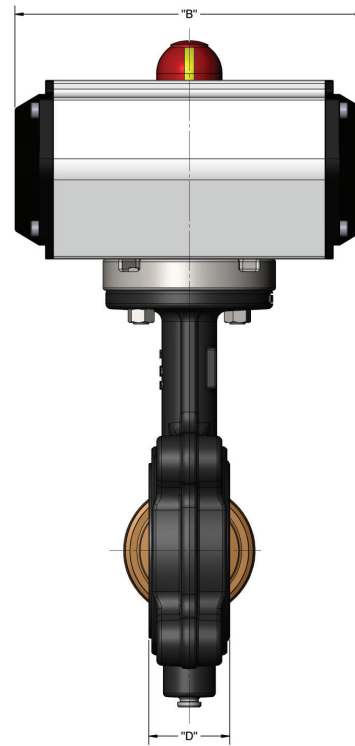
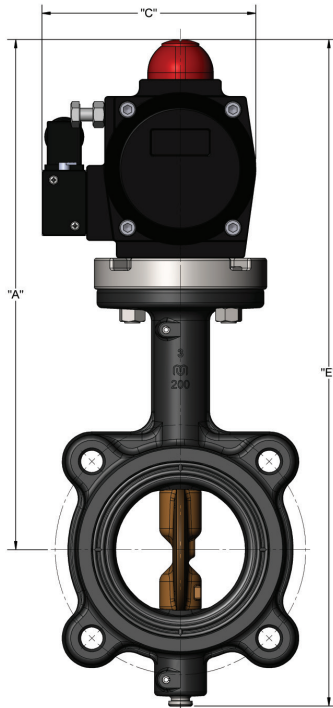


ABS Type Approved;  
Cat. A  
CFR-46



Tested and Certified by  
IAPMO R&T to NSF/ANSI 372  
and NSF/ANSI 61

**Iron Butterfly Valve for Potable Water**  
**Lug Style**  
**200 psi Non-Shock WOG**  
**Bi-Directional Dead End Service to 200 psi Max**  
**Air to Air Pneumatic Actuator**  
**Specifications: API-609 MSS SP-67 Type 1**



- Cast Iron
- Lug Pattern
- Aluminum Bronze Disc
- EPDM Liner
- 200 WOG
- Temp Range: 0° to 250° F for HVAC service
- Double-acting actuator sized for 80 psi air supply
- 120V NEMA 4/4x NAMUR mounted solenoid
- For on/off service

**DIMENSIONS**

AIR TO AIR ACTUATOR ASSEMBLY						
Valve	Model	Dimensions in Inches				
Size	Actuator	A "	B "	C "	D "	E "
2	MC3C	10.48	6.61	2.83	1.69	13.54
2 1/2	MC3C	10.98	6.61	2.83	1.81	14.29
3	MC3C	11.23	6.61	2.83	1.81	14.98
4	MC5C	12.45	7.24	3.19	2.07	16.70
5	MC5C	12.98	7.24	3.19	2.19	17.92
6	MC10C	14.14	10.31	3.86	2.19	19.70
8	MC29C	17.70	11.65	5.02	2.38	23.26
10	MC29C	18.88	11.65	5.02	2.69	26.76
12	MC58C	21.97	18.03	6.22	3.06	31.22

**Note:** Lead free refers to the wetted surface of the pipe, fittings and fixtures in potable water systems that have a weighted average lead content  $\leq 0.25\%$ . Source: California Health and Safety Code (116875).

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**Ultra Pure**  
BY MILWAUKEE VALVE  
**CLB23E 2"-12"**

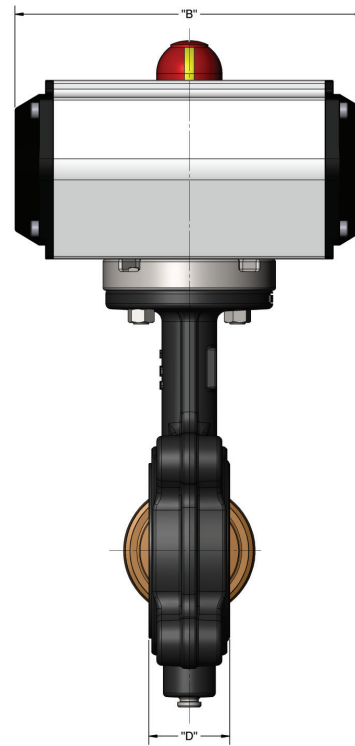
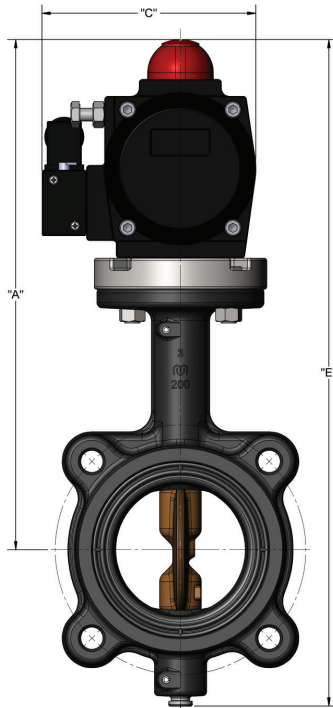


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Cat. A  
CFR-46



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IAPMO R&T to NSF/ANSI 372  
and NSF/ANSI 61

**Iron Butterfly Valve for Potable Water**  
**Lug Style**  
**200 psi Non-Shock WOG**  
**Bi-Directional Dead End Service to 200 psi Max**  
**Spring Return Pneumatic Actuator**  
**Specifications: API-609 MSS SP-67 Type 1**



- Cast Iron
- Lug Pattern
- Aluminum Bronze Disc
- EPDM Liner
- 200 WOG
- Temp Range: 0° to 250° F for HVAC service
- Spring return fail closed actuator
- 120V NEMA 4/4x NAMUR mounted solenoid
- For on/off service

**DIMENSIONS**

SPRING RETURN ACTUATOR ASSEMBLY						
Valve	Model	Dimensions in Inches				
Size	Actuator	A "	B "	C "	D "	E "
2	MC3S4C	10.48	6.61	2.83	1.69	13.54
2 1/2	MC3S4C	10.98	6.61	2.83	1.81	14.29
3	MC5S4C	11.70	7.24	3.19	1.81	15.45
4	MC10S4C	13.14	10.31	3.86	2.07	17.39
5	MC14S4C	15.55	10.55	4.31	2.19	20.49
6	MC29S4C	16.89	11.65	5.02	2.19	22.45
8	MC58S4C	19.35	18.03	6.22	2.38	24.91
10	MC58S4C	20.53	18.03	6.22	2.69	28.41
12	MC121S4C	27.22	22.20	8.27	3.06	36.47

**Note:** Lead free refers to the wetted surface of the pipe, fittings and fixtures in potable water systems that have a weighted average lead content  $\leq 0.25\%$ . Source: California Health and Safety Code (116875).

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**Ultra Pure**  
BY MILWAUKEE VALVE  
**CLC23E 2"-12"**

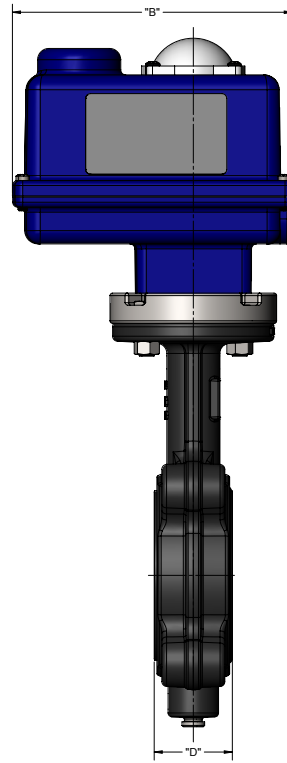
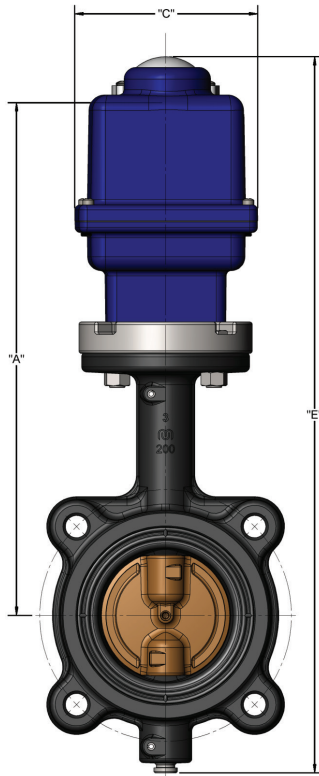


ABS Type Approved;  
Cat. A  
CFR-46



Tested and Certified by  
IAPMO R&T to NSF/ANSI 372  
and NSF/ANSI 61

**Iron Butterfly Valve for Potable Water**  
**Lug Style**  
**200 psi Non-Shock WOG**  
**Bi-Directional Dead End Service to 200 psi Max**  
**Electric Actuator**  
**Specifications: API-609 MSS SP-67 Type 1**



- Cast Iron
- Lug Pattern
- Aluminum Bronze Disc
- EPDM Liner
- 200 WOG
- Temp Range: 0° to 250° F for HVAC service
- 120VAC NEMA 4 rated electric actuator
- 25% duty cycle
- For on/off service
- Two limit switches
- Manual override
- Visual position indicator

**DIMENSIONS**

120 VAC ELECTRIC ACTUATOR ASSEMBLY						
Valve	Model	Dimensions in Inches				
Size	Actuator	A "	B "	C "	D "	E "
2	MCRB200I	12.55	6.88	4.25	1.69	15.61
2 1/2	MCRB200I	13.05	6.88	4.25	1.81	16.36
3	MCRB200I	13.30	6.88	4.25	1.81	17.05
4	MCRB675I	18.26	7.00	7.00	2.07	22.51
5	MCRB675I	19.15	7.00	7.00	2.19	24.09
6	MCRB1000I	19.62	7.00	7.00	2.19	25.18
8	MCRB1500I	21.00	7.00	7.00	2.38	26.56
10	AT25-25	18.93	16.25	27.38	2.69	26.81
12	AT50-25	25.30	16.25	28.38	3.06	34.55

**Note:** Lead free refers to the wetted surface of the pipe, fittings and fixtures in potable water systems that have a weighted average lead content  $\leq 0.25\%$ . Source: California Health and Safety Code (116875).

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# Iron Butterfly Valve for Potable Water Lug Style

200 psi Non-Shock WOG

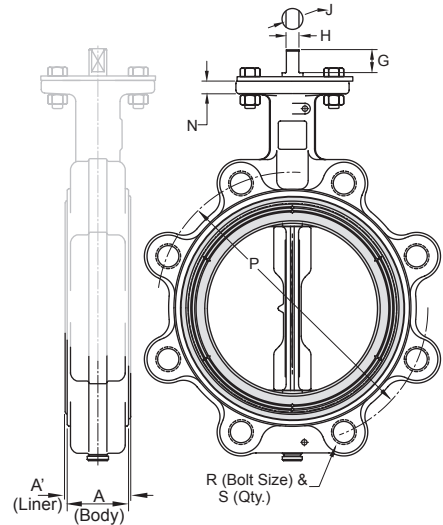
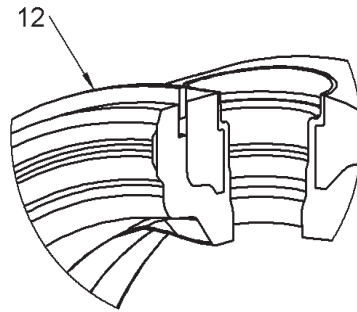
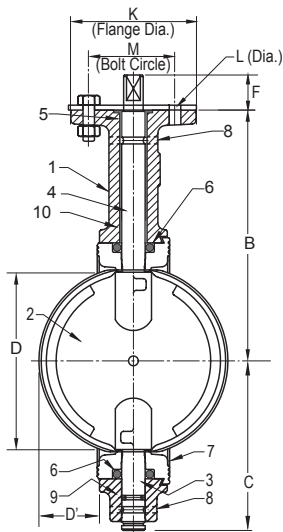
# ML133E/ML233E/ML333E 2"-12" Bi-Directional Dead End Service to 200 psi Max Specifications: API-609 MSS SP-67 Type 1



ABS Type Approved;  
Cat. A  
CFR-46



Tested and Certified by  
IAFMR&T to NSF/ANSI 372  
and NSF/ANSI 61



## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	DUCTILE IRON ASTM A536
2	DISC	ALUMINUM BRONZE ASTM B148
3	BOTTOM STEM	STAINLESS STEEL TYPE 416
4	TOP STEM	STAINLESS STEEL TYPE 416
5	TOP BEARING	REINFORCED NYLON
6	SEAL	EPDM
7	LINER	EPDM
8	ROLL PIN	STAINLESS STEEL
9	STEM SEAL	EPDM
10	LOWER BEARING	REINFORCED NYLON
11	OPERATOR	LEVER HANDLE
		GEAR OPERATOR
		GEAR OPERATOR WITH MEMORY STOP
		GEAR OPERATOR WITH LOCK
		ACTUATOR-AIR/AIR
		ACTUATOR-AIR/SPRING
ACTUATOR-ELECTRIC		
12	RETAINING RING	1066 SPRING STEEL (65Mn)

## DIMENSIONS

	INCHES DN	VALVE SIZE									
		2	2-1/2	3	4	5	6	8	10	12	
A (Body)	INCHES	1.69	1.81	1.81	2.07	2.19	2.19	2.38	2.69	3.06	
	mm	43	46	46	52	55	55	60	68	78	
A <sup>1</sup> (Body)	INCHES	1.82	1.94	1.94	2.20	2.32	2.32	2.51	2.82	3.21	
	mm	46	49	49	55	58	58	63	71	82	
B	INCHES	5.50	6.00	6.25	7.00	7.53	8.00	9.38	10.56	12.06	
	mm	139	152	158	177	191	203	238	268	306	
C	INCHES	3.06	3.31	3.75	4.25	4.94	5.56	5.56	7.88	9.25	
	mm	77	84	95	108	125	141	166	200	235	
D (Chord Dia)	INCHES	1.49	2.01	2.64	3.67	4.71	5.66	7.72	9.70	11.68	
	mm	37	51	67	93	119	143	196	246	296	
D <sup>1</sup> (Intrusion)	INCHES	0.28	0.44	0.69	1.06	1.50	1.94	2.84	3.69	4.50	
	mm	7	11	17	27	38	49	72	93	114	
F	INCHES	1.13	1.13	1.13	1.13	1.13	1.13	1.50	1.50	1.50	
	mm	28	28	28	28	28	28	38	38	38	
G	INCHES	0.81	0.81	0.81	0.81	0.81	0.81	1.06	1.06	1.06	
	mm	20	20	20	20	20	20	27	27	27	
H	INCHES	0.35	0.35	0.35	0.40	0.40	0.44	0.53	0.71	0.71	
	mm	8	8	8	10	10	11	13	18	18	
J	INCHES	0.50	0.50	0.50	0.56	0.56	0.62	0.75	1.00	1.00	
	mm	12	12	12	14	14	14	19	25	25	
K	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.56	0.56	0.56	
	mm	11	11	11	11	11	11	14	14	14	
L (Dia)	INCHES	3.25	3.25	3.25	3.25	3.25	3.25	5.00	5.00	5.00	
	mm	82	82	82	82	82	82	127	127	127	
M	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.50	0.50	0.50	
	mm	11	11	11	11	11	11	12	12	12	
N	INCHES	4.75	5.50	6.00	7.50	8.50	9.50	11.75	14.25	17.00	
	mm	120	139	152	190	215	241	298	362	431	
P	INCHES	5/8-11	5/8-11	5/8-11	5/8-11	3/4-10	3/4-10	3/4-10	7/8-9	7/8-9	
	mm	4	4	4	8	8	8	8	12	12	
R	INCHES	4	4	4	8	8	8	8	12	12	
	mm	4	4	4	8	8	8	8	12	12	
S	INCHES	4	4	4	8	8	8	8	12	12	
	mm	4	4	4	8	8	8	8	12	12	

**Note:** Lead free refers to the wetted surface of the pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%. Source: California Health and Safety Code (116875).

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# ML133E/ML333E 14"-24"

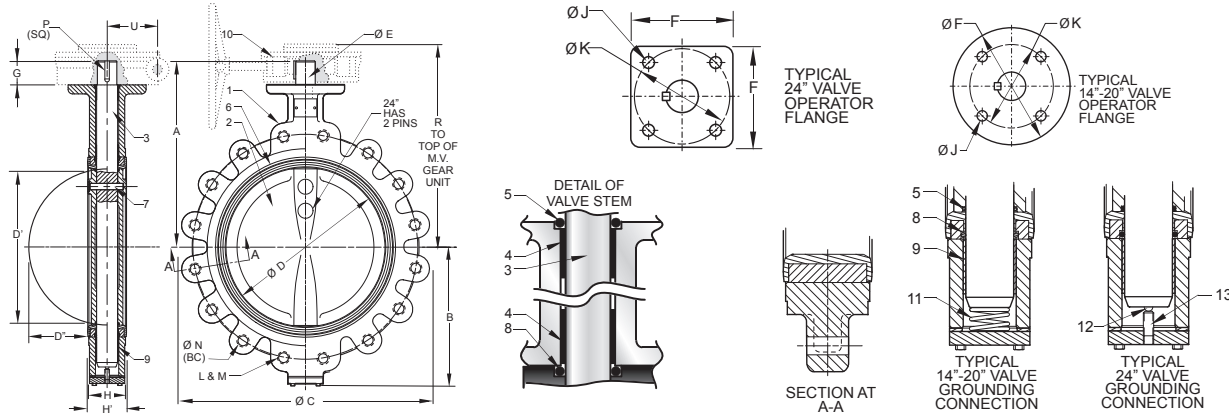


ABS Type Approved;  
Cat. A  
CFR-46



Tested and Certified by  
IAFMR&T to NSF/ANSI 372  
and NSF/ANSI 61

**Iron Butterfly Valve for Potable Water**  
**Lug Style**  
**150 psi Non-Shock WOG**  
**Dead End Service to 150 psi Max\***  
**Specifications: MSS SP-67 Type 1**



## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	DUCTILE IRON ASTM A536
2	DISC	ALUMINUM BRONZE ASTM B148
3	STEM	STAINLESS STEEL TYPE 416
4	TOP BEARING	REINFORCED NYLON
5	STEM O-RING	EPDM
6	LINER	EPDM
7	STEM PIN	ANSI 4140 OR AISI 6150
8	LINER O-RING	EPDM
9	LOWER BEARING	REINFORCED NYLON
10	OPERATOR	GEAR OPERATOR
		GEAR OPERATOR WITH MEMORY STOP
		GEAR OPERATOR WITH LOCK
		ACTUATOR-AIR/AIR (1)
		ACTUATOR-AIR/SPRING (1)
11	GROUNDING SPRING	14"-20"
		24" Only
12	GROUNDING BALL	AISI-1022
13	TENSION SCREW	AISI-1020

(1)- Consult Automation Department.  
\*Uni-directional

## DIMENSIONS

	INCHES DN	VALVE SIZE				
		14	16	18	20	24
A	INCHES	15.50	16.75	18.50	19.75	22.43
	mm	398	425	469	501	569
B	INCHES	11.56	12.69	13.63	15.13	18.06
	mm	258	322	346	384	458
C	INCHES	21.00	23.50	25.00	27.50	32.10
	mm	533	596	635	698	815
D	INCHES	13.25	15.25	17.24	19.24	23.25
	mm	336	387	438	489	591
D <sup>1</sup> (Chord Dia.)	INCHES	12.94	14.77	16.70	18.64	22.49
	mm	329	375	424	474	571
D <sup>11</sup> (Intrusion)	INCHES	5.06	5.59	6.34	7.09	8.55
	mm	128	142	161	180	217
E	INCHES	1.63	1.63	2.13	2.13	2.13
	mm	41	41	54	54	54
F	INCHES	6.50	6.50	9.50	9.50	7.50
	mm	165	165	241	241	190
G	INCHES	2.00	2.00	3.00	3.00	3.06
	mm	50	50	76	76	77
H (Body)	INCHES	3.06	4.00	4.50	5.00	6.06
	mm	77	101	114	127	153
H <sup>1</sup> (Liner)	INCHES	3.19	4.13	4.63	5.13	6.19
	mm	81	104	117	130	157
J	INCHES	0.69	0.69	0.81	0.81	0.81
	mm	17	17	20	20	20
K	INCHES	5.25	5.25	7.50	7.50	7.50
	mm	133	133	190	190	190
L	No. of Holes	12	16	16	20	20
	Thread Size	1-8	1-8	1 1/8-7	1 1/8-7	1 1/4-7
N	INCHES	18.75	21.25	22.75	25.00	29.50
	mm	476	540	577	635	749
P (Key Size)	INCHES	0.38	0.38	0.50	0.50	0.50
	mm	9	9	12	12	12
R	INCHES	17.25	18.75	19.63	20.88	25.00
	mm	438	475	458	530	635
U	INCHES	3.13	3.13	4.50	4.50	4.63
	mm	79	79	114	114	117

**Note:** Lead free refers to the wetted surface of the pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%. Source: California Health and Safety Code (116875).

