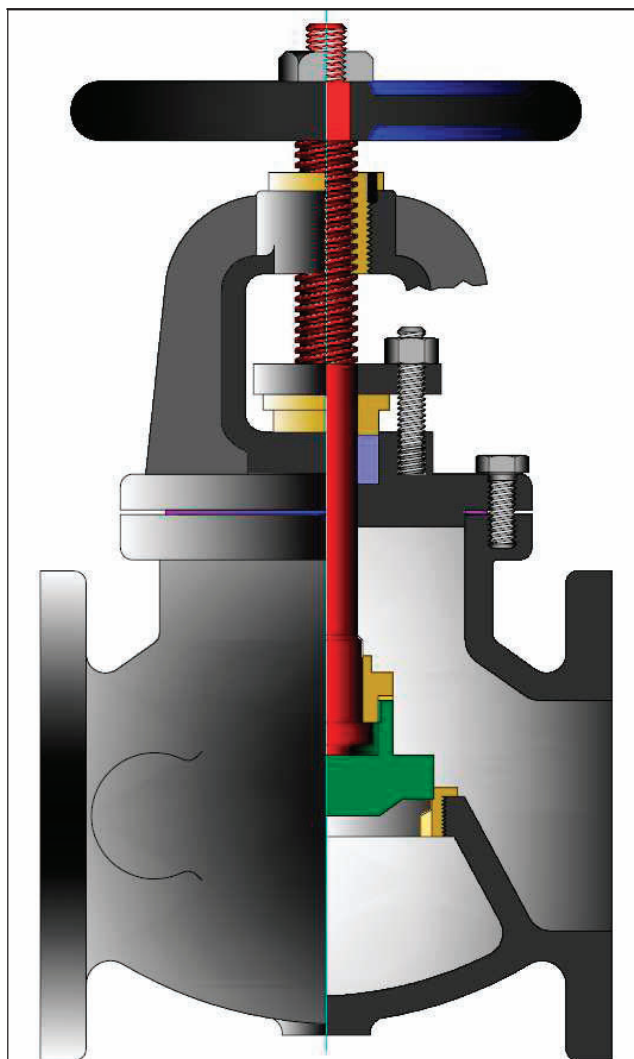


**MSS SP-85 GLOBE VALVE**  
BOLTED BONNET, FLANGED ENDS  
2 TO 12" (50 TO 300 mm) CLASS 125  
CAST IRON



**STANDARD MATERIALS**

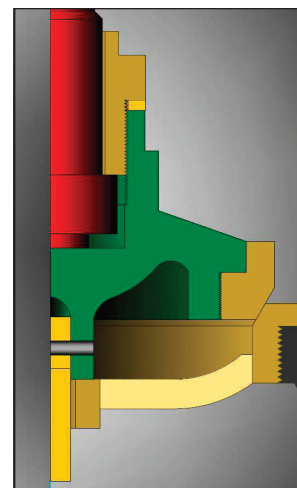
PART		MATERIALS
Body		A126-B
Bonnet		A126-B
Disc	2 - 4"	B62
	5 - 12"	A126-B
Disc Nut		B62
Body Seat Ring		B62
Disc Seat Ring (1)		B62
Stem		B16
Stem Bushing		B62
Stem Bushing Set Screw		A307-A
Gland Flange		A536
Gland Flange Bolt		A307-A
Gland Flange Nut		A563-A
Gland		B62
Packing		Non-Asbestos
Disc Nut Washer		B16
Gasket		Non-Asbestos
Hand Wheel		A126-B
Hand Wheel Nut		A563-A
Taper Pin (1)		Steel
Guide Pin (1)		B16
Body / Bonnet Stud		A307-A
Body / Bonnet Nut		A563-A

Class	Trim	Fig. No.
125	Bronze	241

(1) For valve sizes 5" to 12"

**Design Specifications**

Item	Applicable Specification
Wall thickness	ASME B16.1
Pressure - temperature ratings	MSS SP-85
General valve design	MSS SP-85 Type I
End to End dimensions	ASME B16.10
Flange design	ASME B16.1
Materials	ASTM



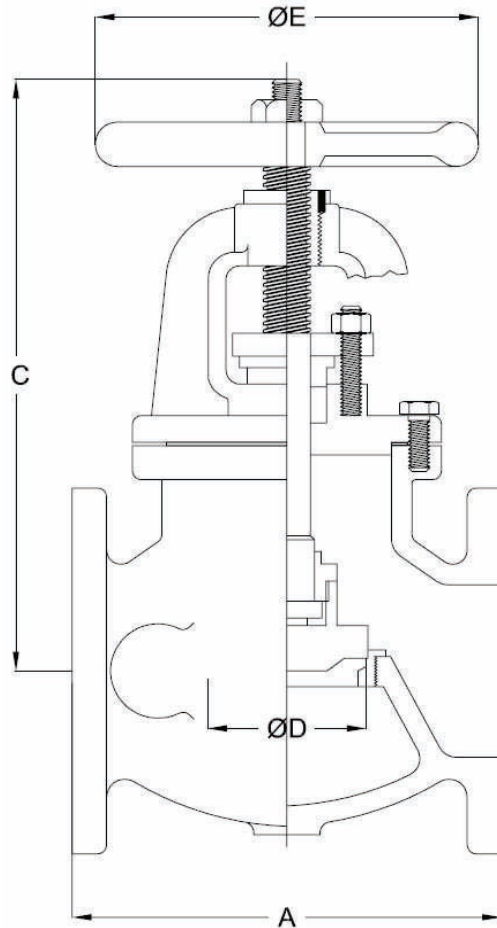
Disc design for valve sizes 5" to 12"

**DESIGN FEATURES:**

- **Seat faces** lapped for smooth finish and superior sealing.
- **Swivel** disc for optimal seating and longer seat life.
- **Stems** are rotating / rising design.
- **Each** valve is shell and seat pressure tested per industry standard MSS SP-85.
- **Gland** is two piece gland / gland flange design for optimal alignment and uniform packing compression.