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# CL Series-Rev. D 2"-12" Bi-Directional Dead End Service to 200 psi Max

Iron Butterfly Valve for Potable Water  
Lug Style

200 psi Non-Shock WOG

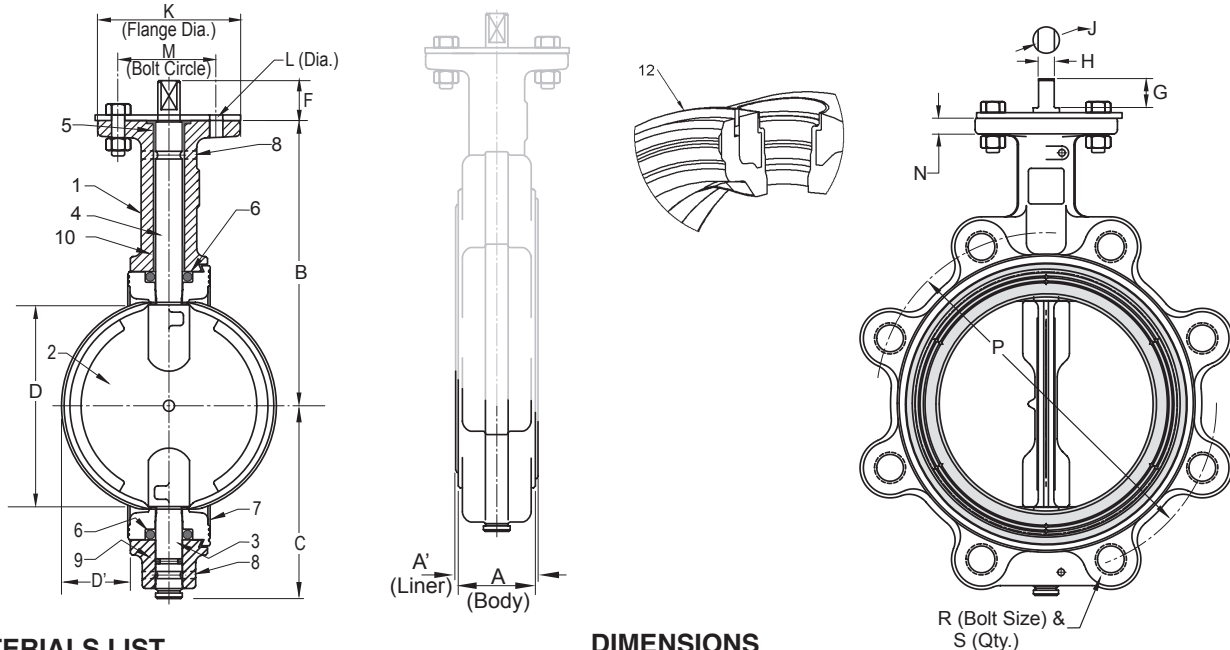
Specifications: API-609 MSS SP-67 Type 1



ABS Type Approved;  
Cat. A  
CFR-46



Tested and Certified by  
IAPMO R&T to NSF/ANSI 372  
and NSF/ANSI 61



## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	CAST IRON ASTM A126 CL B
2	DISC	ALUMINUM BRONZE ASTM B148
3	BOTTOM STEM	STAINLESS STEEL TYPE 416
4	TOP STEM	STAINLESS STEEL TYPE 416
5	TOP BEARING	REINFORCED NYLON
6	SEAL	EPDM
7	LINER	EPDM
8	ROLL PIN	STAINLESS STEEL
9	STEM SEAL	EPDM
10	LOWER BEARING	REINFORCED NYLON
11	OPERATOR	LEVER HANDLE GEAR OPERATOR
12	RETAINING RING	ST1066 SPRING STEEL (65Mn)

## DIMENSIONS

	INCHES DN	VALVE SIZE								
		2	2-1/2	3	4	5	6	8	10	12
A (Body)	INCHES	1.69	1.81	1.81	2.07	2.19	2.19	2.38	2.69	3.06
	mm	43	46	46	52	55	55	60	68	78
A <sup>1</sup> (Liner)	INCHES	1.82	1.94	1.94	2.20	2.32	2.32	2.51	2.82	3.21
	mm	46	49	49	55	58	58	63	71	82
B	INCHES	5.50	6.00	6.25	7.00	7.53	8.00	9.38	10.56	12.06
	mm	139	152	158	177	191	203	238	268	306
C	INCHES	3.06	3.31	3.75	4.25	4.94	5.56	5.56	7.88	9.25
	mm	77	84	95	108	125	141	166	200	235
D (Chord Dia)	INCHES	1.49	2.01	2.64	3.67	4.71	5.66	7.72	9.70	11.68
	mm	37	51	67	93	119	143	196	246	296
D <sup>1</sup> (Intrusion)	INCHES	0.28	0.44	0.69	1.06	1.50	1.94	2.84	3.69	4.50
	mm	7	11	17	27	38	49	72	93	114
F	INCHES	1.13	1.13	1.13	1.13	1.13	1.13	1.50	1.50	1.50
	mm	28	28	28	28	28	28	38	38	38
G	INCHES	0.81	0.81	0.81	0.81	0.81	0.81	1.06	1.06	1.06
	mm	20	20	20	20	20	20	27	27	27
H	INCHES	0.35	0.35	0.35	0.40	0.40	0.44	0.53	0.71	0.71
	mm	8	8	8	10	10	11	13	18	18
J	INCHES	0.50	0.50	0.50	0.56	0.56	0.62	0.75	1.00	1.00
	mm	12	12	12	14	14	14	19	25	25
K	INCHES	4	4	4	4	4	4	6	6	6
	mm	101.6	101.6	101.6	101.6	101.6	101.6	152.4	152.4	152.4
L (Dia)	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.56	0.56	0.56
	mm	11	11	11	11	11	11	14	14	14
M	INCHES	3.25	3.25	3.25	3.25	3.25	3.25	5.00	5.00	5.00
	mm	82	82	82	82	82	82	127	127	127
N	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.50	0.50	0.50
	mm	11	11	11	11	11	11	12	12	12
P	INCHES	4.75	5.50	6.00	7.50	8.50	9.50	11.75	14.25	17.00
	mm	120	139	152	190	215	241	298	362	431
R	INCHES	5/8-11	5/8-11	5/8-11	5/8-11	3/4-10	3/4-10	3/4-10	7/8-9	7/8-9
	mm	15.875	15.875	15.875	15.875	19.0	19.0	19.0	19.0	19.0
S	INCHES	4	4	4	8	8	8	8	12	12
	mm	101.6	101.6	101.6	203.2	203.2	203.2	203.2	304.8	304.8

**Note:** Lead free refers to the wetted surface of the pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%. Source: California Health and Safety Code (116875).

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⚠ State of California Prop 65 **WARNING:** Cancer and Reproductive Harm. For more information visit [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov).



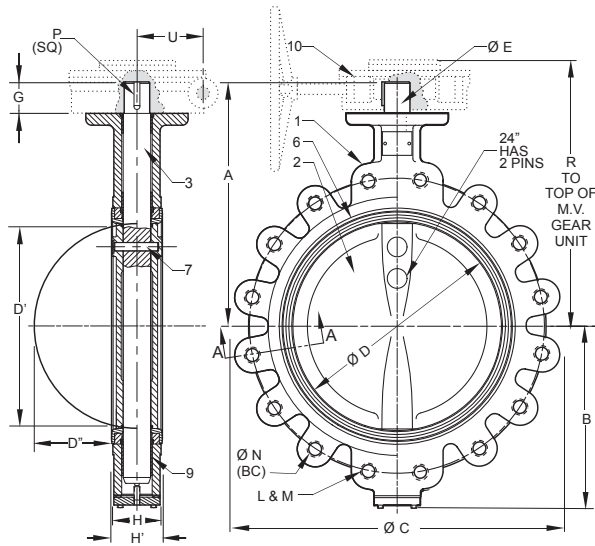
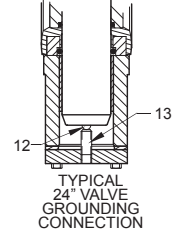
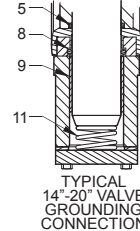
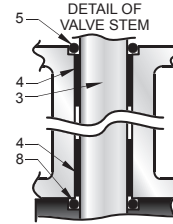
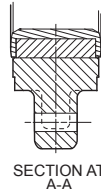
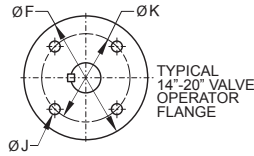
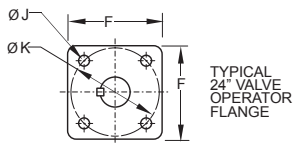


ABS Type Approved;  
Cat. A  
CFR-46



Tested and Certified by  
IAPMO R&T to NSF/ANSI 372  
and NSF/ANSI 61

**Iron Butterfly Valve for Potable Water**  
**Lug Style**  
**150 psi Non-Shock WOG**  
**Dead End Service to 150 psi Max\***  
**Specifications: MSS SP-67 Type 1**



## DIMENSIONS

	VALVE SIZE					
	INCHES DN	14	16	18	20	24
A	INCHES	15.50	16.75	18.50	19.75	22.43
	mm	398	425	469	501	569
B	INCHES	11.56	12.69	13.63	15.13	18.06
	mm	258	322	346	384	458
C	INCHES	21.00	23.50	25.00	27.50	32.10
	mm	533	596	635	698	815
D	INCHES	13.25	15.25	17.24	19.24	23.25
	mm	336	387	438	489	591
D <sup>1</sup> (Chord Dia.)	INCHES	12.94	14.77	16.70	18.64	22.49
	mm	329	375	424	474	571
D <sup>11</sup> (Intrusion)	INCHES	5.06	5.59	6.34	7.09	8.55
	mm	128	142	161	180	217
E	INCHES	1.63	1.63	2.13	2.13	2.13
	mm	41	41	54	54	54
F	INCHES	6.50	6.50	9.50	9.50	7.50
	mm	165	165	241	241	190
G	INCHES	2.00	2.00	3.00	3.00	3.06
	mm	50	50	76	76	77
H (Body)	INCHES	3.06	4.00	4.50	5.00	6.06
	mm	77	101	114	127	153
H <sup>1</sup> (Liner)	INCHES	3.19	4.13	4.63	5.13	6.19
	mm	81	104	117	130	157
J	INCHES	0.69	0.69	0.81	0.81	0.81
	mm	17	17	20	20	20
K	INCHES	5.25	5.25	7.50	7.50	7.50
	mm	133	133	190	190	190
L	No. of Holes	12	16	16	20	20
	Thread Size	1-8	1-8	1 1/8-7	1 1/8-7	1 1/4-7
M	INCHES	18.75	21.25	22.75	25.00	29.50
	mm	476	540	577	635	749
N	INCHES	0.38	0.38	0.50	0.50	0.50
	mm	9	9	12	12	12
P (Key Size)	INCHES	17.25	18.75	19.63	20.88	25.00
	mm	438	476	458	530	635
R	INCHES	3.13	3.13	4.50	4.50	4.63
	mm	79	79	114	114	117

## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	CAST IRON ASTM A126 CL. B
2	DISC	ALUMINUM BRONZE ASTM B148
3	STEM	STAINLESS STEEL TYPE 416
4	TOP BEARING	REINFORCED NYLON
5	STEM O-RING	EPDM
6	LINER	EPDM
7	STEM PIN	ANSI 4140 OR AISI 6150
8	LINER O-RING	EPDM
9	LOWER BEARING	REINFORCED NYLON
10	OPERATOR	GEAR OPERATOR
11	GROUNDING SPRING	STAINLESS STEEL TYPE 302
12	GROUNDING BALL	AISI-1022
13	TENSION SCREW	AISI-1020

\* Uni-directional

**Note:** Lead free refers to the wetted surface of the pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%. Source: California Health and Safety Code (116875).

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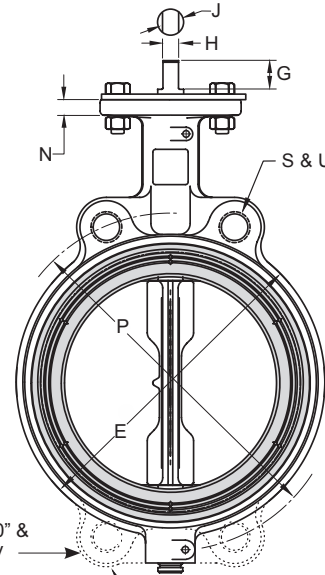
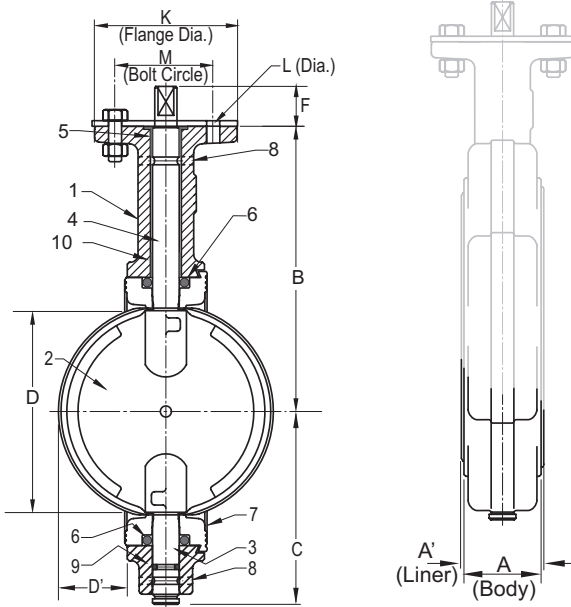


# CW Series 2"-12"



ABS Type Approved; Cat. A  
CFR-46

**Iron Butterfly Valve  
Wafer Style  
200 psi Non-Shock WOG  
Specifications: API-609 MSS SP-67 Type 1**



## DIMENSIONS

### MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	CAST IRON ASTM A126 CL.B
2	DISC	ALUMINUM BRONZE ASTM B148
3	BOTTOM STEM	STAINLESS STEEL TYPE 416
4	TOP STEM	STAINLESS STEEL TYPE 416
5	TOP BEARING	REINFORCED NYLON
6	SEAL	EPDM
7	LINER	EPDM
8	ROLL PIN	STAINLESS STEEL
9	STEM SEAL	EPDM
10	LOWER BEARING	REINFORCED NYLON
11	OPERATOR	LEVER HANDLE GEAR OPERATOR

	VALVE SIZE									
	INCHES DN	2	2-1/2	3	4	5	6	8	10	12
A (Body)	INCHES	1.69	1.81	1.81	2.07	2.19	2.19	2.38	2.69	3.06
	mm	43	46	46	52	55	55	60	68	78
A <sup>1</sup> (Liner)	INCHES	1.82	1.94	1.94	2.20	2.32	2.32	2.51	2.82	3.21
	mm	46	49	49	55	58	58	63	71	82
B	INCHES	5.50	6.00	6.25	7.00	7.53	8.00	9.38	10.56	12.06
	mm	139	152	158	177	191	203	238	268	306
C	INCHES	3.06	3.31	3.75	4.25	4.94	5.56	5.56	7.88	9.25
	mm	77	84	95	108	125	141	166	200	235
D (Chord Dia)	INCHES	1.49	2.01	2.64	3.67	4.71	5.66	7.72	9.70	11.68
	mm	37	51	67	93	119	143	196	246	296
D <sup>1</sup> (Intrusion)	INCHES	0.28	0.44	0.69	1.06	1.50	1.94	2.84	3.69	4.50
	mm	7	11	17	27	38	49	72	93	114
E	INCHES	4.13	4.88	5.38	6.88	7.75	8.75	11.00	13.38	16.13
	mm	105	124	137	175	197	222	279	340	410
F	INCHES	1.13	1.13	1.13	1.13	1.13	1.13	1.50	1.50	1.50
	mm	28	28	28	28	28	28	38	38	38
G	INCHES	0.81	0.81	0.81	0.81	0.81	0.81	1.06	1.06	1.06
	mm	20	20	20	20	20	20	27	27	27
H	INCHES	0.35	0.35	0.35	0.40	0.40	0.44	0.53	0.71	0.71
	mm	8	8	8	10	10	11	13	18	18
J	INCHES	0.50	0.50	0.50	0.56	0.56	0.62	0.75	1.00	1.00
	mm	12	12	12	14	14	14	19	25	25
K	INCHES	4	4	4	4	4	4	6	6	6
	mm	101.6	101.6	101.6	101.6	101.6	101.6	152.4	152.4	152.4
L (Dia)	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.56	0.56	0.56
	mm	11	11	11	11	11	11	14	14	14
M	INCHES	3.25	3.25	3.25	3.25	3.25	3.25	5.00	5.00	5.00
	mm	82	82	82	82	82	82	127	127	127
N	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.50	0.50	0.50
	mm	11	11	11	11	11	11	12	12	12
P	INCHES	4.75	5.50	6.00	7.50	8.50	9.50	11.75	14.25	17.00
	mm	120	139	152	190	215	241	298	362	431
R	Flange Bolt Size	5/8-11	5/8-11	5/8-11	5/8-11	3/4-10	3/4-10	3/4-10	7/8-9	7/8-9
S	No. of Holes	2	2	2	2	2	2	2	4	4
U (Hole Dia.)	INCHES	0.75	0.75	0.75	0.75	0.88	0.88	0.88	1.00	1.00
	mm	19	19	19	19	22	22	22	25	25

**Note:** The wetted surface of this product (In any material combination.) contacted by consumable water contains less than one quarter of one percent (.25%) of lead by weight.

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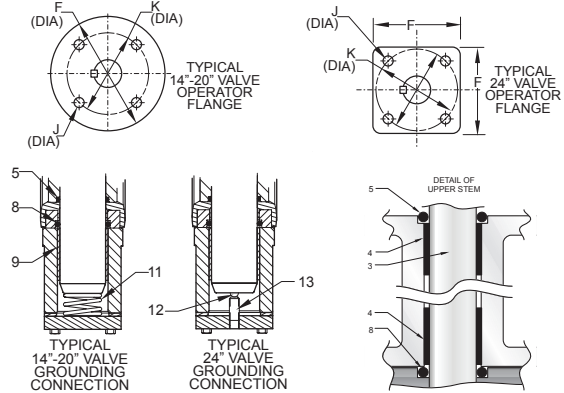
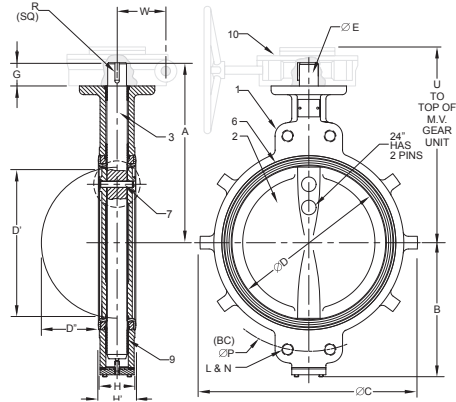


# CW Series 14"-24"



ABS Type Approved; Cat. A  
CFR-46

**Iron Butterfly Valve  
Wafer Style  
150 psi Non-Shock WOG  
Specifications: MSS SP-67 Type 1**



## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	CAST IRON ASTM A126 CL. B
2	DISC	ALUMINUM BRONZE ASTM B148
3	STEM	STAINLESS STEEL TYPE 416
4	TOP BEARING	REINFORCED NYLON
5	STEM O-RING	EPDM
6	LINER	EPDM
7	STEM PIN	ANSI 4140 OR AISI 6150
8	LINER O-RING	EPDM
9	LOWER BEARING	REINFORCED NYLON
10	OPERATOR	GEAR OPERATOR
		GEAR OPERATOR WITH MEMORY STOP
		GEAR OPERATOR WITH LOCK
11 14"-20"	GROUNDING SPRING	STAINLESS STEEL TYPE 302
12 24" Only	GROUNDING BALL	AISI-1022
13 24" Only	TENSION SCREW	AISI-1020

## DIMENSIONS

	VALVE SIZE					
	INCHES DN	14	16	18	20	24
A	INCHES	15.50	16.75	18.50	19.75	22.43
	mm	398	425	469	501	569
B	INCHES	11.56	12.69	13.63	15.13	18.06
	mm	258	322	346	384	458
C	INCHES	21.00	23.50	25.00	27.50	32.10
	mm	533	596	635	698	815
D	INCHES	13.25	15.25	17.24	19.24	23.25
	mm	336	387	438	489	591
D <sup>1</sup> (Chord Dia.)	INCHES	12.94	14.77	16.70	18.64	22.49
	mm	329	375	424	474	571
D <sup>11</sup> (Intrusion)	INCHES	5.06	5.59	6.34	7.09	8.55
	mm	128	142	161	180	217
E	INCHES	1.63	1.63	2.13	2.13	2.13
	mm	41	41	54	54	54
F	INCHES	6.50	6.50	9.50	9.50	7.50
	mm	165	165	241	241	190
G	INCHES	2.00	2.00	3.00	3.00	3.06
	mm	50	50	76	76	77
H (Body)	INCHES	3.06	4.00	4.50	5.00	6.06
	mm	77	101	114	127	153
H <sup>1</sup> (Liner)	INCHES	3.19	4.13	4.63	5.13	6.19
	mm	81	104	117	130	157
J	INCHES	0.69	0.69	0.81	0.81	0.81
	mm	17	17	20	20	20
K	INCHES	5.25	5.25	7.50	7.50	7.50
	mm	133	133	190	190	190
L	No. of Holes	4	4	4	4	4
M	Flange Bolt Size	1-8	1-8	1 1/8-7	1 1/8-7	1 1/4-7
		mm	25	25	29	29
N	INCHES	18.75	21.25	22.75	25.00	29.50
	mm	476	540	577	635	749
P	INCHES	0.38	0.38	0.50	0.50	0.50
	mm	9	9	12	12	12
U	INCHES	17.25	18.75	19.63	20.88	25.00
	mm	438	476	458	530	635
W	INCHES	3.13	3.13	4.50	4.50	4.63
	mm	79	79	114	114	117

**Note:** The wetted surface of this product (In any material combination.) contacted by consumable water contains less than one quarter of one percent (.25%) of lead by weight.

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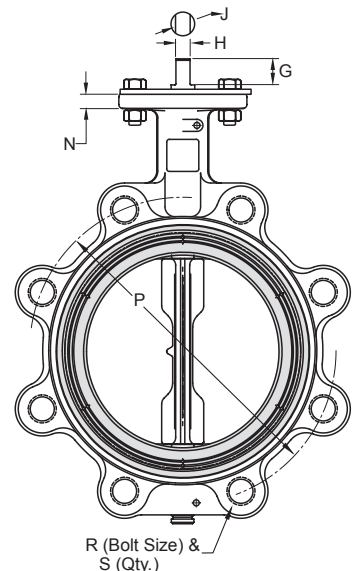
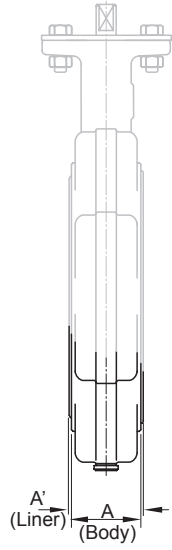
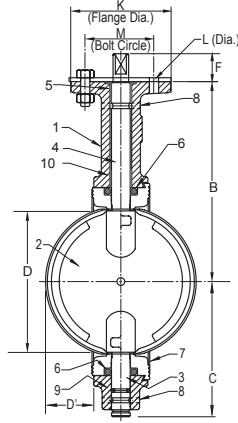


# HL Series 2"-12"



ABS Type Approved; Cat. A  
CFR-46

**Iron Butterfly Valve  
Lug Style  
250 psi Non-Shock WOG  
Dead End Service to 200 psi Max\*  
Specifications: API-609 MSS SP-67 Type 1**



## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	DUCTILE IRON ASTM A536
		DUCTILE IRON-EPOXY COATED
2	DISC	NP DUCTILE IRON ASTM A536
		ALUMINUM BRONZE ASTM B148
		STAINLESS STEEL TYPE 316
3	BOTTOM STEM	STAINLESS STEEL TYPE 416
		STAINLESS STEEL TYPE 316 (1)
4	TOP STEM	STAINLESS STEEL TYPE 416
		STAINLESS STEEL TYPE 316 (1)
5	TOP BEARING	REINFORCED NYLON
6	SEAL	EPDM, BUNA, VITON
7	LINER	BUNA
		EPDM
		VITON
8	ROLL PIN	STAINLESS STEEL
9	STEM SEAL	EPDM, BUNA, VITON
10	LOWER BEARING	REINFORCED NYLON
11	OPERATOR	LEVER HANDLE
		EPOXY COATED LEVER HANDLE
		GEAR OPERATOR
		GEAR OPERATOR WITH MEMORY STOP
		GEAR OPERATOR WITH LOCK
		ACTUATOR-AIR/AIR
		ACTUATOR-AIR/SPRING
ACTUATOR-ELECTRIC		

(1) - 316 Stem used with CF8M Disc

\* Uni-directional

## DIMENSIONS

		VALVE SIZE									
		2	2-1/2	3	4	5	6	8	10	12	
A (Body)	INCHES	1.69	1.81	1.81	2.07	2.19	2.19	2.38	2.69	3.06	
	mm	43	46	46	52	55	55	60	68	78	
A <sup>1</sup> (Liner)	INCHES	1.82	1.94	1.94	2.20	2.32	2.32	2.51	2.82	3.21	
	mm	46	49	49	55	58	58	63	71	82	
B	INCHES	5.50	6.00	6.25	7.00	7.53	8.00	9.38	10.56	12.06	
	mm	139	152	158	177	191	203	238	268	306	
C	INCHES	3.06	3.31	3.75	4.25	4.94	5.56	5.56	7.88	9.25	
	mm	77	84	95	108	125	141	166	200	235	
D (Chord Dia)	INCHES	1.49	2.01	2.64	3.67	4.71	5.66	7.72	9.70	11.68	
	mm	37	51	67	93	119	143	196	246	296	
D <sup>1</sup> (Intrusion)	INCHES	0.28	0.44	0.69	1.06	1.50	1.94	2.84	3.69	4.50	
	mm	7	11	17	27	38	49	72	93	114	
F	INCHES	1.13	1.13	1.13	1.13	1.13	1.13	1.50	1.50	1.50	
	mm	28	28	28	28	28	28	38	38	38	
G	INCHES	0.81	0.81	0.81	0.81	0.81	0.81	1.06	1.06	1.06	
	mm	20	20	20	20	20	20	27	27	27	
H	INCHES	0.35	0.35	0.35	0.40	0.40	0.44	0.53	0.71	0.71	
	mm	8	8	8	10	10	11	13	18	18	
J	INCHES	0.50	0.50	0.50	0.56	0.56	0.62	0.75	1.00	1.00	
	mm	12	12	12	14	14	14	19	25	25	
K	INCHES	4	4	4	4	4	4	6	6	6	
	mm	101.6	101.6	101.6	101.6	101.6	101.6	152.4	152.4	152.4	
L (Dia)	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.56	0.56	0.56	
	mm	11	11	11	11	11	11	14	14	14	
M	INCHES	3.25	3.25	3.25	3.25	3.25	3.25	5.00	5.00	5.00	
	mm	82	82	82	82	82	82	127	127	127	
N	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.50	0.50	0.50	
	mm	11	11	11	11	11	11	12	12	12	
P	INCHES	4.75	5.50	6.00	7.50	8.50	9.50	11.75	14.25	17.00	
	mm	120	139	152	190	215	241	298	362	431	
R	INCHES	5/8-11	5/8-11	5/8-11	5/8-11	3/4-10	3/4-10	3/4-10	7/8-9	7/8-9	
	mm	15.875	15.875	15.875	15.875	19.05	19.05	19.05	19.05	19.05	
S	INCHES	4	4	4	8	8	8	8	12	12	
	mm	101.6	101.6	101.6	203.2	203.2	203.2	203.2	304.8	304.8	

**Note:** The wetted surface of this product (In any material combination.) contacted by consumable water contains less than one quarter of one percent (.25%) of lead by weight.

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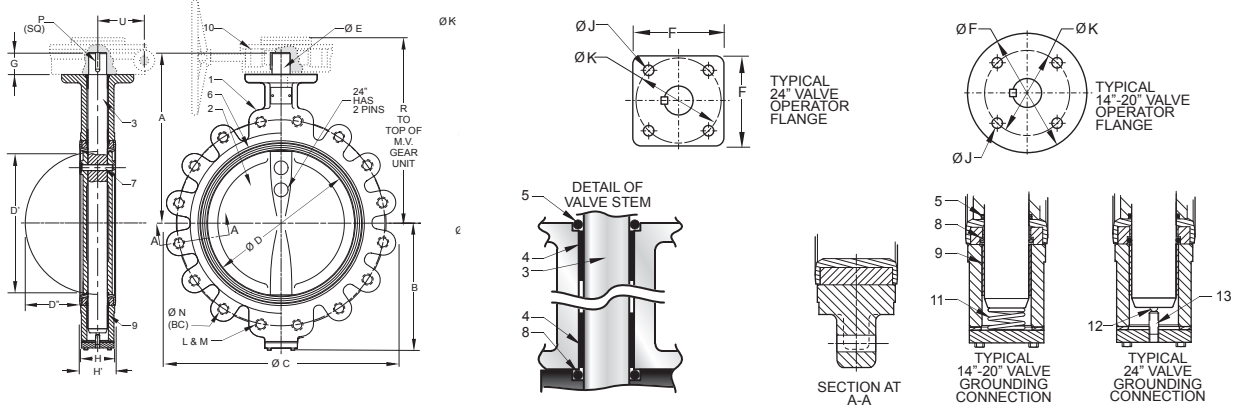
⚠ State of California Prop 65 **WARNING:** Cancer and Reproductive Harm. For more information visit [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov).





# HL Series 14"-24"

**Iron Butterfly Valve  
Lug Style  
200 psi Non-Shock WOG  
Dead End Service to 150 psi Max\*  
Specifications: MSS SP-67 Type 1**



## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	DUCTILE IRON ASTM A536
		DUCTILE IRON-EPOXY COATED
2	DISC	NP DUCTILE IRON ASTM A536
		ALUMINUM BRONZE ASTM B148
		STAINLESS STEEL ASTM A351 CF8M
3	STEM	STAINLESS STEEL TYPE 416
		STAINLESS STEEL TYPE 316 (2)
4	TOP BEARING	REINFORCED NYLON
5	STEM O-RING	EPDM, BUNA, VITON
6	LINER	BUNA
		EPDM
		VITON
7	STEM PIN	ANSI 4140 OR AISI 6150
8	LINER O-RING	EPDM, BUNA, VITON
9	LOWER BEARING	REINFORCED NYLON
10	OPERATOR	GEAR OPERATOR
		GEAR OPERATOR WITH MEMORY STOP
		GEAR OPERATOR WITH LOCK
		ACTUATOR-AIR/AIR (1)
		ACTUATOR-AIR/SPRING (1) ACTUATOR-ELECTRIC (1)
11	GROUNDING SPRING	STAINLESS STEEL TYPE 302
12	GROUNDING BALL	AISI-1022
13	TENSION SCREW	AISI-1020

## DIMENSIONS

		VALVE SIZE				
		INCHES	14	16	18	20
A	DN	352	406	457	508	610
	INCHES	15.50	16.75	18.50	19.75	22.43
B	INCHES	11.56	12.69	13.63	15.13	18.06
	mm	298	325	346	384	458
C	INCHES	21.00	23.50	25.00	27.50	32.10
	mm	533	596	635	698	815
D	INCHES	13.25	15.25	17.24	19.24	23.25
	mm	336	387	438	489	591
D <sup>1</sup> (Chord Dia.)	INCHES	12.94	14.77	16.70	18.64	22.49
	mm	329	375	424	474	571
D <sup>11</sup> (Intrusion)	INCHES	5.06	5.59	6.34	7.09	8.55
	mm	128	142	161	180	217
E	INCHES	1.63	1.63	2.13	2.13	2.13
	mm	41	41	54	54	54
F	INCHES	6.50	6.50	9.50	9.50	7.50
	mm	165	165	241	241	190
G	INCHES	2.00	2.00	3.00	3.00	3.06
	mm	50	50	76	76	77
H (Body)	INCHES	3.06	4.00	4.50	5.00	6.06
	mm	77	101	114	127	153
H <sup>1</sup> (Liner)	INCHES	3.19	4.13	4.63	5.13	6.19
	mm	81	104	117	130	157
J	INCHES	0.69	0.69	0.81	0.81	0.81
	mm	17	17	20	20	20
K	INCHES	5.25	5.25	7.50	7.50	7.50
	mm	133	133	190	190	190
L	No. of Holes	12	16	16	20	20
M	Thread Size	1-8	1-8	1 1/8-7	1 1/8-7	1 1/4-7
	INCHES	18.75	21.25	22.75	25.00	29.50
N	mm	476	540	577	635	749
	INCHES	0.38	0.38	0.50	0.50	0.50
P (Key Size)	mm	9	9	12	12	12
	INCHES	17.25	18.75	19.63	20.88	25.00
R	mm	438	476	458	530	635
	INCHES	3.13	3.13	4.50	4.50	4.63
U	mm	79	79	114	114	117

- (1) - Consult Automation Department  
 (2) - 316 Stainless Steel used with CF8M Disc  
 \* Uni-directional

**Note:** The wetted surface of this product (In any material combination.) contacted by consumable water contains less than one quarter of one percent (.25%) of lead by weight.

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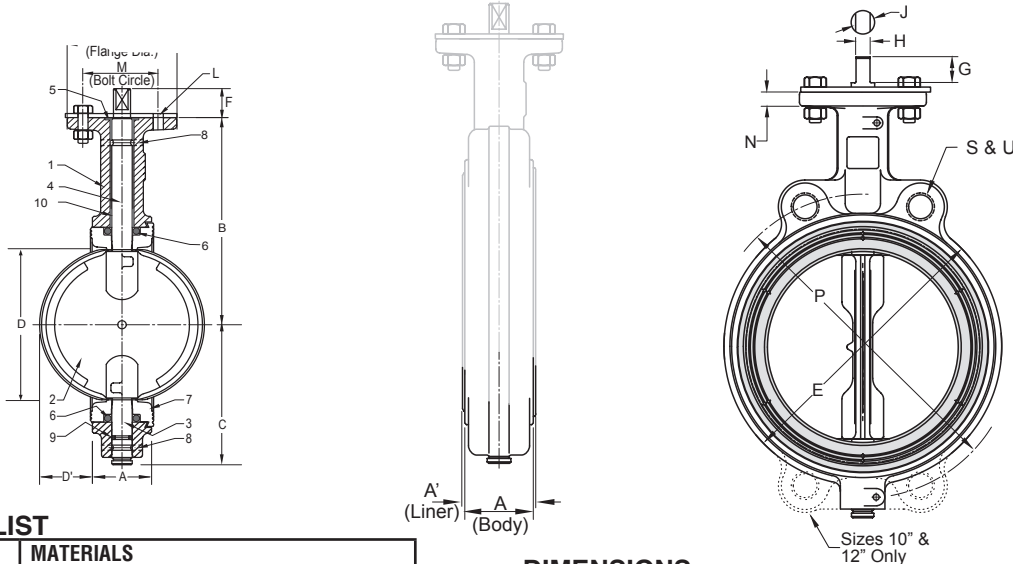


# HW Series 2"-12"



ABS Type Approved; Cat. A  
CFR-46

**Iron Butterfly Valve  
Wafer Style  
250 psi Non-Shock WOG  
Specifications: API-609 MSS SP-67 Type 1**



## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	DUCTILE IRON ASTM A536
		DUCTILE IRON-EPOXY COATED
2	DISC	NP DUCTILE IRON ASTM A536
		ALUMINUM BRONZE ASTM B148
		STAINLESS STEEL TYPE 316
3	BOTTOM STEM	STAINLESS STEEL TYPE 416
		STAINLESS STEEL TYPE 316 (1)
4	TOP STEM	STAINLESS STEEL TYPE 416
		STAINLESS STEEL TYPE 316 (1)
5	TOP BEARING	REINFORCED NYLON
6	SEAL	EPDM, BUNA, VITON
7	LINER	BUNA
		EPDM
		VITON
8	ROLL PIN	STAINLESS STEEL
9	STEM SEAL	EPDM, BUNA, VITON
10	LOWER BEARING	REINFORCED NYLON
11	OPERATOR	LEVER HANDLE
		EPOXY COATED LEVER HANDLE
		GEAR OPERATOR
		GEAR OPERATOR WITH MEMORY STOP
		GEAR OPERATOR WITH LOCK
		ACTUATOR-AIR/AIR
ACTUATOR-AIR/SPRING		
		ACTUATOR-ELECTRIC

(1) - 316 Stainless Steel used with CF8M Disc.