# **GLOBE VALVE DIMENSIONS CLASS 125**

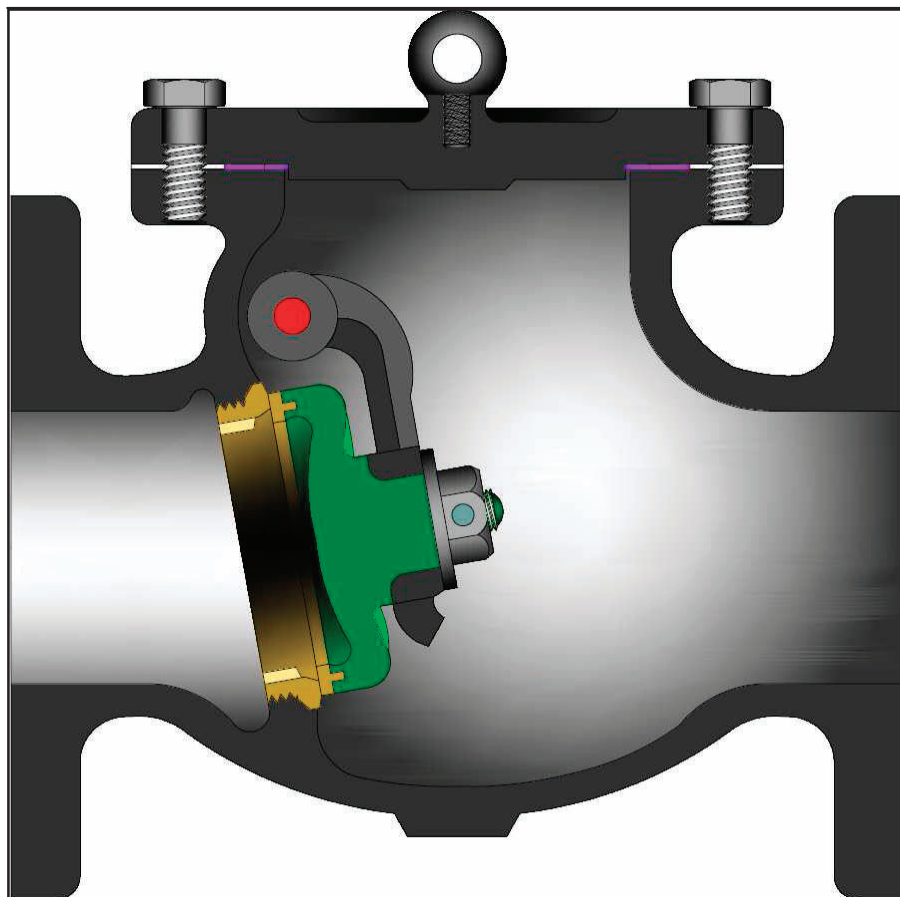
SIZE	FIG 241					
	A	C	D	E	WT	C <sub>v</sub>
in mm						
2	8.00	11.9	2.00	7.0	36	45
50	203	303	51	178	16	
2½	8.50	12.8	2.50	7.0	49	75
65	216	326	64	178	22	
3	9.50	13.6	3.00	8.0	57	110
80	241	346	76	203	26	
4	11.50	14.6	4.00	10.0	95	200
100	292	370	102	254	43	
5	13.00	17.7	5.00	12.0	139	320
125	330	450	127	305	63	
6	14.00	19.7	6.00	12.0	183	475
150	356	500	152	305	83	
8	19.50	22.7	8.00	14.0	378	875
200	495	576	203	356	172	
10	24.50	27.0	10.00	16.0	523	1370
250	622	686	254	406	237	
12	27.50	29.8	12.00	18.0	700	2050
300	699	757	305	457	318	



**C** = Center to top open

**WT** = Weight

**C<sub>v</sub>** = Flow Coefficient



Class	Trim	Fig. No.
125	Bronze	559
	Iron	1259
	T316 SS	559P

### Design Specifications

Item	Applicable Specification
Wall thickness	ASME B16.1
Pressure - temperature ratings	MSS SP-71
General valve design	MSS SP-71 Type I
End to End dimensions	ASME B16.10
Flange design	ASME B16.1
Materials	ASTM

### STANDARD MATERIALS

FIGURE NUMBER	559	1259	559P
CLASS	125	125	125
PART	MATERIALS		
Body	A126-B		3% Nickel
Cap	A126-B		3% Nickel
Disc	A126-B or A536		3% Nickel (1)
Disc Seat Ring	B62	-	A351 Gr. CF8M (1)
Seat Ring	B62	A536	A351 Gr. CF8M
Gasket	Non-Asbestos		
Carrier	A536		3% Nickel
Carrier Pin	B16	A276-410	A276-304
Disc Nut	A307-A		T304 SS
Split Pin	T304 SS	T410 SS	T304 SS
Washer	Steel		T304 SS
Body / Cap Stud	A307-A		
Body / Cap Nut	A563-A		
Side Plug	B16	A276-410	A276-304

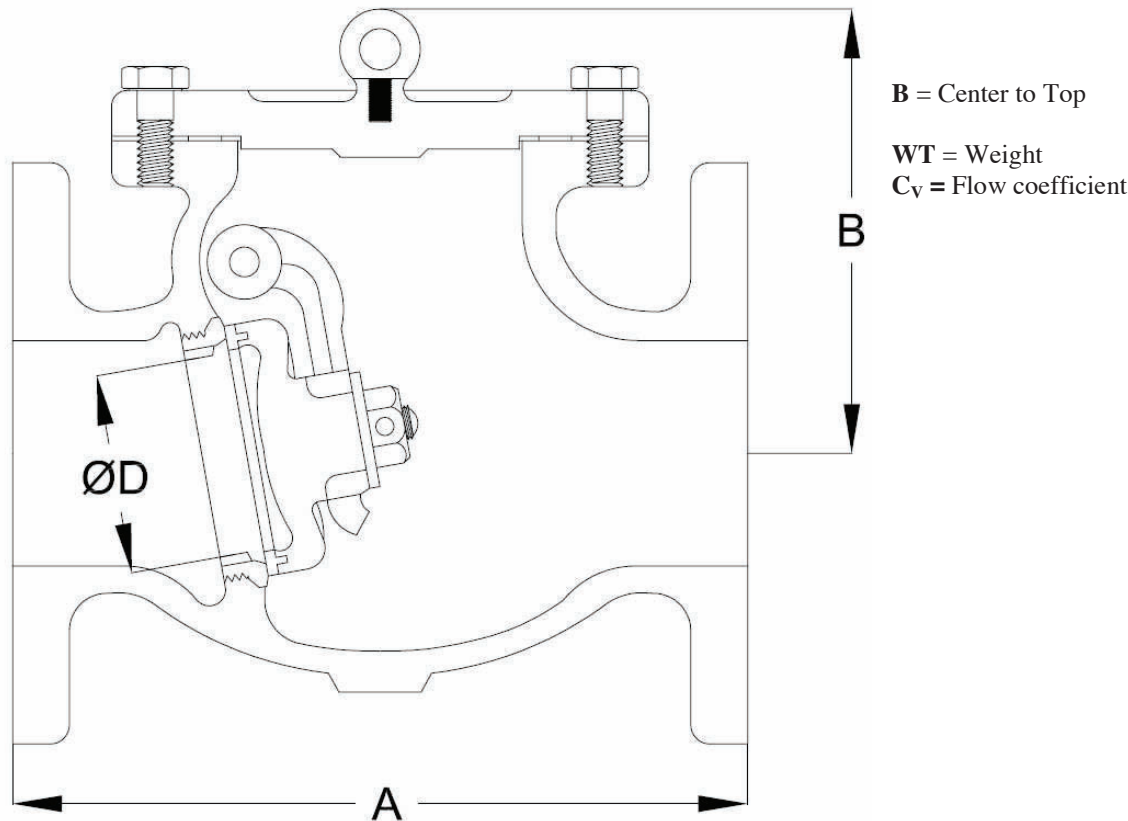
### DESIGN FEATURES:

- **Seat faces** lapped for smooth finish and superior sealing.
- **Swivel disc** for improved seat alignment and longer life.
- **Each** valve is shell and seat pressure tested per industry standard MSS SP-71.
- **Check** valve are suitable for service in horizontal line with cap vertical or in a vertical line with flow upward.

(1) For sizes 2" and 3", the disc is solid A351 Gr. CF8M for figure 559P.

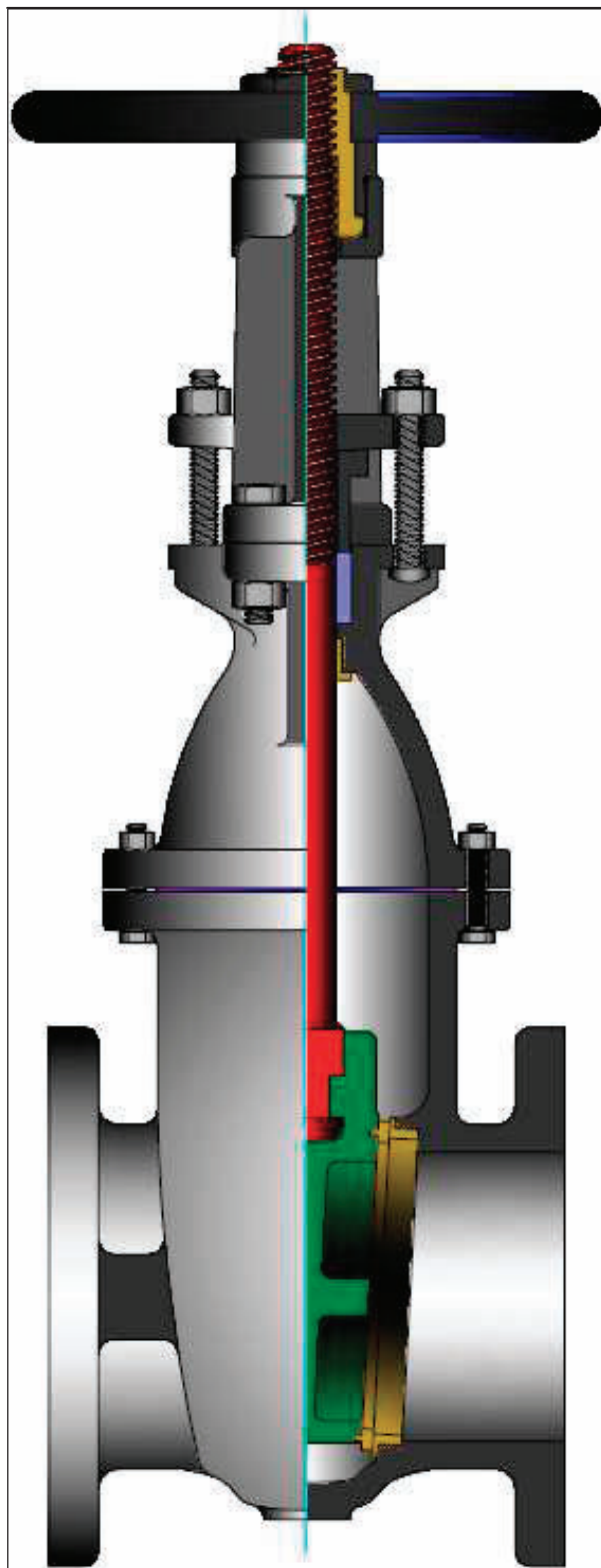
SWING CHECK VALVE DIMENSIONS CLASS 125

SIZE	FIG 559, 1259, & 559P				
in	A	B	D	WT	C <sub>v</sub>
mm					
2	8.00	4.7	2.00	25	45
50	203	118	50	11	
2½	8.50	5.4	2.50	36	75
65	216	136	64	16	
3	9.50	5.8	3.00	46	110
80	241	147	75	21	
4	11.50	6.7	3.94	81	210
100	292	169	100	37	
5	13.00	7.8	4.94	115	345
125	330	198	125	52	
6	14.00	8.5	5.94	150	530
150	356	215	150	68	
8	19.50	10.4	7.94	253	1010
200	495	264	200	115	
10	24.50	11.9	9.88	442	1580
250	622	303	250	200	
12	27.50	13.5	12.00	638	2460
300	699	343	305	289	
14	31.00	15.5	14.00	792	3340
350	787	394	356	359	
16	36.00	17.6	16.00	1020	4360
400	914	448	406	463	
18	36.00	19.3	18.00	1304	5980
450	914	490	457	591	
20	40.00	22.3	20.00	1771	7400
500	1016	565	508	803	
24	48.00	24.9	24.00	2630	10600
600	1219	632	610	1193	



# UL AND FM IRON VALVES

**UL AND FM MSS SP-70 GATE VALVE**  
**BOLTED BONNET, FLANGED ENDS**  
**IRON, RISING STEM**  
**2 TO 12" (50 TO 300 mm) CLASS 175**



**STANDARD MATERIALS**

PART	MATERIALS
Body	A126-B
Bonnet	A126-B
Yoke	A126-B
Wedge	A126-B
Wedge Seat Ring	B62
Body Seat Ring	B62
Stem	B16
Stem Bushing	B62
Stem Bushing Lock Nut	A536
Gland Flange	A536
Gland Flange Bolt	A307-A
Gland Flange Nut	A307-A
Gland	B62
Packing	Non-Asbestos
Gasket	Non-Asbestos
Backseat Ring	B62
Hand Wheel	A126-B
Hand Wheel Nut	A536
Body / Bonnet Stud	A307-A
Body / Bonnet Nut	A307-A
Bonnet / Yoke Bolt	A307-A
Bonnet / Yoke Nut	A307-A