**Note:** The wetted surface of this product (In any material combination.) contacted by consumable water contains less than one quarter of one percent (.25%) of lead by weight.

## DIMENSIONS

	INCHES DN	VALVE SIZE								
		2	2-1/2	3	4	5	6	8	10	12
A (Body)	INCHES	1.69	1.81	1.81	2.07	2.19	2.19	2.38	2.69	3.06
	mm	43	46	46	52	55	55	60	68	78
A <sup>1</sup> (Liner)	INCHES	1.82	1.94	1.94	2.20	2.32	2.32	2.51	2.82	3.21
	mm	46	49	49	55	58	58	63	71	82
B	INCHES	5.50	6.00	6.25	7.00	7.53	8.00	9.38	10.56	12.06
	mm	139	152	158	177	191	203	238	268	306
C	INCHES	3.06	3.31	3.75	4.25	4.94	5.56	5.56	7.88	9.25
	mm	77	84	95	108	125	141	166	200	235
D (Chord Dia)	INCHES	1.49	2.01	2.64	3.67	4.71	5.66	7.72	9.70	11.68
	mm	37	51	67	93	119	143	196	246	296
D <sup>1</sup> (Intrusion)	INCHES	0.28	0.44	0.69	1.06	1.50	1.94	2.84	3.69	4.50
	mm	7	11	17	27	38	49	72	93	114
E	INCHES	4.13	4.88	5.38	6.88	7.75	8.75	11.00	13.38	16.13
	mm	105	124	137	175	197	222	279	340	410
F	INCHES	1.13	1.13	1.13	1.13	1.13	1.13	1.50	1.50	1.50
	mm	28	28	28	28	28	28	38	38	38
G	INCHES	0.81	0.81	0.81	0.81	0.81	0.81	1.06	1.06	1.06
	mm	20	20	20	20	20	20	27	27	27
H	INCHES	0.35	0.35	0.35	0.40	0.40	0.44	0.53	0.71	0.71
	mm	8	8	8	10	10	11	13	18	18
J	INCHES	0.50	0.50	0.50	0.56	0.56	0.62	0.75	1.00	1.00
	mm	12	12	12	14	14	14	19	25	25
K	INCHES	4	4	4	4	4	4	6	6	6
	mm	101.6	101.6	101.6	101.6	101.6	101.6	152.4	152.4	152.4
L (Dia)	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.56	0.56	0.56
	mm	11	11	11	11	11	11	14	14	14
M	INCHES	3.25	3.25	3.25	3.25	3.25	3.25	5.00	5.00	5.00
	mm	82	82	82	82	82	82	127	127	127
N	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.50	0.50	0.50
	mm	11	11	11	11	11	11	12	12	12
P	INCHES	4.75	5.50	6.00	7.50	8.50	9.50	11.75	14.25	17.00
	mm	120	139	152	190	215	241	298	362	431
R	Flange Bolt Size	5/8-11	5/8-11	5/8-11	5/8-11	3/4-10	3/4-10	3/4-10	7/8-9	7/8-9
S	No. of Holes	2	2	2	2	2	2	2	4	4
U (Hole Dia.)	INCHES	0.75	0.75	0.75	0.75	0.88	0.88	0.88	1.00	1.00
	mm	19	19	19	19	22	22	22	25	25

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# ML Series-REV. D 2"-12"

Iron Butterfly Valve

Lug Style

200 psi Non-Shock WOG

Bi-Directional Dead End Service to 200 psi Max\*

Specifications: API-609 MSS SP-67 Type 1



ABS Type Approved; Cat. A  
CFR-46

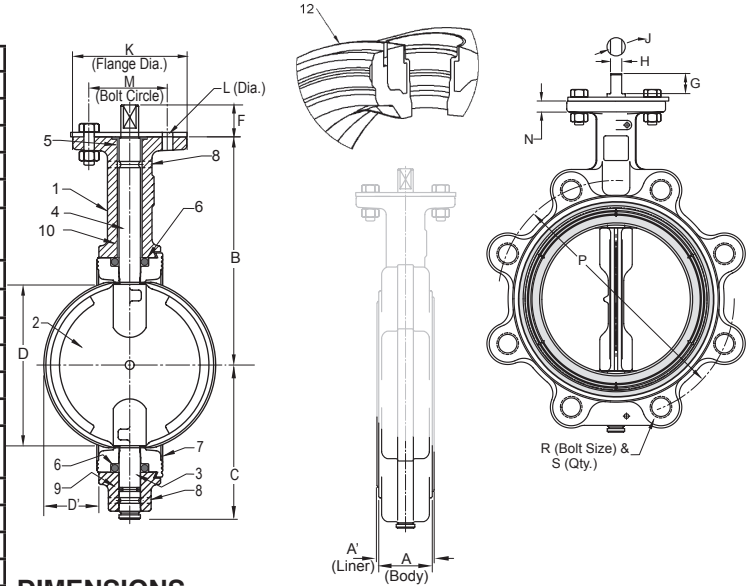
## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	CAST IRON ASTM A126 CL. B
		DUCTILE IRON ASTM A536
		DUCTILE IRON-EPOXY COATED
2	DISC	NP DUCTILE IRON ASTM A536
		ALUMINUM BRONZE ASTM B148
		STAINLESS STEEL ASTM A351 CF8M
		NYLON COATED DUCTILE IRON EPOXY COATED DUCTILE IRON
3	BOTTOM STEM	STAINLESS STEEL TYPE 416
		STAINLESS STEEL TYPE 316 (2)
4	TOP STEM	STAINLESS STEEL TYPE 416
		STAINLESS STEEL TYPE 316 (2)
5	TOP BEARING	REINFORCED NYLON
6	SEAL	EPDM, BUNA, VITON (1)
7	LINER	BUNA
		EPDM
		VITON
		HYPALON
		NEOPRENE BLACK-FDA
		NEOPRENE WHITE-FDA
		TEFLON OVER BUNA (150# WOG)
8	ROLL PIN	STAINLESS STEEL
9	STEM SEAL	EPDM, BUNA, VITON (1)
10	LOWER BEARING	REINFORCED NYLON
11	OPERATOR	LEVER HANDLE
		EPOXY COATED LEVER HANDLE
		GEAR OPERATOR
		GEAR OPERATOR WITH MEMORY STOP
		GEAR OPERATOR WITH LOCK
		ACTUATOR-AIR/AIR
		ACTUATOR-AIR/SPRING
		ACTUATOR-ELECTRIC
12*	RETAINING RING	1066 SPRING STEEL (65Mn)

(1) - VITON O-RINGS ARE USED WITH HYPALON, NEOPRENE, AND TEFLON LINERS.

(2) 316 STEM USED WITH CF8M DISC

\*EPDM AND BUNA LINER ONLY. ALL OTHER LINERS AND EPOXY COATED BODIES ARE UNI-DIRECTIONAL TO 150 psi.



## DIMENSIONS

	INCHES DN	VALVE SIZE									
		2	2-1/2	3	4	5	6	8	10	12	
A (Body)	INCHES	1.69	1.81	1.81	2.07	2.19	2.19	2.38	2.69	3.06	
	mm	43	46	46	52	55	55	60	68	78	
A <sup>1</sup> (Liner)	INCHES	1.82	1.94	1.94	2.20	2.32	2.32	2.51	2.82	3.21	
	mm	46	49	49	55	58	58	63	71	82	
B	INCHES	5.50	6.00	6.25	7.00	7.53	8.00	9.38	10.56	12.06	
	mm	139	152	158	177	191	203	238	268	306	
C	INCHES	3.06	3.31	3.75	4.25	4.94	5.56	5.56	7.88	9.25	
	mm	77	84	95	108	125	141	141	200	235	
D (Chord Dia)	INCHES	1.49	2.01	2.64	3.67	4.71	5.66	7.72	9.70	11.68	
	mm	37	51	67	93	119	143	196	246	296	
D <sup>1</sup> (Intrusion)	INCHES	0.28	0.44	0.69	1.06	1.50	1.94	2.84	3.69	4.50	
	mm	7	11	17	27	38	49	72	93	114	
F	INCHES	1.13	1.13	1.13	1.13	1.13	1.13	1.50	1.50	1.50	
	mm	28	28	28	28	28	28	38	38	38	
G	INCHES	0.81	0.81	0.81	0.81	0.81	0.81	1.06	1.06	1.06	
	mm	20	20	20	20	20	20	27	27	27	
H	INCHES	0.35	0.35	0.35	0.40	0.40	0.44	0.53	0.71	0.71	
	mm	8	8	8	10	10	11	13	18	18	
J	INCHES	0.50	0.50	0.50	0.56	0.56	0.62	0.75	1.00	1.00	
	mm	12	12	12	14	14	14	19	25	25	
K	INCHES	4	4	4	4	4	4	6	6	6	
	mm	101.6	101.6	101.6	101.6	101.6	101.6	152.4	152.4	152.4	
L (Dia)	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.56	0.56	0.56	
	mm	11	11	11	11	11	11	14	14	14	
M	INCHES	3.25	3.25	3.25	3.25	3.25	3.25	5.00	5.00	5.00	
	mm	82	82	82	82	82	82	127	127	127	
N	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.50	0.50	0.50	
	mm	11	11	11	11	11	11	12	12	12	
P	INCHES	4.75	5.50	6.00	7.50	8.50	9.50	11.75	14.25	17.00	
	mm	120	139	152	190	215	241	298	362	431	
R	INCHES	5/8-11	5/8-11	5/8-11	5/8-11	3/4-10	3/4-10	3/4-10	7/8-9	7/8-9	
	mm	15.875	15.875	15.875	15.875	19.0	19.0	19.0	19.0	19.0	
S	INCHES	4	4	4	8	8	8	8	12	12	
	mm	101.6	101.6	101.6	203.2	203.2	203.2	203.2	304.8	304.8	

**Note:** The wetted surface of this product (In any material combination.) contacted by consumable water contains less than one quarter of one percent (.25%) of lead by weight.

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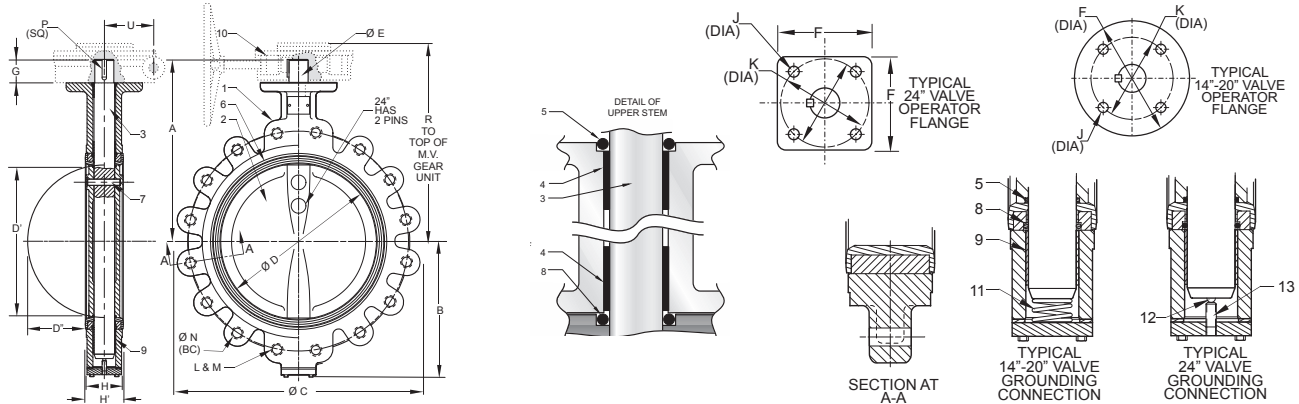


# ML Series 14" - 24"



ABS Type Approved; Cat. A  
CFR-46

**Iron Butterfly Valve  
Lug Style  
150 psi Non-Shock WOG  
Dead End Service to 150 psi Max\*  
Specifications: MSS SP-67 Type 1**



## MATERIALS

ITEM	PART	MATERIALS
1	BODY	CAST IRON ASTM A126 CL. B
		DUCTILE IRON ASTM A536
		DUCTILE IRON-EPOXY COATED
2	DISC	NP DUCTILE IRON ASTM A536
		ALUMINUM BRONZE ASTM B148
		STAINLESS STEEL TYPE 316
3	STEM	STAINLESS STEEL TYPE 416
		STAINLESS STEEL TYPE 316 (3)
4	TOP BEARING	REINFORCED NYLON
5	STEM O-RING	EPDM, BUNA, VITON (1)
6	LINER	BUNA
		EPDM
		VITON
		HYPALON
7	STEM PIN	ANSI 4140 OR AISI 6150
8	LINER O-RING	EPDM, BUNA, VITON (1)
9	LOWER BEARING	REINFORCED NYLON
10	OPERATOR	GEAR OPERATOR
		GEAR OPERATOR WITH MEMORY STOP
		GEAR OPERATOR WITH LOCK
		ACTUATOR-AIR/AIR (2)
		ACTUATOR-AIR/SPRING (2)
11	GROUNDING SPRING 14"-20"	STAINLESS STEEL TYPE 302
12	GROUNDING BALL 24" Only	AISI-1022
13	TENSION SCREW 24" Only	AISI-1020

## DIMENSIONS

		VALVE SIZE				
		14	16	18	20	24
A	INCHES	15.50	16.75	18.50	19.75	22.43
	mm	398	425	469	501	569
B	INCHES	11.56	12.69	13.63	15.13	18.06
	mm	258	322	346	384	458
C	INCHES	21.00	23.50	25.00	27.50	32.10
	mm	533	596	635	698	815
D	INCHES	13.25	15.25	17.24	19.24	23.25
	mm	336	387	438	489	591
D <sup>1</sup> (Chord Dia.)	INCHES	12.94	14.77	16.70	18.64	22.49
	mm	329	375	424	474	571
D <sup>11</sup> (Intrusion)	INCHES	5.06	5.59	6.34	7.09	8.55
	mm	128	142	161	180	217
E	INCHES	1.63	1.63	2.13	2.13	2.13
	mm	41	41	54	54	54
F	INCHES	6.50	6.50	9.50	9.50	7.50
	mm	165	165	241	241	190
G	INCHES	2.00	2.00	3.00	3.00	3.06
	mm	50	50	76	76	77
H (Body)	INCHES	3.06	4.00	4.50	5.00	6.06
	mm	77	101	114	127	153
H <sup>1</sup> (Liner)	INCHES	3.19	4.13	4.63	5.13	6.19
	mm	81	104	117	130	157
J	INCHES	0.69	0.69	0.81	0.81	0.81
	mm	17	17	20	20	20
K	INCHES	5.25	5.25	7.50	7.50	7.50
	mm	133	133	190	190	190
L	No. of Holes	12	16	16	20	20
M	Thread Size	1-8	1-8	1 1/8-7	1 1/8-7	1 1/4-7
N	INCHES	18.75	21.25	22.75	25.00	29.50
	mm	476	530	577	635	749
P (Key Size)	INCHES	0.38	0.38	0.50	0.50	0.50
	mm	9	9	12	12	12
R	INCHES	17.25	18.75	19.63	20.88	25.00
	mm	438	475	458	530	635
U	INCHES	3.13	3.13	4.50	4.50	4.63
	mm	79	79	114	114	117

(1) - Viton O-rings are used with Hypalon liner

(2) - Consult Automation Department

(3) - 316 Stem used with CF8M disc

\* Uni-directional

**Note:** The wetted surface of this product (In any material combination.) contacted by consumable water contains less than one quarter of one percent (.25%) of lead by weight.

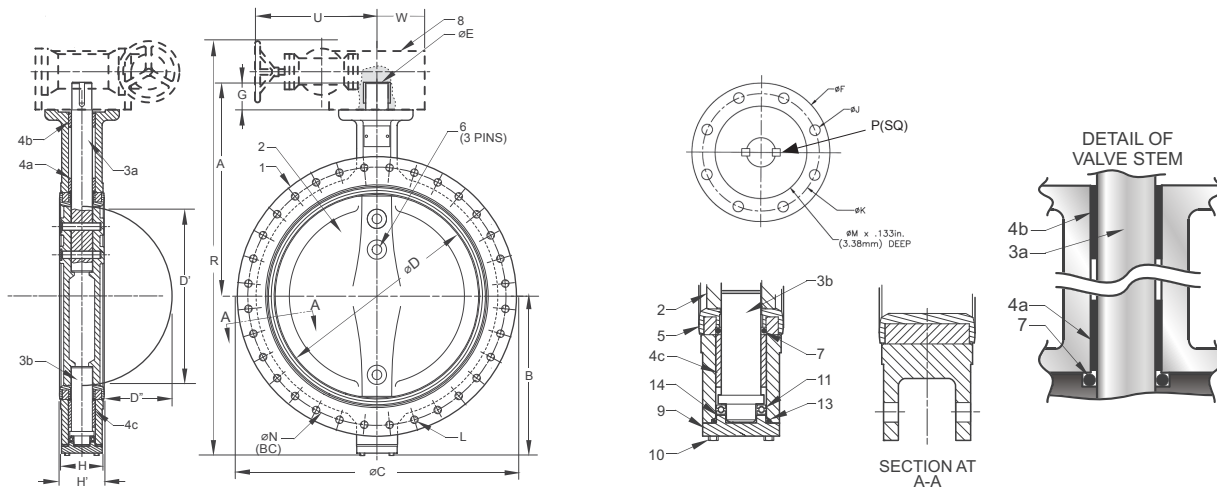
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# ML Series 30" - 48"

**Iron Butterfly Valve  
Lug Style  
150 psi Non-Shock WOG  
ASME B16.47 Series A Flanges  
Specifications: MSS SP-67 Type 1**



## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	CAST IRON ASTM A126 CL. B
		DUCTILE IRON ASTM A536
2	DISC	ALUMINUM BRONZE ASTM B148 C95400
		NP DUCTILE IRON ASTM A536
		STAINLESS STEEL ASTM A351 CF8M
3a	UPPER STEM	STAINLESS STEEL TYPE 410
3b	LOWER STEM	STAINLESS STEEL TYPE 410
4a	UPPER STEM BEARING, SHORT	CAST BRASS
4b	UPPER STEM BEARING, LONG	CAST BRASS
4c	LOWER STEM BEARING	CAST BRASS
5	LINER	BUNA
		EPDM
		VITON
6	STEM PIN	STAINLESS STEEL TYPE 302
7	LINER O-RING	BUNA
8	OPERATOR	GEAR OPERATOR
		ACTUATOR-AIR/AIR (1)
		ACTUATOR-AIR/SRING (1)
9	BOTTOM CAP	ASTM A126 CL.B
		FASTENING BOLTS
		CARBON STEEL 8.8
10	BOTTOM CAP	ASTM A126 CL.B
11	THRUST BEARING	AISI-1020
12	KEY	SS410
13	BOTTOM CAP O-RING	BUNA
14	THRUST BEARING GASKET	ASTM A570 Gr. 33

(1) - Consult Automation Department.

## DIMENSIONS

		VALVE SIZE			
		30	36	42	48
A	INCHES	29.72	33.46	39.69	42.95
	mm	755	850	1008	1091
B	INCHES	22.01	25.83	30.60	34.02
	mm	559	656	777	864
øC	INCHES	38.74	45.98	53.00	59.49
	mm	984	1168	1346	1511
øD	INCHES	29.29	34.04	40.55	45.67
	mm	744	864	1030	1160
D <sup>1</sup> (Chord Dia.)	INCHES	28.56	33.10	39.33	44.35
	mm	725	840	999	1126
D <sup>11</sup> (Intrusion)	INCHES	11.30	13.00	15.20	17.10
	mm	287	330	386	434
øE	INCHES	2.49	2.95	3.35	4.13
	mm	63	75	85	105
øF (Mtg. Flange)	INCHES	11.81	11.81	11.81	13.78
	mm	300	300	300	350
G	INCHES	3.74	5.12	5.91	5.91
	mm	95	130	150	150
H (Body Width)	INCHES	6.50	8.00	9.88	10.88
	mm	165	203	251	276
H <sup>1</sup> (Liner Width)	INCHES	6.89	8.31	10.27	11.26
	mm	175	211	261	286
øJ	INCHES		0.71		0.87
	mm		18		22
øK	INCHES		10.00		11.73
	mm		254		298
L	No. of Holes (per Flange)	See Flange Bolting Table in Butterfly Catalog			
	Thread				
	Bolt Size				
øM	INCHES	7.87			9.06
	mm	200			230
øN	INCHES	36.00	42.75	49.50	56.00
	mm	914	1086	1257	1422
P (Square Key Size)	INCHES	0.71	0.79	0.87	1.10
	mm	18	20	22	28
R	INCHES	62.80	68.98	79.17	89.43
	mm	1595	1752	2011	2271.5
U	INCHES	13.23	14.06	14.06	17.72
	mm	336	357	357	450
W	INCHES	5.75	6.65	6.65	7.13
	mm	146	169	169	181

**Note:** The wetted surface of this product (In any material combination.) contacted by consumable water contains less than one quarter of one percent (.25%) of lead by weight.

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# MW Series 2" - 12"

Iron Butterfly Valve

Wafer Style

200 psi Non-Shock WOG

Specifications: API-609 MSS SP-67 Type 1

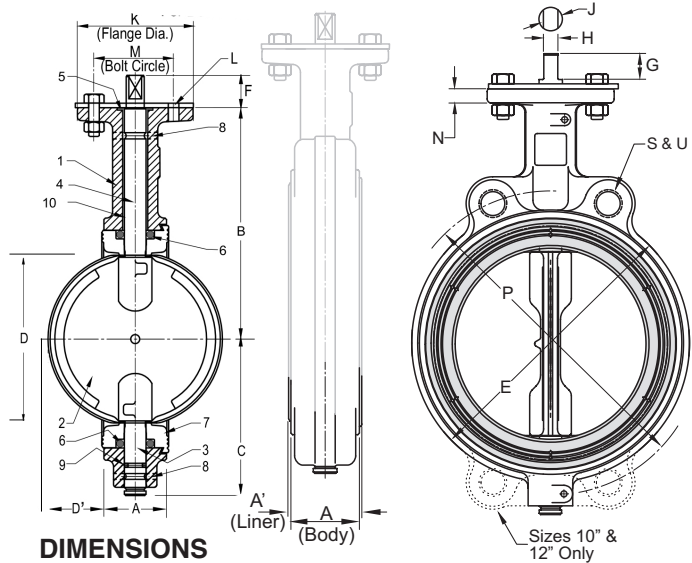


ABS Type Approved; Cat. A  
CFR-46

## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	CAST IRON ASTM A126 CL.B
		DUCTILE IRON ASTM A536
		DUCTILE IRON-EPOXY COATED
2	DISC	NP DUCTILE IRON ASTM A536
		ALUMINUM BRONZE ASTM B148
		STAINLESS STEEL TYPE 316
3	BOTTOM STEM	STAINLESS STEEL TYPE 416
		STAINLESS STEEL TYPE 316 (2)
4	TOP STEM	STAINLESS STEEL TYPE 416
5	TOP BEARING	REINFORCED NYLON
		STAINLESS STEEL TYPE 316 (2)
6	SEAL	EPDM, BUNA, VITON (1)
7	LINER	BUNA
		EPDM
		VITON
		HYPALON
		NEOPRENE BLACK-FDA
		NEOPRENE WHITE-FDA
8	ROLL PIN	STAINLESS STEEL
		TEFLON OVER BUNA (150# WOG)
9	STEM SEAL	EPDM, BUNA, VITON (1)
10	LOWER BEARING	REINFORCED NYLON
11	OPERATOR	LEVER HANDLE
		EPOXY COATED LEVER HANDLE
		GEAR OPERATOR
		GEAR OPERATOR WITH MEMORY STOP
		GEAR OPERATOR WITH LOCK
		ACTUATOR-AIR/AIR
ACTUATOR-AIR/SRING		
ACTUATOR-ELECTRIC		

(1) - VITON O-RINGS ARE USED WITH HYPALON, NEOPRENE, AND TEFLON LINERS.  
(2) - 316 STEM USED WITH CF8M DISC.



## DIMENSIONS

	INCHES DN	VALVE SIZE								
		2	2-1/2	3	4	5	6	8	10	12
A (Body)	INCHES	1.69	1.81	1.81	2.07	2.19	2.19	2.38	2.69	3.06
	mm	43	46	46	52	55	55	60	68	78
A <sup>1</sup> (Liner)	INCHES	1.82	1.94	1.94	2.20	2.32	2.32	2.51	2.82	3.21
	mm	46	49	49	55	58	58	63	71	82
B	INCHES	5.50	6.00	6.25	7.00	7.53	8.00	9.38	10.56	12.06
	mm	139	152	158	177	191	203	238	268	306
C	INCHES	3.06	3.31	3.75	4.25	4.94	5.56	5.56	7.88	9.25
	mm	77	84	95	108	125	141	166	200	235
D (Chord Dia)	INCHES	1.49	2.01	2.64	3.67	4.71	5.66	7.72	9.70	11.68
	mm	37	51	67	93	119	143	196	246	296
D <sup>1</sup> (Intrusion)	INCHES	0.28	0.44	0.69	1.06	1.50	1.94	2.84	3.69	4.50
	mm	7	11	17	27	38	49	72	93	114
E	INCHES	4.13	4.88	5.38	6.88	7.75	8.75	11.00	13.38	16.13
	mm	105	124	137	175	197	222	279	340	410
F	INCHES	1.13	1.13	1.13	1.13	1.13	1.50	1.50	1.50	1.50
	mm	28	28	28	28	28	38	38	38	38
G	INCHES	0.81	0.81	0.81	0.81	0.81	0.81	1.06	1.06	1.06
	mm	20	20	20	20	20	20	27	27	27
H	INCHES	0.35	0.35	0.35	0.40	0.40	0.44	0.53	0.71	0.71
	mm	8	8	8	10	10	11	13	18	18
J	INCHES	0.50	0.50	0.50	0.56	0.56	0.62	0.75	1.00	1.00
	mm	12	12	12	14	14	14	19	25	25
K	INCHES	4	4	4	4	4	4	6	6	6
	mm	101.6	101.6	101.6	101.6	101.6	101.6	152.4	152.4	152.4
L (Dia)	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.56	0.56	0.56
	mm	11	11	11	11	11	11	14	14	14
M	INCHES	3.25	3.25	3.25	3.25	3.25	3.25	5.00	5.00	5.00
	mm	82	82	82	82	82	82	127	127	127
N	INCHES	0.44	0.44	0.44	0.44	0.44	0.44	0.50	0.50	0.50
	mm	11	11	11	11	11	11	12	12	12
P	INCHES	4.75	5.50	6.00	7.50	8.50	9.50	11.75	14.25	17.00
	mm	120	139	152	190	215	241	298	362	431
R	Flange Bolt Size	5/8-11	5/8-11	5/8-11	5/8-11	3/4-10	3/4-10	3/4-10	7/8-9	7/8-9
	No. of Holes	2	2	2	2	2	2	2	4	4
U (Hole Dia.)	INCHES	0.75	0.75	0.75	0.75	0.88	0.88	0.88	1.00	1.00
	mm	19	19	19	19	22	22	22	25	25

**Note:** The wetted surface of this product (In any material combination.) contacted by consumable water contains less than one quarter of one percent (.25%) of lead by weight.

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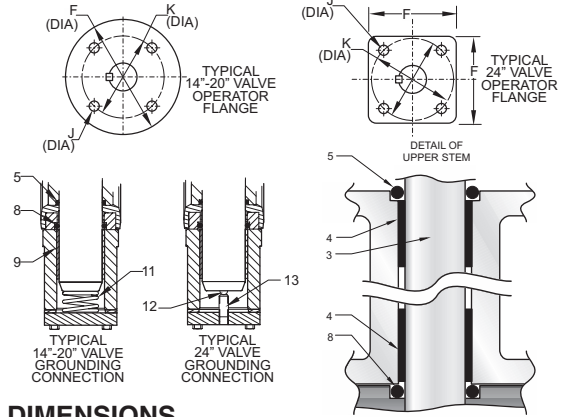
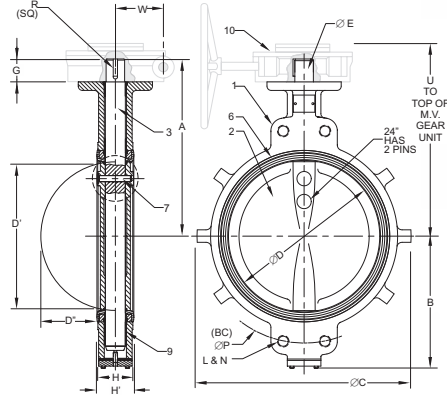


# MW Series 14" - 24"



ABS Type Approved; Cat. A  
CFR-46

**Iron Butterfly Valve  
Wafer Style  
150 psi Non-Shock WOG  
Specifications: MSS SP-67 Type 1**



## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	CAST IRON ASTM A126 CL. B
		DUCTILE IRON ASTM A536
		DUCTILE IRON-EPOXY COATED
2	DISC	NP DUCTILE IRON ASTM A536
		ALUMINUM BRONZE ASTM B148
		STAINLESS STEEL TYPE 316
3	STEM	STAINLESS STEEL TYPE 416
		STAINLESS STEEL TYPE 316 (3)
4	TOP BEARING	REINFORCED NYLON
5	STEM O-RING	EPDM, BUNA, VITON (1)
6	LINER	BUNA
		EPDM
		VITON
		HYPALON
7	STEM PIN	ANSI 4140 OR AISI 6150
8	LINER O-RING	EPDM, BUNA, VITON (1)
9	LOWER BEARING	REINFORCED NYLON
10	OPERATOR	GEAR OPERATOR
		GEAR OPERATOR WITH MEMORY STOP
		GEAR OPERATOR WITH LOCK
		ACTUATOR-AIR/AIR (2)
		ACTUATOR-AIR/SRING (2)
11	GROUNDING SPRING	14"-20"
		24" Only
12	GROUNDING BALL	AISI-1022
13	TENSION SCREW	AISI-1020

(1) - Viton O-rings are used with Hypalon liner.

(2) - Consult Automation Department

(3) - 316 stem used with CF8M disc.

## DIMENSIONS

		VALVE SIZE				
		14	16	18	20	24
A	INCHES	352	406	457	508	610
	DN	15.50	16.75	18.50	19.75	22.43
B	INCHES	398	425	469	501	569
	mm	11.56	12.69	13.63	15.13	18.06
C	INCHES	258	322	346	384	458
	mm	21.00	23.50	25.00	27.50	32.10
D	INCHES	533	596	635	698	815
	mm	13.25	15.25	17.24	19.24	23.25
D <sup>1</sup> (Chord Dia.)	INCHES	336	387	438	489	591
	mm	12.94	14.77	16.70	18.64	22.49
D <sup>11</sup> (Intrusion)	INCHES	128	142	161	180	217
	mm	5.06	5.59	6.34	7.09	8.55
E	INCHES	41	41	54	54	54
	mm	1.63	1.63	2.13	2.13	2.13
F	INCHES	165	165	241	241	190
	mm	6.50	6.50	9.50	9.50	7.50
G	INCHES	50	50	76	76	77
	mm	2.00	2.00	3.00	3.00	3.06
H (Body)	INCHES	77	101	114	127	153
	mm	3.06	4.00	4.50	5.00	6.06
H <sup>1</sup> (Liner)	INCHES	81	104	117	130	157
	mm	3.19	4.13	4.63	5.13	6.19
J	INCHES	17	20	20	20	20
	mm	0.69	0.69	0.81	0.81	0.81
K	INCHES	133	133	190	190	190
	mm	5.25	5.25	7.50	7.50	7.50
L	No. of Holes	4	4	4	4	4
M	Flange Bolt Size	1-8	1-8	1 1/8-7	1 1/8-7	1 1/4-7
	INCHES	1-8	1-8	1 1/8-7	1 1/8-7	1 1/4-7
N	mm	25	25	29	29	32
P	INCHES	476	540	577	635	749
	mm	18.75	21.25	22.75	25.00	29.50
R (Key Size)	INCHES	9	9	12	12	12
	mm	0.38	0.38	0.50	0.50	0.50
U	INCHES	438	476	458	530	635
	mm	17.25	18.75	19.63	20.88	25.00
W	INCHES	79	79	114	114	117
	mm	3.13	3.13	4.50	4.50	4.63

**Note:** The wetted surface of this product (In any material combination.) contacted by consumable water contains less than one quarter of one percent (.25%) of lead by weight.

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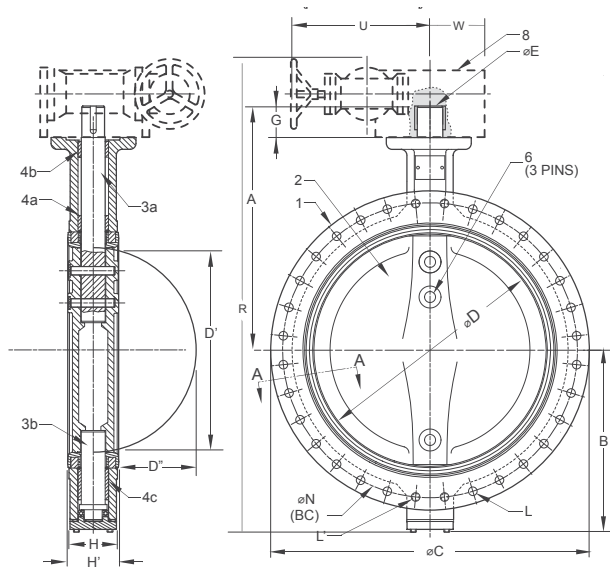
⚠ State of California Prop 65 **WARNING:** Cancer and Reproductive Harm. For more information visit [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov).





# MW Series 30" - 48"

Iron Butterfly Valve  
 Wafer Style  
 150 psi Non-Shock  
 Specifications: MSS SP-67 Type 1



## MATERIALS LIST

ITEM	PART	MATERIALS
1	BODY	CAST IRON ASTM A126 CL. B
		DUCTILE IRON ASTM A536
2	DISC	ALUMINUM BRONZE ASTM B148 C95400
		NP DUCTILE IRON ASTM A536
		STAINLESS STEEL TYPE 316
3a	UPPER STEM	STAINLESS STEEL TYPE 410
3b	LOWER STEM	STAINLESS STEEL TYPE 410
4a	UPPER STEM BEARING, SHORT	CAST BRASS
4b	UPPER STEM BEARING, LONG	CAST BRASS
4c	LOWER STEM BEARING	CAST BRASS
5	LINER	BUNA
		EPDM
		VITON
6	STEM PIN	STAINLESS STEEL TYPE 302
7	LINER O-RING	BUNA
8	OPERATOR	GEAR OPERATOR
		ACTUATOR-AIR/AIR (1)
		ACTUATOR-AIR/SPRING (1)
9	BOTTOM CAP	ASTM A126 CL.B
10	BOTTOM CAP FASTENING BOLTS	CARBON STEEL 8.8
11	THRUST BEARING	AISI-1020
12	KEY	SS410
13	BOTTOM CAP O-RING	BUNA
14	THRUST BEARING GASKET	ASTM A570 Gr. 33

(1) - Consult Automation Department.

## DIMENSIONS

	INCHES DN	VALVE SIZE			
		30	36	42	48
A	INCHES	29.72	33.46	39.69	42.95
	mm	755	850	1008	1091
B	INCHES	22.01	25.83	30.60	34.02
	mm	559	656	777	864
øC	INCHES	38.74	45.98	53.00	59.49
	mm	984	1168	1346	1511
øD	INCHES	29.29	34.04	40.55	45.67
	mm	744	864	1030	1160
D <sup>1</sup> (Chord Dia.)	INCHES	28.56	33.10	39.33	44.35
	mm	725	840	999	1126
D <sup>11</sup> (Intrusion)	INCHES	11.30	13.00	15.20	17.10
	mm	287	330	386	434
øE	INCHES	2.49	2.95	3.35	4.13
	mm	63	75	85	105
øF (Mtg. Flange)	INCHES	11.81	11.81	11.81	13.78
	mm	300	300	300	350
G	INCHES	3.74	5.12	5.91	5.91
	mm	95	130	150	150
H (Body Width)	INCHES	6.50	8.00	9.88	10.88
	mm	165	203	251	276
H <sup>1</sup> (Liner Width)	INCHES	6.89	8.31	10.27	11.26
	mm	175	211	261	286
øJ	INCHES	0.71			0.87
	mm	18			22
øK	INCHES	10.00			11.73
	mm	254			298
L	No. of Holes (per Flange)	See Flange Bolting Table in Butterfly Catalog			
	Thread				
	Bolt Size				
øM	INCHES	7.87			9.06
	mm	200			230
øN	INCHES	36.00	42.75	49.50	56.00
	mm	914	1086	1257	1422
P (Square Key Size)	INCHES	0.71	0.79	0.87	1.10
	mm	18	20	22	28
R	INCHES	62.80	68.98	79.17	89.43
	mm	1595	1752	2011	2271.50
U	INCHES	13.23	14.06	14.06	17.72
	mm	336	357	357	450
W	INCHES	5.75	6.65	6.65	7.13
	mm	146	169	169	181

**Note:** The wetted surface of this product (In any material combination.) contacted by consumable water contains less than one quarter of one percent (.25%) of lead by weight.