**Design Specifications**

Item	Applicable Specification
Wall thickness	ASME B16.1
Pressure - temperature ratings	MSS SP-70
General valve design	MSS SP-70
End to End dimensions	ASME B16.10
Flange design	ASME B16.1
Fire Service	FM 1120, FM 1130, and UL 262
Materials	ASTM

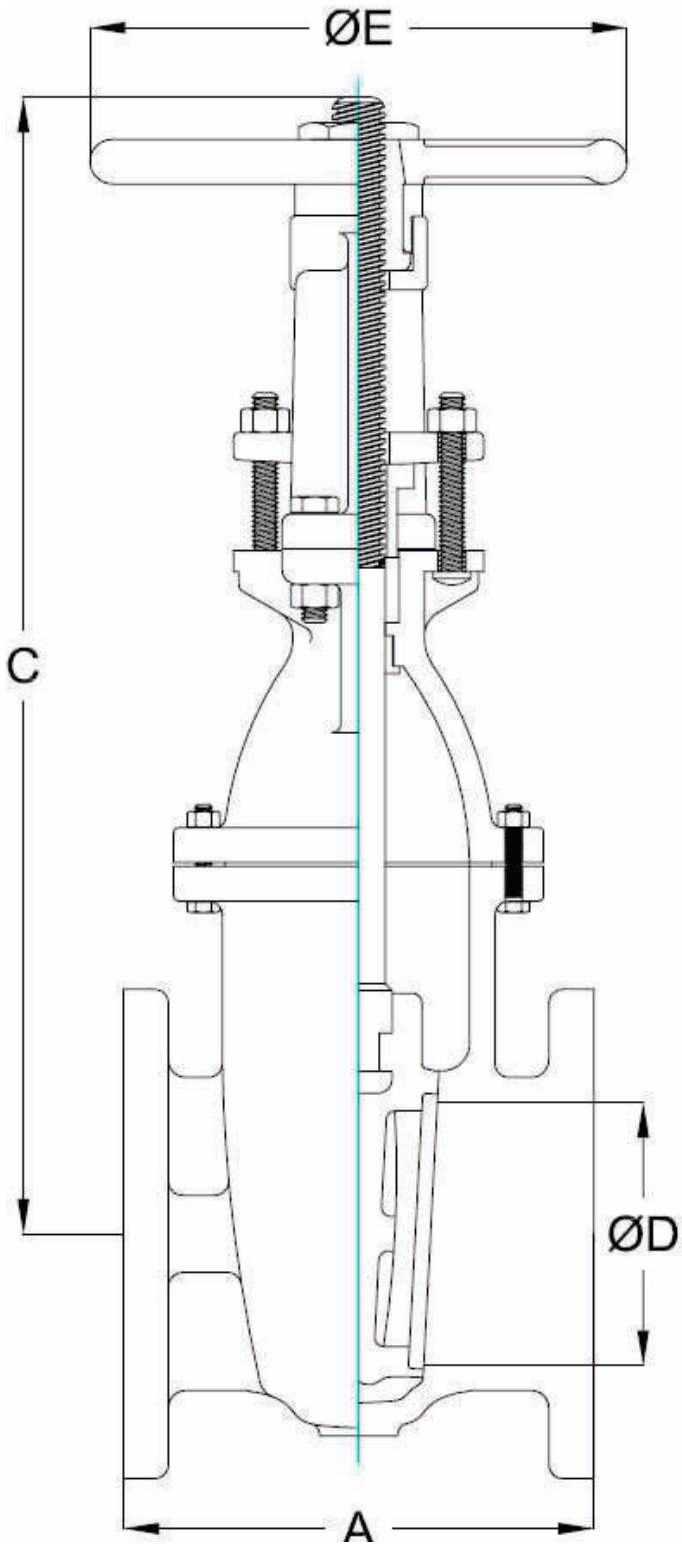
**DESIGN FEATURES:**

- **Seat faces** lapped for smooth finish and superior sealing.
- **Stems** are non-rotating with surface finish to optimize packing seal.
- **Each** valve is shell and seat pressure tested per industry standard MSS SP-70.
- **Gland** is two piece gland / gland flange design for optimal alignment and uniform packing compression.
- **Renewable** seat rings.
- **Body** has 5 tapping bosses.
- **Solid wedge.**
- **UL and FM** approved fire safety valves.

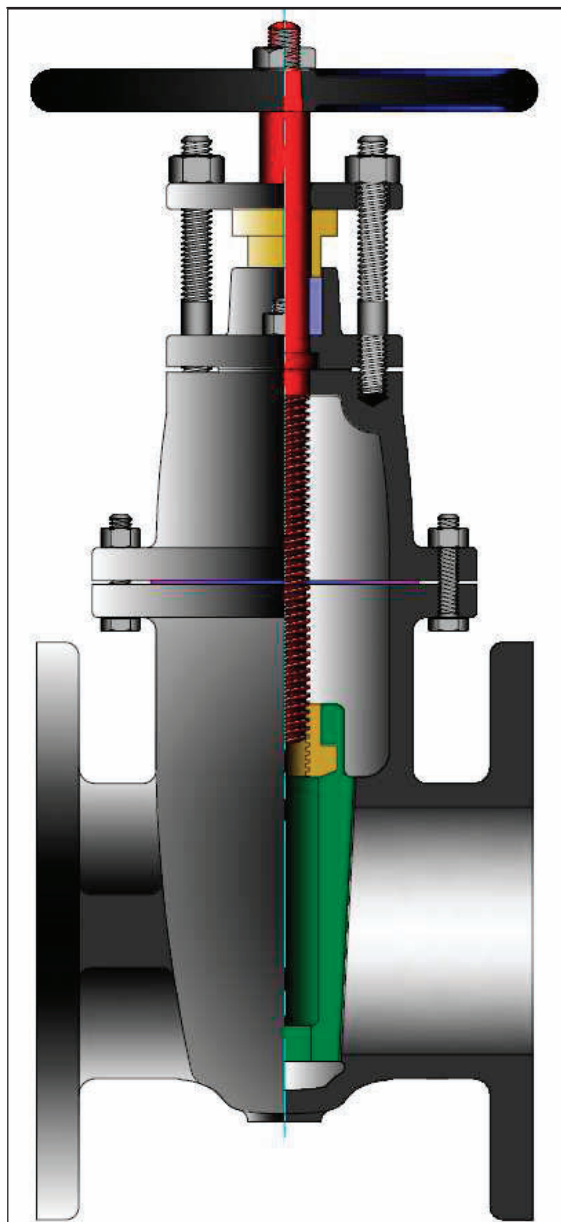
Class	Fig. No.
175	762U

UL AND FM GATE VALVE DIMENSIONS (CLASS 125).