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# BB2 Series 1/4" - 2"

BB2-350 Solder  
BB2-100 Threaded

Bronze Butterball® Butterfly Valve

175 psig WOG

CSA (AGA/CGA) & UL Rating (1) (\*)

Vacuum to 29" (Except 1/4" & 3/8" Threaded End)

Specification: WW-V-1967



## MATERIALS LIST

ITEM	PART	MATERIALS	ASTM SPEC.
1	BODY	BRONZE	ASTM B584
2	DISC	STAINLESS STEEL	TYPE 304
3	STEM	STAINLESS STEEL	TYPE 303
4	HEX NUT	STAINLESS STEEL	TYPE 302
5	GLAND	ROD BRONZE	CA-360
6	PACKING	NYLON	
7	HANDLE	STEEL W/ZINC PLATING	
8	FLAT GRIP	VINYL	
9	DISC SEAT	VITON	
10	TAILPIECE	3/8" - 3/4" BRASS ROD	ASTM B16
		1" - 2" BRONZE	ASTM B584

## FEATURES

- Full Port Design
- Full Flow, High Cv
- One Piece Bronze Body\*
- Stainless Steel Stem and Disc
- Viton Seal
- Excellent throttling characteristics<sup>(3)</sup>
- Requires no system pressure to seal
- 30°F to 275°F Temperature Range

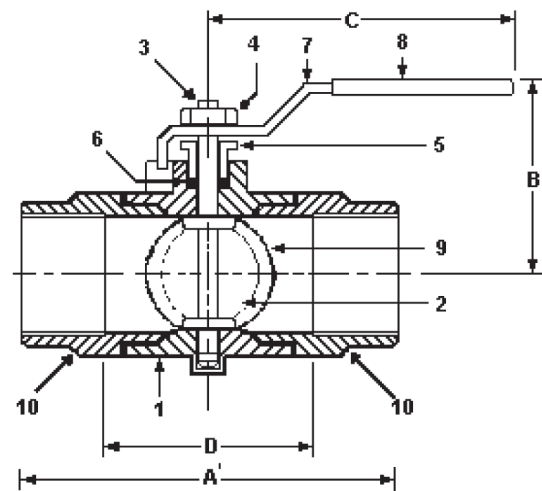
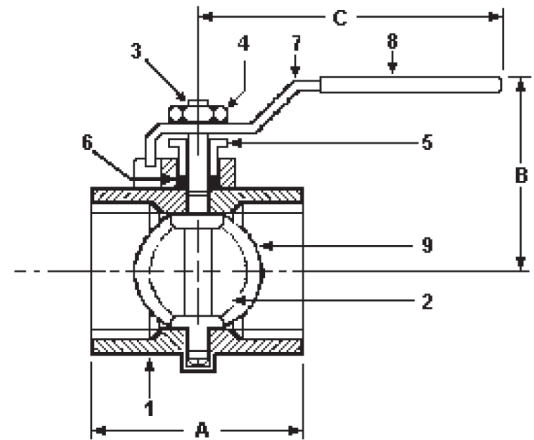
## APPLICATIONS

- Natural Gas Shut-off\* (1/2" psi and 5 psi)
- LP Gas Shut-off\*
- Gas and Air Systems
- Fuel Oil (Types 1-6)\*
- Oil Systems\*
- Liquid Service including water<sup>(2)</sup>
- Throttling, Balancing & Shut-off<sup>(3)</sup>
- Vacuum Service

\* Applies to BB2-100 Series Threaded End only

<sup>(2)</sup> Do not use on hot water over 120° F

<sup>(3)</sup> Do not throttle or leave in the near closed position as seal damage may result.



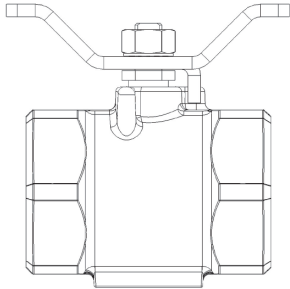
## DIMENSIONS

	VALVE SIZE								
	INCHES	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
A (Body)	DN	6	10	15	20	25	32	40	50
	INCHES	2.25	2.34	1.88	2.00	2.13	2.63	2.88	3.25
A'	INCHES		2.38	2.50	3.13	3.63	4.38	4.88	5.63
	mm	N/A	60	63	79	92	111	123	142
B	INCHES	1.50	1.50	1.50	1.56	1.75	2.19	2.31	3.63
	mm	38	38	38	39	44	55	58	92
C	INCHES	3.50	3.50	3.50	3.50	3.50	5.00	5.00	5.00
	mm	89	89	89	89	89	127	127	127
D	INCHES		1.63	1.50	1.63	1.81	2.44	2.69	2.94
	mm	N/A	41	38	41	46	62	68	74
Cv			10	13	25	43	85	112	180
Tourque	in/lb	18	18	18	22	35	50	70	120
Weight (lbs)	BB2-100	0.60	0.60	0.50	0.70	0.80	1.00	1.50	3.00
	BB2-350	N/A	0.50	0.50	0.60	1.00	1.60	2.00	3.70

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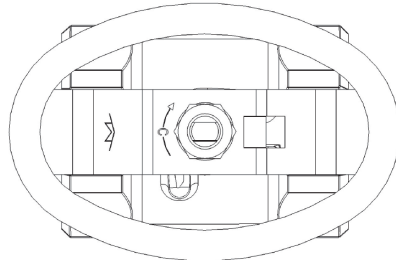
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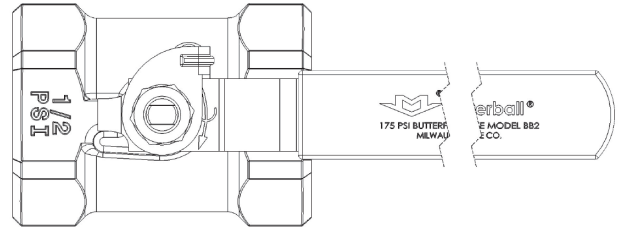
### Tee Handle Option

To Order Tee Handle,  
Add suffix "T" to Number.  
(E.g. BB2-100T)



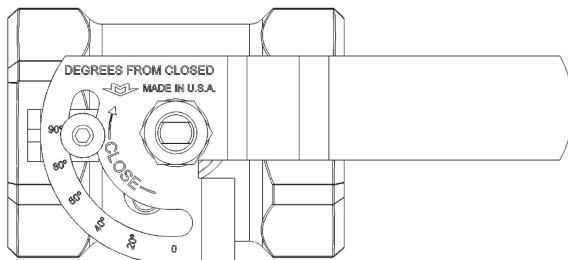
### Oval Handle Option

To Order Oval Handle,  
Add suffix "R" to Number.  
(E.g. BB2-100R)



### Memory Stop Option

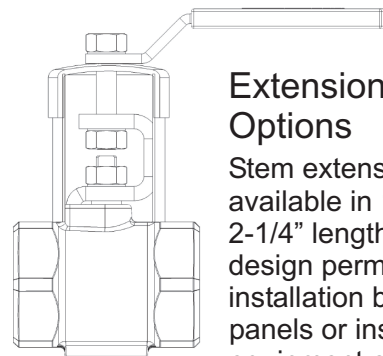
To Order Memory Stop Option,  
Use this Model Number, BB2-102



### Calibrated Memory Stop Handle Option

This Flow Set Handle Provides a  
visual 90 X Scale to Position  
the Memory Stop.

Order using Model Number BB2FS100.



### Extension Stem Options

Stem extensions are  
available in 1-1/4" &  
2-1/4" lengths. The  
design permits valve  
installation behind  
panels or inside  
equipment enclosures.

1-1/4" Extension, Order BB2-103

2-1/4" Extension, Order BB2-104

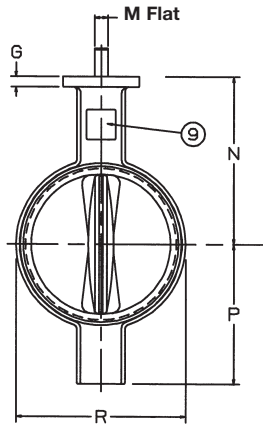
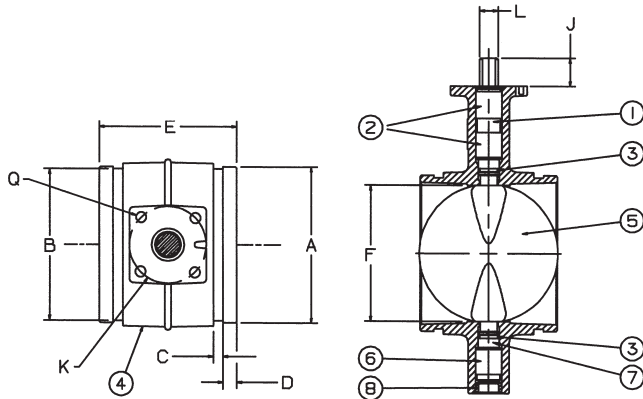
**NOTE:** Some Accessories Can be  
Combined for Added Versatility.  
Consult Factory.

# UPGG-245E/345E 2"-10"



NSF/ANSI 61  
NSF/ANSI 372

**Polyamide Coated Ductile Iron Grooved End Butterfly, 300 psi Grooved Mechanical Style, Maximum Temperature Rating of 200° F**  
**Extended Neck, Elastomer Encapsulated Disc**  
**Grooved End Compatible with IPS Pipe**  
**Specifications: MSS SP-67**



NOT RECOMMENDED FOR STEAM SERVICE



**UPGG-245E**

## DIMENSIONS

	VALVE SIZE								
	INCHES DN	2	2 1/2	3	4	5	6	8	10
A	INCHES	2.38	2.88	3.50	4.50	5.56	6.63	8.63	10.75
	mm	60	73	89	114	141	168	219	273
B	INCHES	2.32	2.72	3.34	4.33	5.39	6.45	8.44	10.56
	mm	59	69	85	110	137	164	214	268
C	INCHES	.33	.31	.31	.38	.38	.38	.44	.50
	mm	8	8	8	10	10	10	11	13
D	INCHES	.63	.63	.63	.63	.63	.63	.75	.75
	mm	16	16	16	16	16	16	19	19
E	INCHES	3.33	3.85	3.85	4.56	5.86	5.86	5.26	6.29
	mm	85	98	98	116	149	149	134	160
F	INCHES	2.42	2.42	2.86	3.84	4.79	5.73	7.71	9.56
	mm	61	61	73	98	122	146	196	243
J	INCHES	1.31	1.22	1.18	1.24	1.24	1.29	1.32	1.38
	mm	33	31	30	32	32	33	34	35
L	INCHES	.50	.50	.50	.66	.66	.78	.78	1.06
	mm	13	13	13	17	17	20	20	27
M	INCHES	.37	.37	.37	.50	.50	.56	.56	.75
	mm	9	9	9	13	13	14	14	19
N	INCHES	4.00	4.19	4.44	5.33	5.83	7.11	8.05	9.86
	mm	102	106	113	135	148	181	204	250
P	INCHES	3.14	3.25	3.54	4.35	4.84	5.93	6.87	9.17
	mm	80	83	90	111	123	151	175	233
R	INCHES	2.89	3.46	3.97	5.03	6.27	7.25	9.25	11.25
	mm	73	88	101	128	159	184	235	286

UPGG-245E - Lever Operator

UPGG-345E - Gear Operator

## MATERIALS LIST

ITEM	PART	MATERIALS	MATERIALS
1	UPPER STEM	STAINLESS STEEL	ASTM A582 TYPE 416
2	UPPER BEARING	SPLIT METAL	-
3	O-RING	EPDM	-
4	BODY	DUCTILE IRON	ASTM A395 W/POLYAMIDE COATING
5	DISC	DUCTILE IRON	ASTM A395 W/EPDM
6	LOWER BEARING	SPLIT METAL	-
7	LOWER STEM	STAINLESS STEEL	ASTM A582 TYPE 416
8	DUST PLUG	PVC	-
9	NAME PLATE	ALUMINUM	-

**Note:** Lead free refers to the wetted surface of the pipe, fittings and fixtures in potable water systems that have a weighted average lead content  $\leq 0.25\%$ . Source: California Health and Safety Code (116875).

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# BUTTERFLY FEATURES & OPTIONS

## STANDARD FEATURES

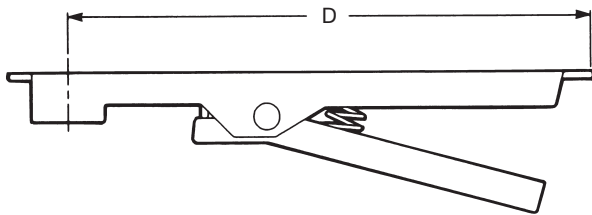
HEAVY DUTY DESIGN  
 PHENOLIC CARTRIDGE DESIGN  
 LOW TORQUE LINER  
 BUBBLE TIGHT SHUT OFF  
 LOW TORQUE POLYMER BEARING STD  
 DEAD END SERVICE (LUG ONLY)  
 FIELD REPAIRABLE

EXTENDED NECK BODY  
 LOW PROFILE DISC  
 BLOWOUT PROOF STEMS  
 STAINLESS STEEL STEMS (416)  
 BI-DIRECTIONAL SHUT OFF (EXCEPT AS NOTED)  
 VACUUM RATINGS TO 29" OF MERCURY

## OPERATORS

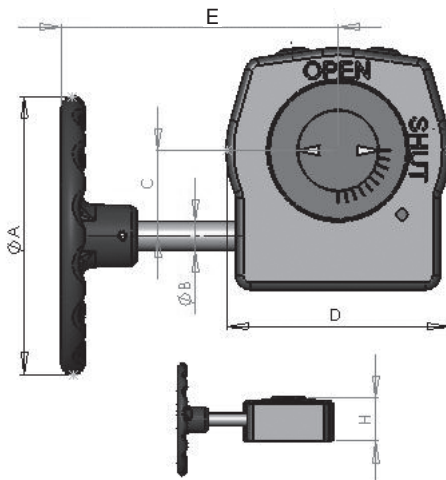
### MANUAL

10 POSITION, PAD LOCKABLE, DUCTILE IRON LEVER HANDLE –STD, EPOXY COATING OPTIONAL.



VALVE SIZE	PART NUMBER	D-DIMENSION (inches)
2, 2-1/2, 3	84016-LL	9.00
4, 5	84016-RL	11.00
6	84016-SL	11.00
8	84016-UL	15.00
10, 12	84016-WL	15.00

WEATHER RESISTENT GEAR OPERATOR, CAST IRON, MEMORY STOP AND LOCKING DEVICE OPTIONAL.



VALVE SIZE	PART NUMBER	GEAR RATIO	ØA	ØB	C	D	E	H
2-3	8115-24N-L	24:1	6.00	0.63	1.80	4.20	8.80	2.30
4-5	8115-24N-R	24:1	6.00	0.63	1.80	4.20	8.80	2.30
6	8115-24N-S	24:1	6.00	0.63	1.80	4.20	8.80	2.30
8	8115-30N-U	30:1	9.00	0.75	2.60	6.03	8.50	3.23
10-12	8115-30N-W	30:1	9.00	0.75	2.60	6.03	8.50	3.23
14-16	8115-48N-16	50:1	9.00	0.75	3.10	6.97	13.40	3.46
18-20	8115-65N-20	80:1	12.00	1.00	4.93	10.30	12.60	4.63
24	8115-78N-24	120:1	16.00	1.00	4.93	10.30	12.60	6.00

## ACTUATORS

PNEUMATIC ACTUATORS  
 DOUBLE ACTING ACTUATORS  
 SPRING-RETURN ACTUATORS  
 SOLENOID VALVES  
 LIMIT SWITCHES  
 VALVE POSITIONERS

120 VOLT AC AND DC VOLTAGES  
 NEMA 4 AND 7 HOUSING  
 4-20 mA DC VALVE POSITIONERS  
 ACTUATOR BRACKETS  
 EXTRA LIMIT SWITCHES  
 ELECTRIC ACTUATORS

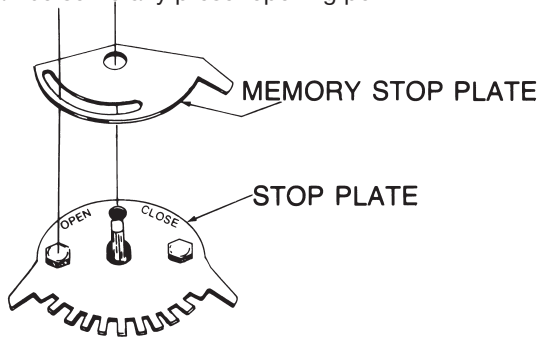
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# OPTIONS & ACCESSORIES

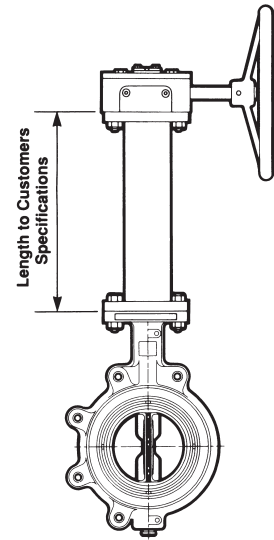
## MEMORY STOP

The “MS” Memory Stop provides an adjustable stop when the valve is used in a balancing application. The Memory Stop can be set to any preset opening point.



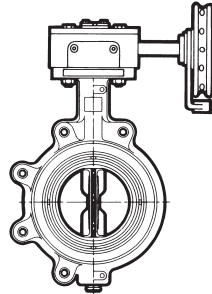
## STEM EXTENSION

Provides means of operation at a required distance away from the valve body. Manual or automatic, actuators are easily adapted to mounting flange on the extension. To order, specify distance from valve mounting-flange to base of operator.



## CHAINWHEEL

The chain wheel provides for remote operation of the valve in high, normally out-of-reach locations. Attaches to the gear operator easily for quick valve open/close response. Sprocket rim is aluminum; chain is steel. Specify the handwheel diameter (“A” dimension) and chain length. Chain sold separately.