SIZE	FIG 762U						
in	A	C	D	E	WT	lb	C <sub>v</sub>
mm						kg	
2	7.00	14.8	2.00	7.0	36		240
50	178	375	51	178	16		
2½	7.50	16.6	2.50	7.0	48		390
65	191	422	64	178	22		
3	8.00	18.9	3.00	8.0	60		560
80	203	479	76	203	27		
4	9.00	23.4	4.00	10.0	103		1000
100	229	594	102	254	47		
6	10.50	32.3	6.00	12.0	186		2400
150	267	819	152	305	84		
8	11.50	39.5	8.00	14.0	298		4500
200	292	1003	203	356	135		
10	13.00	48.1	10.00	16.0	441		7000
250	330	1222	254	406	200		
12	14.00	56.0	12.00	18.0	628		10500
300	356	1422	305	457	285		



C = Center to top open  
WT = Weight  
C<sub>v</sub> = Flow Coefficient



Class	Fig. No.
125	710U

**DESIGN FEATURES:**

- **Seat faces** lapped for smooth finish and superior sealing.
- **Renewable** seat rings.
- **Body** has 5 tapping bosses.
- **Each** valve is shell and seat pressure tested per industry standard MSS SP-70.
- **Gland** is two piece gland / gland flange design for optimal alignment and uniform packing compression.
- **UL and FM** approved fire safety valves.

**STANDARD MATERIALS**

PART	MATERIALS
Body	A126-B
Bonnet	A126-B
Stuffing Box	A126-B
Wedge	A126-B
Wedge Seat Ring	B62
Body Seat Ring	B62
Stem	B16
Gasket	Non-Asbestos
Wedge Nut	B62
Gland Flange	A536
Gland Flange Bolt	A307-A
Gland Flange Nut	A563-A
Gland	B62
Packing	Non-Asbestos
Gasket	Non-Asbestos
Backseat Ring	B62
Hand Wheel	A126-B
Hand Wheel Nut	A536
Body / Bonnet Stud	A307-A
Body / Bonnet Nut	A307-A

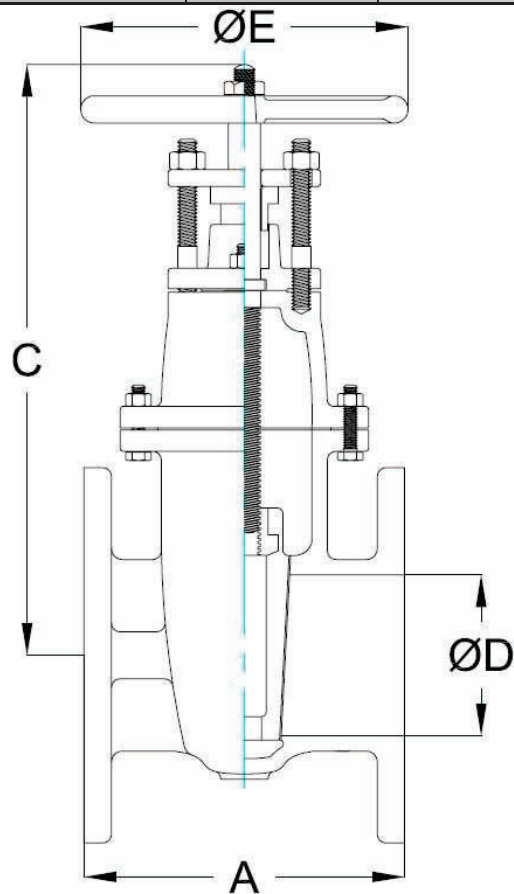
**Design Specifications**

Item	Applicable Specification
Wall thickness	ASME B16.1
Pressure - temperature ratings	MSS SP-70
General valve design	MSS SP-70
End to End dimensions	ASME B16.10
Flange design	ASME B16.1
Fire Service	FM 1120, FM 1130, and UL 262
Materials	ASTM



# **UL AND FM GATE VALVE DIMENSIONS (CLASSES 125).**

SIZE	FIG 710U					
in	A	C	D	E	WT	lb
mm						kg
2	7.00	12.3	2.00	7.0	33	240
50	178	312	51	178	15	
2½	7.50	13.3	2.50	7.0	44	390
65	191	337	64	178	20	
3	8.00	15.0	3.00	8.0	55	560
80	203	381	76	203	25	
4	9.00	17.8	4.00	10.0	95	1000
100	229	451	102	254	43	
5	10.00	20.1	5.00	12.0	132	1600
125	254	511	127	305	60	
6	10.50	23.1	6.00	12.0	172	2400
150	267	587	152	305	78	
8	11.50	27.8	8.00	14.0	271	4500
200	292	705	203	356	123	
10	13.00	32.9	10.00	16.0	361	7000
250	330	836	254	406	164	
12	14.00	37.4	12.00	18.0	578	10500
300	356	949	305	457	262	

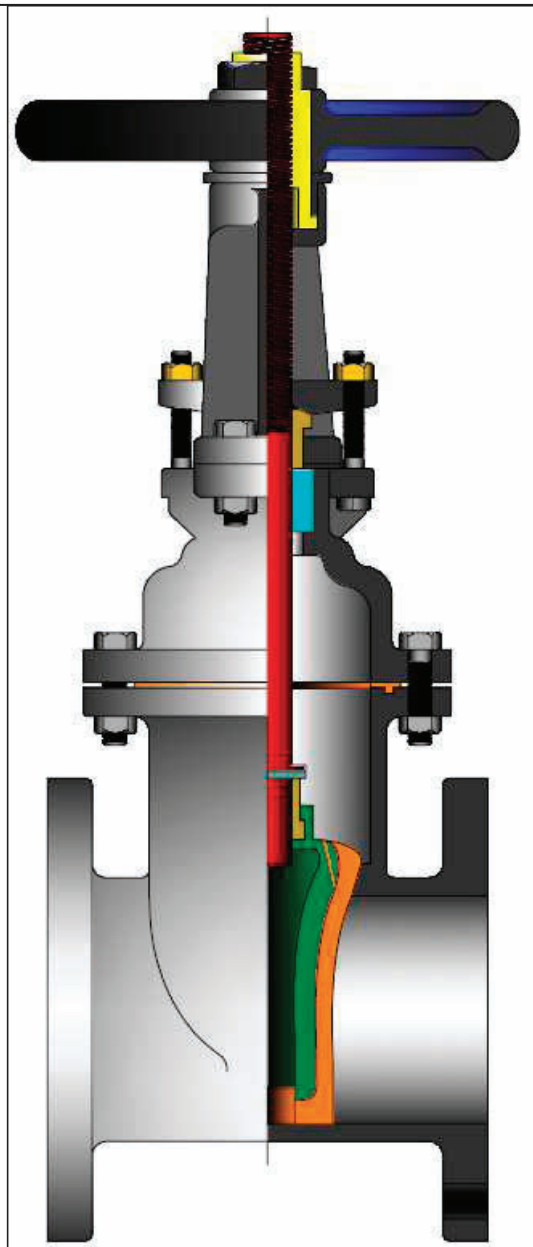


**C** = Center to top open

**WT** = Weight

**C<sub>v</sub>** = Flow Coefficient

**UL AND FM MSS SP-70 GATE VALVE**  
BOLTED BONNET, FLANGED ENDS  
IRON, RISING STEM  
2½ TO 12" (50 TO 300 mm) CLASSES 125 & 250



Class	Fig. No.
125	722U
250	722F

**DESIGN FEATURES:**

- Each valve is shell and seat pressure tested per industry standard MSS SP-70.
- Gland is two piece gland / gland flange design for optimal alignment and uniform packing compression.
- UL and FM approved fire protection valves.
- Epoxy coated interior/exterior upon request.

**STANDARD MATERIALS**

PART	MATERIALS
Body	A126-B
Bonnet	A126-B
Yoke (2)	A126-B
Stem Bushing	B62
Stem Bushing Locknut (3)	A536
Wedge (1)	Cast Iron Coated in EPDM
Disc Nut	B62
Taper Pin	304 SST
Stem	420 SST
Gland Flange	A536
Gland	B62
Packing	Non-Asbestos
Gasket	EPDM
O-Ring (4)	EPDM
Gland Bolt	Steel
Gland Nut	B16
Yoke Bolt (2)	Steel
Yoke Nut (2)	Steel
Body Bolt	Steel
Body Nut	Steel
Hand Wheel	A126-B
Hand Wheel Nut	A536

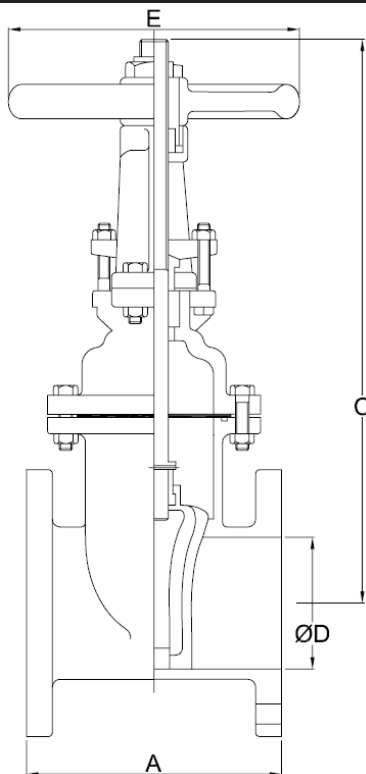
- (1) In class 250, size 2½" is cast bronze instead of EPDM.  
 (2) In class 250, for sizes 6"-12".  
 (3) In class 250, for sizes 2½"-6"  
 (4) In class 250, disc assembly contains o-ring.

**Design Specifications**

Item	Applicable Specification
Wall thickness	ASME B16.1
Pressure - temperature ratings	MSS SP-70
General valve design	MSS SP-70
End to End dimensions	ASME B16.10
Flange design	ASME B16.1
Fire Service	FM 1120, FM 1130, and UL 262
Materials	ASTM

# **UL AND FM GATE VALVE DIMENSIONS (CLASSES 125 & 250).**

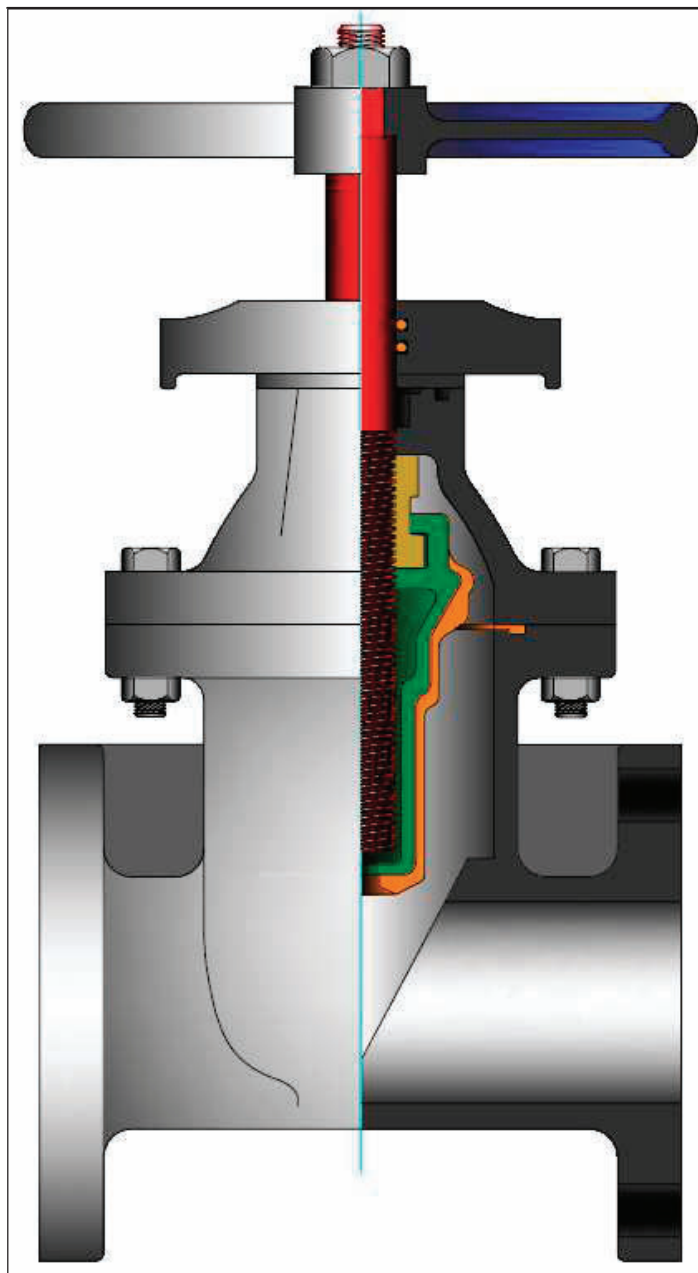
SIZE	FIG 722U							FIG 722F						
in	A	C	D	E	WT	lb	C <sub>V</sub>	A	C	D	E	WT	lb	C <sub>V</sub>
mm						kg							kg	
2 ½	7.50	14.1	2.50	7.0	44		490	8.50	14.1	2.50	7.0	51		490
65	191	359	64	178	20			216	359	64	178	23		
3	8.00	20.9	3.00	10.0	85		710	9.50	20.9	3.00	10.0	102		710
80	203	530	76	254	39			241	530	76	254	46		
4	9.00	22.3	4.00	10.0	96		1300	11.00	22.3	4.00	10.0	120		1300
100	229	565	102	254	44			279	565	102	254	54		
6	10.50	30.5	6.00	12.0	178		3100	12.00	30.5	6.00	12.0	218		3100
150	267	775	152	305	81			305	775	152	305	99		
8	11.50	38.3	8.00	14.0	279		5700	13.00	38.3	8.00	14.0	317		5700
200	292	972	203	356	127			330	972	203	356	144		
10	13.00	46.3	10.00	16.0	435		8900	14.75	46.3	10.00	16.0	517		8900
250	330	1175	254	406	197			375	1175	254	406	234		
12	14.00	54.9	12.00	18.0	607		13400	16.62	54.9	12.00	18.0	707		13400
300	356	1394	305	457	275			422	1394	305	457	321		