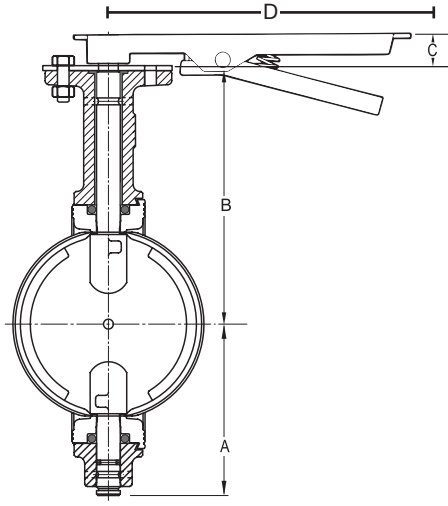
“C”, “M” AND “H” SERIES BUTTERFLY VALVE CHAINWHEEL GUIDE				
VALVE SIZE	HANDWHEEL SIZE (INCHES)	CHAINWHEEL NUMBER	CHAIN SIZE	MASTERLINK
2	6	ARG 1.5	R1-0-C-746	R1-0-ML-746
2.5	6	ARG 1.5	R1-0-C-746	R1-0-ML-746
3	6	ARG 1.5	R1-0-C-746	R1-0-ML-746
4	6	ARG 1.5	R1-0-C-746	R1-0-ML-746
5	6	ARG 1.5	R1-0-C-746	R1-0-ML-746
6	6	ARG 1.5	R1-0-C-746	R1-0-ML-746
8	9	ARG 2.0	R1-0-C-746	R1-0-ML-746
10	9	ARG 2.0	R1-0-C-746	R1-0-ML-746
12	9	ARG 2.0	R1-0-C-746	R1-0-ML-746
14	9	ARG 2.0	R1-0-C-746	R1-0-ML-746
16	9	ARG 2.0	R1-0-C-746	R1-0-ML-746
18	12	ARG 2.5	R4-0-C-746	R4-0-ML-746
20	12	ARG 2.5	R4-0-C-746	R4-0-ML-746
24	16	ARG 3.5	R4-0-C-746	R4-0-ML-746
30	15	ARG 3.5	R4-0-C-746	R4-0-ML-746
36	15	ARG 3.5	R4-0-C-746	R4-0-ML-746
42	15	ARG 3.5	R4-0-C-746	R4-0-ML-746
48	17.5	ARG 3.5	R4-0-C-746	R4-0-ML-746

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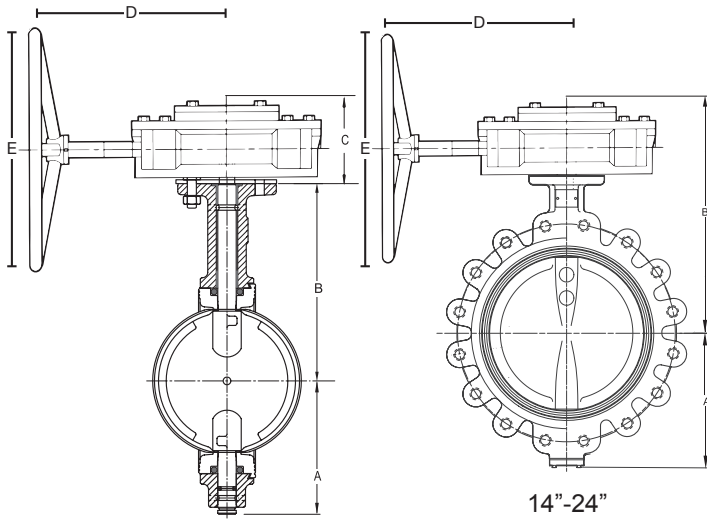


# Butterfly Height With Lever or Gear Operator Wafer and Lug Styles



2"-12"

Butterfly with Lever Handle						
Size		A	B	C	D	Height
2"	INCHES	3.06	5.50	1.13	9.00	9.69
2 1/2"	INCHES	3.31	6.00	1.13	9.00	10.44
3"	INCHES	3.75	6.25	1.13	9.00	11.13
4"	INCHES	4.25	7.00	1.13	11.00	12.38
5"	INCHES	4.94	7.53	1.13	11.00	13.60
6"	INCHES	5.56	8.00	1.13	11.00	14.69
8"	INCHES	5.56	9.38	1.50	15.00	16.44
10"	INCHES	7.88	10.56	1.50	15.00	19.94
12"	INCHES	9.25	12.06	1.50	15.00	22.81



2"-12"

14"-24"

Butterfly with Gear Operator							
Size		A	B	C	D	E	Height
2"	INCHES	3.06	5.50	2.30	8.80	6.00	10.86
2 1/2"	INCHES	3.31	6.00	2.30	8.80	6.00	11.61
3"	INCHES	3.75	6.25	2.30	8.80	6.00	12.30
4"	INCHES	4.25	7.00	2.30	8.80	6.00	13.55
5"	INCHES	4.94	7.53	2.30	8.80	6.00	14.77
6"	INCHES	5.56	8.00	2.30	8.80	6.00	15.86
8"	INCHES	5.56	9.38	3.23	8.50	9.00	18.17
10"	INCHES	7.88	10.56	3.23	8.50	9.00	21.67
12"	INCHES	9.25	12.06	3.23	8.50	9.00	24.54
14"	INCHES	11.56	17.25	-	13.40	9.00	28.81
16"	INCHES	12.69	18.75	-	13.40	9.00	31.44
18"	INCHES	13.63	19.63	-	12.60	12.00	33.26
20"	INCHES	15.13	20.88	-	12.60	12.00	36.01
24"	INCHES	18.06	25.00	-	12.60	16.00	43.06

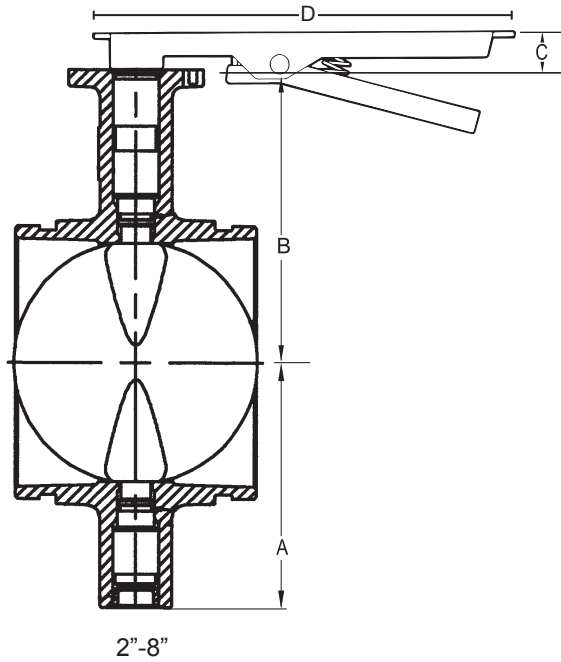
**Note:** 30"-48" Please see specification sheet.

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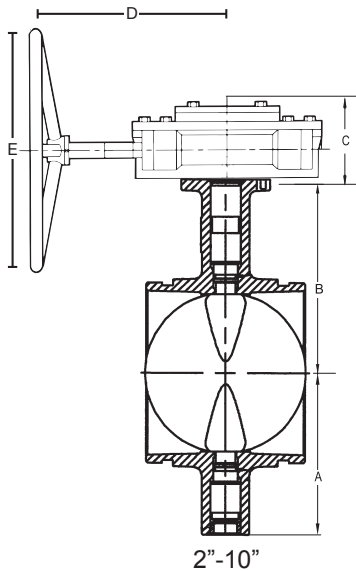




# Butterfly Height With Lever or Gear Operator Grooved Style



Grooved Butterfly with Lever Handle						
Size		A	B	C	D	Height
2	INCHES	3.14	4	1	6.19	8.14
2 1/2	INCHES	3.25	4.19	1	6.19	8.44
3	INCHES	3.54	4.44	1	6.19	8.98
4	INCHES	4.35	5.33	1	6.19	10.68
5	INCHES	4.84	5.83	1	6.19	11.67
6	INCHES	5.93	7.11	1	6.19	14.04
8	INCHES	6.87	8.05	1	6.19	15.92



Grooved Butterfly with Gear Operator							
Size		A	B	C	D	E	Height
2	INCHES	3.14	4	2.79	7.84	5.91	9.93
2 1/2	INCHES	3.25	4.19	2.79	7.84	5.91	10.23
3	INCHES	3.54	4.44	2.79	7.84	5.91	10.77
4	INCHES	4.35	5.33	2.79	7.84	5.91	12.47
5	INCHES	4.84	5.83	2.79	7.84	5.91	13.46
6	INCHES	5.93	7.11	2.79	7.84	5.91	15.83
8	INCHES	6.87	8.05	2.79	9.53	9.84	17.71
10	INCHES	9.17	9.86	3.26	11.54	9.84	22.29

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# ENGINEERING SPECIFICATIONS

## DESIGN & TESTING

Milwaukee Valve butterfly valves are designed and tested in accordance with the latest editions of the Manufacturers Standardizations Society SP-67, and the American Petroleum Institute API-609. Available in both wafer and lug styles, all bodies are provided with extended necks to allow for up to 2" of insulation. Approved by U.S. Coast Guard for use in category "A" service as described in Title 46 code of Federal Regulations 46.20-15.

## RATED WORKING PRESSURE

The maximum rated working pressure is 200 psi for 2" through 12" valves and 150 psi for 14" through 48". If necessary, H-Series (Hi-Pressure) valves can be ordered with a maximum working pressure of 250 psi for 2" through 12" valves and 200 psi for 14" through 24".

Lug body valves are recommended for applications where dead end service is required to remove downstream piping for maintenance. Placement of a downstream flange is still always advised for safety; extreme care should always be taken with hot fluids. The pressure rating of Milwaukee butterfly valves in dead end service is a function of size and liner material. For valves in sizes 2" to 12" inclusive, the ratings are liner material dependent, and given in the table below. All valves 14" through 24" inclusive are rated at 150 psi (unidirectional) for dead end service, regardless of liner material. Valves larger than 24" should not be used in dead-end service.

## ELASTOMER GUIDE

Material	Continuous Use Temp. (F)	Uses	Dead End Rating
EPDM	-30 to 250	Also known as EP or Nordel, EPDM is a general service elastomer for use in hot water and HVAC glycol systems. It is compatible with a wide range of fluids, including alcohol and acetone, but should never be used where even a trace of oil or hydrocarbon products may be present.	Bidirectional to 200 psig in all sizes from 2" through 12", inclusive.
Buna-N	+10 to 180	Also known as Nitrile, Buna-N has good strength and toughness, as well as good general chemical resistance, including most hydrocarbons. It's a good general service material for use in water, vacuum, acid, alts, alkalines, fats, oils, greases, hydraulic oils and glycols. Buna-N is not recommended for acetone, ketones, and nitrated or chlorinated hydrocarbons.	Bidirectional to 200 psig in all sizes from 2" through 12", inclusive.
Viton®	-20 to 300	Viton® is a registered trademark of DuPont, and is a fluorinated hydrocarbon elastomer with good overall resistance to petroleum based products in general. Viton is not recommended for steam or hot water service over 120 F, nor for concentrated alkalines.	Unidirectional to 150 psig in all sizes from 2" through 12" inclusive.
Neoprene (FDA Approved)	0 to 180	As an FDA approved material, Neoprene (available in black or white), is used in many food and beverage applications. Beyond these, it's recommended for moderate acids, oils, fats, greases and solvents.	Unidirectional to 150 psig in all sizes from 2" through 12" inclusive.
Hypalon®	0 to 180	Hypalon® is a registered trademark of DuPont. It is a chlorosulfonated polyethylene with good resistance to acids, hydrocarbon oils and fuels. It is not recommended for use with most esters, ethers, and ketones.	Unidirectional to 150 psig in all sizes from 2" through 12" inclusive

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# CHEMICAL RESISTANCE GUIDE

## EXPLANATION OF RATINGS:

- A - Excellent**
- B - Good**
- C - Fair**
- P - Poor**

This guide has been prepared to aid in selecting the proper material for various media. This information is intended only as a general guide and should not be taken as a guarantee. To insure reliable performance, conduct an actual experiment using suggested elastomer, planned media, and actual service temperature and pressure conditions.

	BUNA-N	EPDM	HYPALON	NEOPRENE	VITON	BRONZE	DUCTILE IRON	STAINLESS STEEL
CHEMICALS								
Acetone	P	A	P	P	P	A	A	A
Air (Dry)	A	A	A	A	A	A	A	A
Alcohol, Butyl	B	B	B	B	A	B	A	A
Alcohol, Ethyl	C	A	B	B	-	B	A	B
Alcohol, Methyl	B	A	A	A	A	B	A	A
Asphalt	C	P	-	-	B	A	A	A
Aluminum Acetate	C	B	-	-	C	P	P	A
Ammonia Gas	B	A	P	B	P	P	-	A
Ammonia Liquid	C	A	P	B	P	P	-	A
Aniline Dies	P	B	C	C	B	P	B	A
Barium Nitrate	A	A	B	A	A	P	A	A
Beer	A	A	A	B	A	B	P	-
Beet Sugar Liquors	-	A	A	B	C	A	B	A
Benzene (Benzol)	P	P	P	P	B	B	A	B
Brines, Saturated	B	B	B	B	B	B	P	B
Butane	A	P	C	A	A	C	A	A
Calcium Chloride	C	A	A	A	A	B	A	B
Carbon Tetrachloride	P	P	-	-	C	P	C	A
Chlorinate (10 ppm)	C	B	-	-	B	P	-	B
Citric Acid	B	B	A	A	-	P	P	A
Diesel Oil Fuels	A	P	C	C	A	A	A	A
Dioxane	P	P	B	B	P	A	A	A
Ethylene Glycol	A	A	A	A	A	B	A	B
Freon	B	A	A	A	P	B	B	A
Fructose	A	A	-	-	A	-	A	P
Fuel Oil	A	P	C	C	A	B	B	A
Gas, Natural	B	P	A	A	A	B	A	A
Gas, Sour	C	P	-	-	B	B	B	B
Gasoline, Unleaded	P	P	B	B	A	B	A	A
Glucose	A	B	A	A	-	A	A	-
Grease	A	P	-	-	A	P	A	A
Ink, Newsprint	B	A	-	B	B	P	A	A
JP-4 Fuel	A	P	P	P	A	A	A	A
Kerosene	A	P	C	B	A	A	A	A
Ketones	P	A	P	P	P	A	A	A
Latex	A	C	C	C	B	-	A	A
Linseed Oil	A	C	B	B	A	A	A	A

	BUNA-N	EPDM	HYPALON	NEOPRENE	VITON	BRONZE	DUCTILE IRON	STAINLESS STEEL
CHEMICALS								
LPG	A	P	P	C	B	A	A	B
Mineral Oils	A	P	B	B	A	A	A	A
Minewater	A	B	C	C	A	C	P	-
Molasses	A	P	A	A	B	A	A	A
Naphtha	B	P	P	P	B	B	A	P
Nitric Acid, 10%	P	B	A	B	A	P	P	B
Nitric Acid, 100%	P	P	-	-	C	P	P	B
Nitrogen	-	A	-	-	-	A	A	A
Oleic Acid	B	C	B	B	C	B	C	B
Oxygen	C	A	A	A	A	A	A	A
Paints, Solvents	P	A	-	-	-	A	A	A
Paraffin	A	P	A	A	A	A	B	A
Phenol Gas	P	C	C	C	B	P	P	A
Tar	C	P	-	C	B	A	A	A
Salt Water	A	A	A	B	A	C	P	B
Sewage	A	B	A	A	A	C	B	B
Soap Solutions	A	A	A	A	A	B	B	A
Sugar	A	A	B	B	A	P	B	A
Sulfate Liquor	P	C	B	B	B	P	-	A
Sulfite Liquor	C	A	B	B	B	P	B	B
Sulfuric Acid 0-77%	C	B	B	P	B	P	P	B
Sulfuric Acid 100%	P	P	B	P	P	P	P	P
Tannic Acid (Tannin)	B	A	A	A	B	B	B	B
Toluol (Tolurene)	C	P	P	P	B	A	A	A
Trichlorethylene	-	P	P	P	B	A	-	A
Turpentine	A	P	P	P	A	A	B	A
Varnish	B	P	-	-	B	B	-	-
Vinegar	P	A	A	B	A	P	P	A
Water and Lime	A	A	B	B	A	P	P	A

## TEMPERATURE LIMITATIONS-

BUNA-N	+10°F to 180°F
EPDM	-30°F to 250°F
HYPALON®	0°F to 180°F
NEOPRENE-FDA	0°F to 180°F
VITON®	-20°F to 300°F

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# FLANGE BOLTING



MACHINE BOLTS



STUD BOLTS



CAP SCREWS

VALVE STYLE	CLASS	VALVE SIZE	BOLT DIA.	THREADS PER INCH	NUMBER OF TAPPED HOLES		MACHINE BOLT				STUD				CAP SCREW	
							MACHINE BOLT		CAP SCREW-BLIND		STUD		STUD-BLIND HOLE		CAP SCREW	
							THROUGH	BLIND	QTY	LENGTH	QTY	LENGTH	QTY	LENGTH	QTY	LENGTH
LUG	125	2	0.625	11	4	-	4	4.00	-	-	4	4.75	-	-	8	1.50
		2-1/2	0.625	11	4	-	4	4.50	-	-	4	5.00	-	-	8	1.50
		3	0.625	11	4	-	4	4.50	-	-	4	5.25	-	-	8	1.75
		4	0.625	11	8	-	8	5.00	-	-	8	5.75	-	-	16	1.75
		5	0.750	10	8	-	8	5.50	-	-	8	6.25	-	-	16	2.00
		6	0.750	10	8	-	8	5.50	-	-	8	6.25	-	-	16	2.00
		8	0.750	10	8	-	8	6.00	-	-	8	6.75	-	-	16	2.25
		10	0.875	9	12	-	12	6.50	-	-	12	7.50	-	-	24	2.25
		12	0.875	9	12	-	12	7.00	-	-	12	8.00	-	-	24	2.75
		14	1.000	8	12	-	12	7.50	-	-	12	8.50	-	-	24	2.75
		16	1.000	8	16	-	16	8.75	-	-	16	9.75	-	-	32	3.00
		18	1.125	7	16	-	16	9.50	-	-	16	10.75	-	-	32	3.50
20	1.125	7	16	8	16	10.25	8	3.50	16	11.50	8	5.50	40	3.50		
24	1.250	7	16	8	16	12.00	8	3.50	16	13.00	8	5.50	40	3.50		

WAFER	125	2	0.625	11	-	-	4	4.50	-	-	4	5.00	-	-		
		2-1/2	0.625	11	-	-	4	4.75	-	-	4	5.25	-	-		
		3	0.625	11	-	-	4	5.00	-	-	4	5.50	-	-		
		4	0.625	11	-	-	8	5.00	-	-	8	5.75	-	-		
		5	0.750	10	-	-	8	5.25	-	-	8	6.00	-	-		
		6	0.750	10	-	-	8	5.50	-	-	8	6.25	-	-		
		8	0.750	10	-	-	8	6.00	-	-	8	6.75	-	-		
		10	0.875	9	-	-	12	6.50	-	-	12	7.50	-	-		
		12	0.875	9	-	-	12	7.00	-	-	12	8.00	-	-		
		14	1.000	8	4	-	12	7.50	-	-	12	8.50	-	-		
		16	1.000	8	4	-	16	8.50	-	-	16	9.50	-	-		
		18	1.125	7	4	-	16	9.50	-	-	16	10.50	-	-		
		20	1.125	7	-	8	16	10.25	8	3.50	16	11.50	8	5.25		
		24	1.250	7	-	8	16	12.00	8	3.50	16	13.00	8	5.25		

Bolting lengths are calculated based on ASME B16.5 Class 150 RF flanges. For 4" and larger ASME B16.1 Class 125# flanges, use bolt lengths above.

Consult factory for 3" and smaller valves when using ASME B16.1 flanges.