**C** = Center to top open

**WT** = Weight

**C<sub>v</sub>** = Flow Coefficient



#### STANDARD MATERIALS

PART	MATERIALS
Body	A126-B
Bonnet	A126-B
Box	A126-B
Operation Nut	A126-B
Wedge	Cast Iron Coated in EPDM
Disc Nut	B62
Base Plate	A126-B
Stem	420 SST
O Ring	EPDM
Gasket	EPDM
Body Bolt	Steel
Body Nut	Steel
Hand Wheel	A126-B
Hand Wheel Nut	Steel

Class	Fig. No.
125	721UF

#### DESIGN FEATURES:

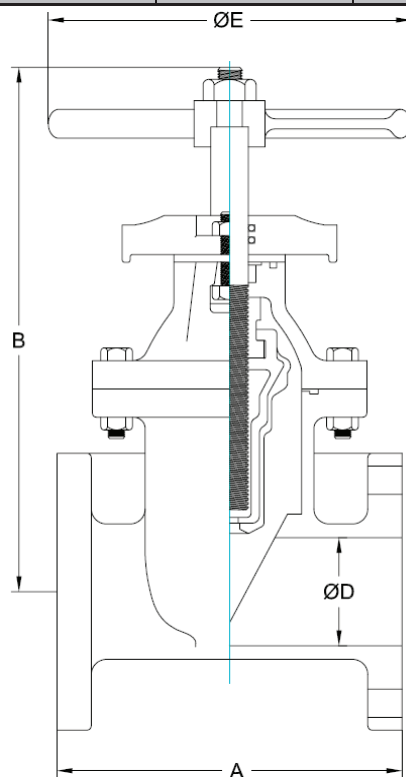
- Each valve is shell and seat pressure tested per industry standard MSS SP-70.
- UL and FM approved fire protection valves.
- Epoxy coated interior/exterior upon request.

#### Design Specifications

Item	Applicable Specification
Wall thickness	ASME B16.1
Pressure - temperature ratings	MSS SP-70
General valve design	MSS SP-70
End to End dimensions	ASME B16.10
Flange design	ASME B16.1
Fire Service	FM 1120, FM 1130, and UL 262
Materials	ASTM

# **UL AND FM GATE VALVE DIMENSIONS (CLASS 125).**

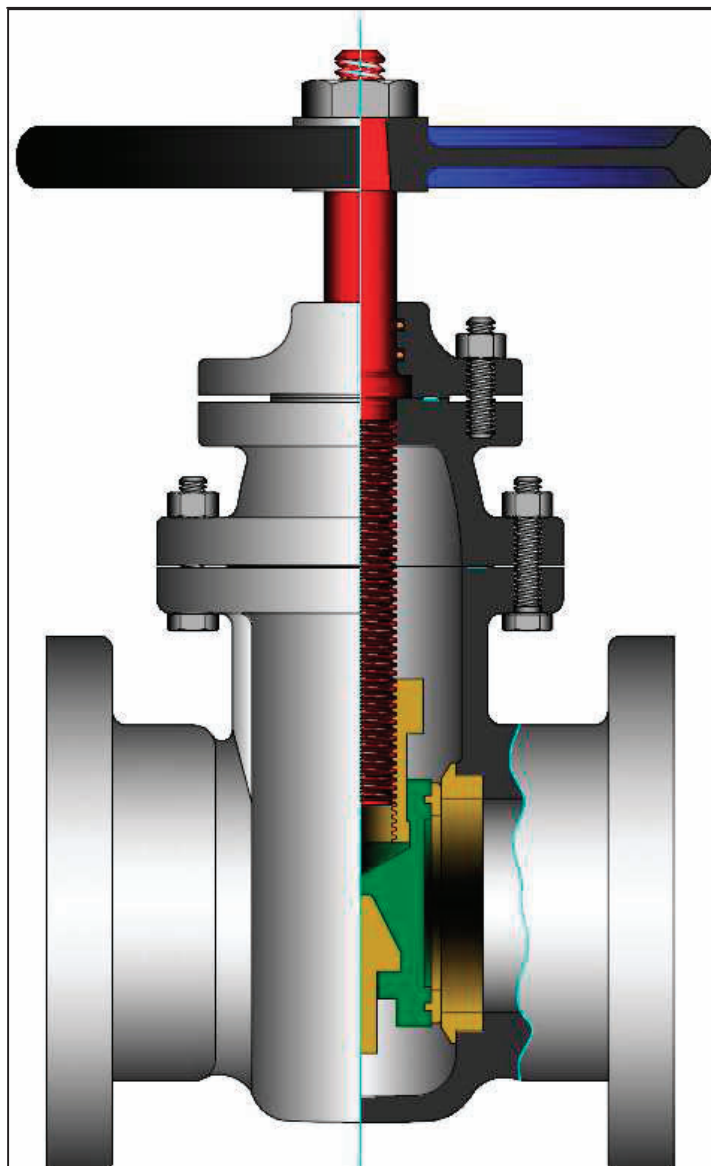
SIZE	FIG 721UF					
in	A	C	D	E	WT	lb
mm						kg
2 ½	7.50	9.9	2.50	7.0	42	390
65	191	252	64	178	19	
3	8.00	13.9	3.00	7.5	77	560
80	203	352	76	191	35	
4	9.00	14.3	4.00	9.0	104	1000
100	229	364	102	229	47	
6	10.50	18.3	6.00	11.0	182	2400
150	267	464	152	279	83	
8	11.50	21.7	8.00	13.5	246	4500
200	292	551	203	343	112	
10	13.00	25.6	10.00	16.0	436	7000
250	330	651	254	406	198	
12	14.00	29.1	12.00	19.0	605	10500
300	356	740	305	483	274	