Bolting lengths do not include clearance for washers. If washers are to be used their thickness must be added to the suggested bolting length

Bolting should be in accordance with ASME B18.2.1

Hex nuts should be in accordance with ASME B18.2.2 (Heavy hex used for calculation)

Bolting and hex nuts are Unified Coarse Thread Series (UNC) Class 2A (bolts) and Class 2B (hex nuts) per ASME B1.1

20 inch and 24 inch lug valves have 4 blind tapped holes each side (8 total)

14 inch through 18 inch wafer valves have 4 thru tapped holes, 20 inch and 24 inch wafer valves have 4 blind tapped holes each side (8 total)

## Large Diameter Butterfly Flange Bolting

Parameter	Size	30	36	42	48
#Tapped Holes (Thru)		24	28	32	40
#Tapped Holes (each side)		4	4	4	4
Blind, at stems, 2 at top and 2 at btm.					
<b>All Cap Screw Installation:</b>					
# of Cap Screws		48	56	64	80
Size (thd X length)		1-1/4-7x5.00	1-1/2-6x6.00	1-1/2-6x6.50	1-1/2-6x7.00
# of Cap Screws		8	8	8	8
Size (thd X length)		1-1/4-7x4.00	1-1/2-6x4.50	1-1/2-6x6.00	1-1/2-6x6.25

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# INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

## **Butterfly Valve Installation Guidelines**

Milwaukee Valve's resilient seated butterfly valves are designed for installation between Class 125 cast iron or Class 150 steel flanges, conforming to ASME B16.1, ASME B16.5 or ASME B16.47 (Series A).

The elastomer seat (liner) is lapped over into a recess in both faces of the body to provide a leak-proof seal between the valve and the faces of the pipe flanges. Installations between metallic flanges do not require gaskets and should not be used. **Installations between thermoplastic flanges (Polypropylene, Polyethylene, PVC/CPVC, etc.) require a full-faced elastomer gasket (compatible with system/media) that is 1/8" thick and has a durometer (hardness) of 70 +/- 5 Shore A at each flange connection.** Slip-on flanges are not recommended, rather flat face weld neck flanges are preferred to support the entire surface of the rubber liner.

It is good practice to install valve with side of body marked "inlet" facing pressure, especially when valve is to be dead-ended on the line. For isolating a piece of equipment, the valve downstream from the equipment in normal operation should be installed with "inlet" away from the equipment, because that is the side that will see pressure when the equipment is removed. EPDM and Buna lined valves 2" - 12" are suitable for bi-directional dead-end service. Other liner materials, epoxy coated valve bodies, and all 14" - 24" butterfly valves are unidirectional dead-end capable.

## **Valve Installation Procedure – Flange, Lug & Wafer Style Only**

1. Thoroughly clean and prepare the piping system before valve installation.
2. Inspect the valve port and seating surfaces for cleanliness just prior to installation.
3. Support the valve to prevent unnecessary stresses induced by connecting pipe.
4. Be sure the rating of the valve is compatible with the intended service conditions.
5. Operate the valve from open to closed position.
6. Spread the flanges to exceed face to face dimension by approximately 3/16" to prevent damage to the liner.
7. Valve should be installed with the disc in the "near closed" position. Milwaukee Valve butterfly valves normally are shipped with the disc in the 5% open position. The valve can be installed in the pipeline with the shaft in the vertical, horizontal or other intermediate diagonal position, based on the application.
8. Prior to tightening any flange bolts, the valve should be carefully cycled to the open position to check for possible disc interference. Interference may occur when the butterfly valve is installed on systems using pipe that has extra heavy wall thicknesses. Corrective action would include tapering the pipe ID, or the use of spool pieces.
9. Centralize valve in flanges, small valves may be supported by hand; larger valves may require strap and lifting device. (This is to ensure raised face flanges contact the valve properly, concentric and metal-to-metal all around except for 2-1/2" and smaller. For wafer valves, spacers over threaded rod on the bottom may be used to support/centralize the valve.)
10. Lug butterfly valves should be installed using the crossover method for tightening. See bolt tightening sequence and torque values below. This distributes the bolt loads evenly across the valve. **Do not over-tighten the bolts.** In dead end service (lug only) the side of the valve marked "inlet" should face the pressure side of the system. For safety, a downstream flange is recommended. See Flange Bolting page for bolt or cap screw length and diameter. EPDM and Buna lined valves 2"-12" are suitable for Bi-Directional Dead End Service.
11. Wafer butterfly valves should be centered between the flanges by installing bolts through the alignment lugs and rotating the valve into position. There should be full and even contact between the elastomer and the flange face. On wafer-type valves, use only sufficient torque to obtain metal-to-metal contact between the pipe flange faces and the valve body around the elastomer sealing faces.
12. For gear operated valves, the valve is normally shipped with the handwheel loose. The installing contractor or mechanic must take care to ensure the roll pin that holds the handwheel to the input shaft of the gear operator is installed completely and is balanced on both sides of the handwheel. The fit of the pin in the handwheel and the shaft is controlled and should provide years of reliable service.
13. Verify the gear operator travel stops after installation. Adjust as necessary.

## NOTES:

- Provide lever handles for 6" and smaller butterfly valves.
- Provide gear operator for 8" and larger butterfly valves.
- Provide chainwheel operators for valves installed seven feet or more about floor level.
- These valves are not recommended for steam service.

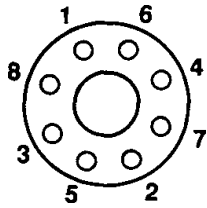
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# INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

## Recommended Bolt Tightening Sequence and Torques



BOLT TIGHTENING SEQUENCE AND TORQUES		
SIZE VALVE	SIZE FASTENERS	TORQUE (FT - LBS)
2" - 4"	5/8"	15 - 45
5" - 8"	3/4"	25 - 75
10" - 12"	7/8"	40 - 140
14" - 16"	1"	56 - 58
18" - 20"	1 1/8"	78 - 80
24" - 30"	1 1/4"	114 - 116
32" - 48"	1 1/2"	198 - 200

⚠ Important Note: If using thermoplastic flanges, always refer to the flange manufacturer's installation instructions and do not exceed their recommended torque values. Over-torquing may cause damage to the flange. See the Technical Bulletin in Technical/Service Information on the website for more information.

### Travel/End Stop Adjustment Procedure

See Milwaukee Valve's Instructions for Mounting Gear Operators for more information: Instructions for Mounting Gear Operators in Technical/Service Information on website.

### Operation

Manual butterfly valves can be operated by a lever handle or a gear operator. It is usually recommended that gear operators be used for valves 8" and larger. Turning the valve handle 90° clockwise will fully close the valve. The valve handle also serves as a disc position indicator. When the valve handle is parallel to the pipe, the valve is open, when perpendicular to the pipe, the valve is closed. Gear operators provide position indication with an indicator dial located on the top of the operator. Valves that are used infrequently should be cycled on a regular basis from open to close to prevent the build-up of material inside the valve.

### Inspection & Maintenance

Butterfly valves require no routine maintenance. Periodic cycling of the valve is highly recommended.

### Repair Parts

Under normal conditions, spare parts are not required. Consult factory for availability for repair parts.

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# FLOW SIZING

The nomograph gives relationships of valve size, flow, velocity and pressure drop for various disc position.

## Limitations:

Nomograph values are approximate. Do not use equations for any of the conditions listed below, please consult factory.

- For compressible fluids, where pressure ( $\Delta p$ ) exceeds half of inlet pressure.
- For non-compressible fluids, where pressure drop causes cavitation or flashing.
- For dual-phase flow such as steam-water mixtures.

## SAMPLE CALCULATION - LIQUID

### Given:

Water (1.0 specific gravity) at 60°F is flowing through a 6-inch valve at a rate of 1,000 gpm.

### Find:

Line velocity (ft./sec.) and pressure drop when valve is full-open (disc at 90°).

### Solution:

From 6-inch valve size at lower left of nomograph, go diagonally up to the intersecting horizontal line for 1,000 gpm. From that point, proceed directly down to determine line velocity as 11 ft./sec.

16" TO 24" SIZES  
10" TO 14" SIZES  
2" TO 8" SIZES

For pressure drop, return to the 1,000 gpm intersection and continue up to "90° disc open" intersecting diagonal line. From this point, go horizontally to the left to determine pressure drop as 0.5 psi.

## SAMPLE CALCULATION - GAS

### Given:

Gas (.08 lb./cu. ft. density) is flowing through a 8-inch valve at a rate of 1,500 cu. ft./min.

### Find:

Line velocity (ft./sec.) and pressure drop when valve is full-open (disc at 90°).

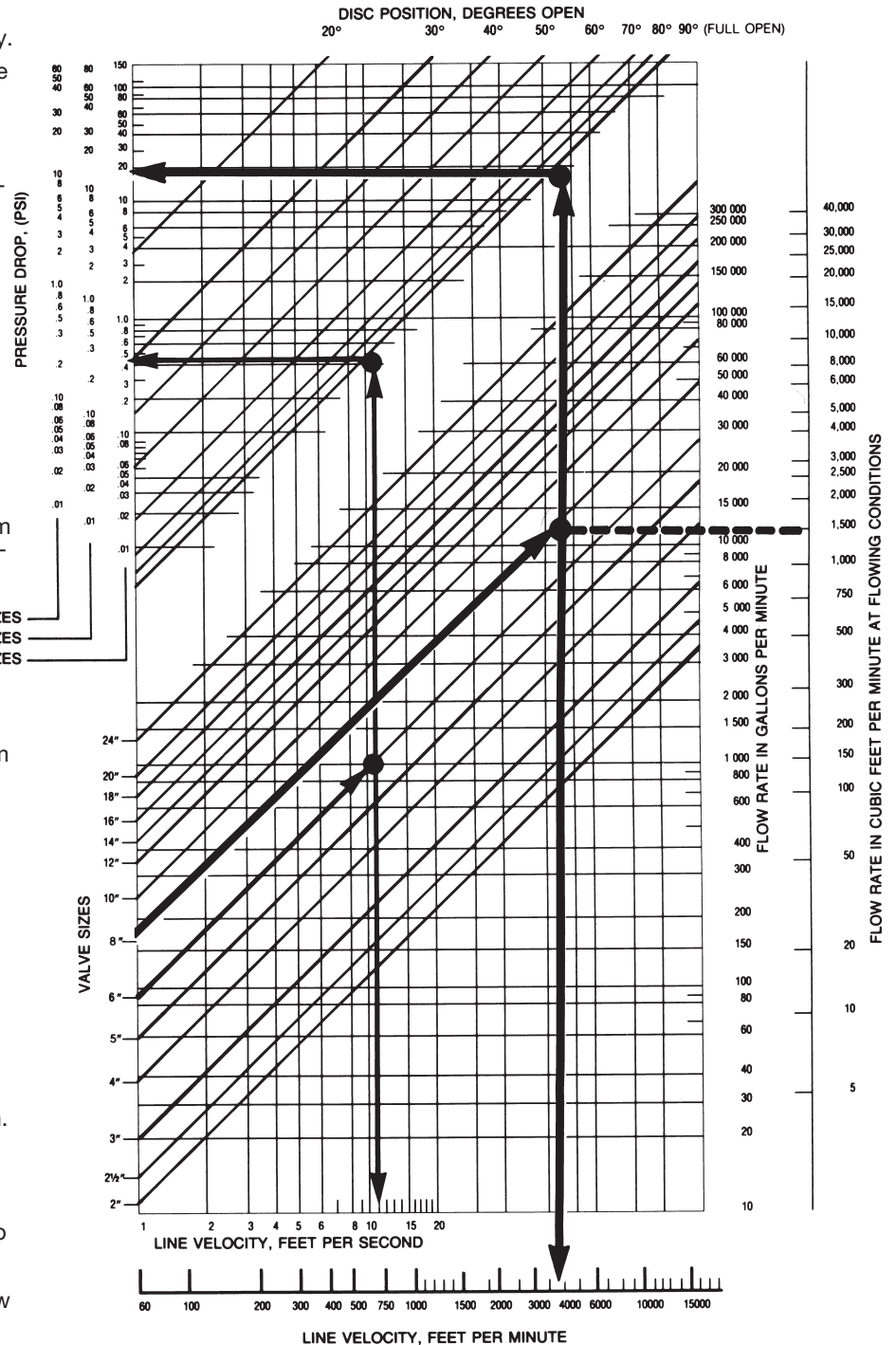
### Solution:

From 8-inch valve size at lower left of nomograph, go diagonally up to the intersecting horizontal line for 1,500 cu. ft./min. From that point, proceed directly down to bottom line of nomograph to determine line velocity as 4000 (ft./min.).

For pressure drop, return to the 1,500 cu. ft./min. intersection and continue up to "90° disc open" intersecting diagonal line. From this point, go horizontally to the left to determine pressure drop as 17 psi. Now convert pressure drop to gas by dividing gas density by water density and multiplying by 17.

$$\Delta p = \frac{.08}{62.34} \times 17 = 0.22 \text{ psi}$$

## NOMOGRAPH





# FLOW COEFFICIENTS

## C<sub>v</sub> VALUES

The valve flow coefficient (C<sub>v</sub>) is a number which represents a valve's ability to pass flow. The bigger the C<sub>v</sub>, the more flow a valve can pass with a given pressure drop. A C<sub>v</sub> of 1 means a valve will pass 1 gallon per minute (gpm) of 60°F water with a pressure drop (Δp) of 1 (PSI) across the valve. A C<sub>v</sub> of 350 means a valve will pass 350 gpm of 60°F water with a Δp of 1 PSI.

Valve Size (in.)	C <sub>v</sub> @ VARIOUS DISC ANGLES							Full 90° Open (C <sub>v</sub> )
	20°	30°	40°	50°	60°	70°	80°	
2	4.06	14.2	26.3	44.5	70.6	105	135	159
2-1/2	6.17	20.9	38.6	65.3	140	156	215	266
3	13.6	31.4	57.9	98.0	156	240	342	457
4	23.9	55.1	102	173	274	423	625	860
5	37.2	85.6	158	268	426	656	970	1,320
6	53.3	123	227	384	610	941	1,420	2,020
8	94.3	217	401	679	1,080	1,660	2,500	3,540
10	145	334	617	1,040	1,660	2,560	3,830	5,580
12	209	481	888	1,500	2,390	3,690	5,620	8,080
14	335	670	1,226	1,935	2,893	4,406	6,752	9,578
16	443	886	1,622	2,560	3,827	5,829	8,933	12,671
18	567	1,138	2,075	3,275	4,896	7,457	11,429	16,211
20	711	1,422	2,609	4,116	6,156	9,377	14,371	20,385
24	1,038	2,078	3,792	5,985	8,947	13,628	20,887	29,627
30	9,583	14,375	19,167	23,958	28,750	33,542	38,333	43,125
36	14,163	21,245	28,326	35,408	42,289	49,571	56,652	63,734

## GENERAL NOTES

- Liquid flow data is based on pressure drop and flow rate with viscosity similar to water at 60°F using flow coefficient.
- Nomograph flow rate for gases is in cubic feet per minute (cfm) at flowing conditions. To convert flow rate from standard cu. ft. per minute to cfm, use the following formula:

$$\text{CFM} : \frac{(\text{SCFM} \times 14.7) \times (460 + ^\circ\text{F})}{(\text{line pressure, psia}) \times 520}$$

- Gas density in lbs./cu. ft., equals:

$$\frac{\left( \frac{2.70 \times}{\text{line pressure, psia}} \right) \times \left( \text{specific gravity of gas (relative to air)} \right)}{460 + ^\circ\text{F}}$$

- Limitations:**

Do not use equations for any of the conditions listed below, please consult factory.

- For compressible fluids, where pressure (Δp) exceeds half of inlet pressure.
- For non-compressible fluids, where pressure drop causes cavitation or flashing.
- For dual-phase flow such as steam-water mixtures.

C<sub>v</sub> = Flow coefficient for valves; expresses flow rate in gallons per minute of 60F water with 1.0 psi pressure drop across valve.

$$C_v = Q \sqrt{\frac{SQ}{(62.34)(dp)}}$$

K = resistance coefficient.

$$K = d \sqrt{\frac{29.9}{C_v}}$$

SQ = weight density of fluid, in pounds per cubic feet.

d = internal diameter of pipe, in inches.

Q = rate of flow, in gallons per minute.

dp = differential pressure, in pounds per square inch gauge.



# ACTUATION SIZING CHARTS

OPERATING TORQUE (IN./LBS.) – MILWAUKEE VALVE “M & C” SERIES BUTTERFLY VALVES Required at valve stem at pressure differentials indicated.									
Fluid	Valve Size	25 psi	50 psi	75 psi	100 psi	125 psi	150 psi	175 psi	200 psi
For Oils and Similar Lubricating Liquids	2	50	51	52	53	55	56	58	60
	2-1/2	60	61	63	65	68	69	70	73
	3	74	80	83	89	94	100	102	104
	4	120	130	145	156	168	180	190	200
	5	185	210	230	250	275	300	310	340
	6	280	320	360	400	445	485	530	580
	8	500	580	650	750	830	920	1000	1080
	10	800	900	1070	1200	1480	1600	1700	1800
	12	1200	1480	1700	1800	2190	2400	2650	2900
	14	1790	2190	2435	2670	3030	3340		
	16	2310	2970	3340	3670	4200	4755		
	18	3055	3790	4320	4835	5620	6375		
	20	3805	4795	5410	6170	7275	8190		
24	5615	6370	7980	9000	10632	11800			
For Water and Other Non-Lubricating Liquids	2	100	101	103	110	115	118	120	122
	2-1/2	105	107	108	112	118	120	125	128
	3	160	166	172	180	183	186	190	195
	4	273	285	298	310	323	335	348	360
	5	420	440	465	485	510	530	550	575
	6	625	660	700	745	790	825	870	900
	8	1100	1200	1280	1350	1450	1520	1600	1690
	10	1700	1900	2000	2210	2390	2550	2700	2880
	12	2500	2800	3100	3300	3580	3800	4100	4360
	14	3804	4164	4428	4800	5160	5508		
	16	4920	5508	6000	6600	7152	7608		
	18	6504	7200	8004	8700	9552	10200		
	20	8064	9108	10008	11100	12000	13104		
24	11904	13500	14760	16200	17544	18888			
For Gases Including Non-Lubricating of Dry Gases	2	170	171	173	174	176	178	181	183
	2-1/2	240	245	248	250	253	257	260	263
	3	336	342	348	360	370	365	380	385
	4	570	585	595	610	620	635	645	660
	5	760	800	835	870	900	935	970	1000
	6	1250	1300	1350	1400	1440	1500	1540	1580
	8	2350	2440	2520	2600	2670	2700	2830	2900
	10	3700	3900	4000	4200	4400	4500	4700	4900
	12	5300	5580	5800	6100	6300	6600	6850	7100
	14	5706	6246	6642	7200	7740	8262		
	16	7380	8262	9000	9900	10700	11400		
	18	9756	10800	12000	13050	14328	15300		
	20	12096	13662	15012	16650	18000	19650		
24	17856	20250	22146	243000	26300	28330			

Valve Size	Operating Torque (IN./LBS.) - Large Diameter Butterflies*					
	50 PSI		100 PSI		150 PSI	
	Wet	Dry	Wet	Dry	Wet	Dry
30"	31,500	46,750	34,000	51,000	36,750	55,000
36"	44,750	69,250	47,930	71,750	51,250	76,750
42"	76,750	115,250	78,750	123,250	88,000	131,750
48"	106,500	160,250	119,750	171,500	122,000	183,500

\* Operating Torques Based on EPDM/Buna at Ambient Temperature

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