**C** = Center to top open and closed

**WT** = Weight

**C<sub>v</sub>** = Flow Coefficient



**STANDARD MATERIALS**

PART	MATERIALS
Body	A126-B
Bonnet	A126-B
Box	A126-B
Wedge Pin	B62
Body Seat Ring	B62
Disc Seat Ring	B62
Disc Seat Ring	A126-B
Disc Nut	B62
Body Bolt	Steel
Body Nut	Steel
Box Bolt	Steel
O Ring	EPDM
Handwheel	A126-B
Handwheel Nut	Steel
Stem	410
Body Gasket	Graphite
Bonnet Gasket	Graphite

Class	Fig. No.
175 W.O.G.	710UF

**Design Specifications**

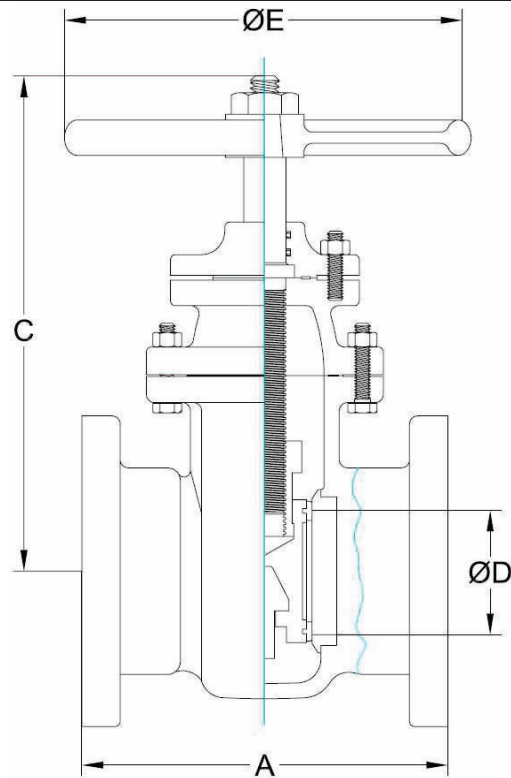
Item	Applicable Specification
Wall thickness	ASME B16.1
Pressure - temperature ratings	MSS SP-70
General valve design	MSS SP-70
End to End dimensions	ASME B16.10
Flange design	ASME B16.1
Fire Service	FM 1120, FM 1130, and UL 262
Materials	ASTM

**DESIGN FEATURES:**

- **Parallel** seat design allows for superior gateway seals.
- **Each** valve is shell and seat pressure tested per industry standard MSS SP-70.
- **Gasket** joints conform to AWWA C111 and ANSI A21.11.
- **UL and FM** approved fire protection valves.

**UL AND FM PARALLEL SEAT GATE VALVE DIMENSIONS (175 W.O.G.).**

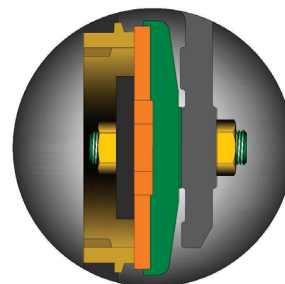
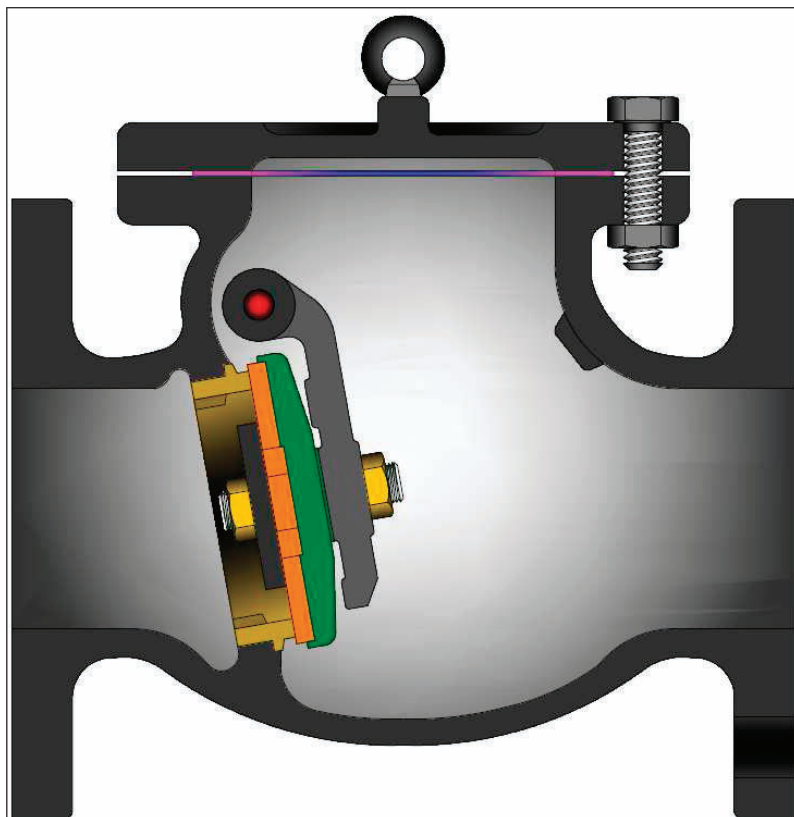
SIZE	FIG 710UF					
in	A	C	D	E	WT	lb
mm						kg
3	8.00	12.1	3.00	10.0	77	560
80	203	306	76	254	35	
4	9.00	13.7	4.00	10.0	104	1000
100	229	347	102	254	47	
6	10.50	18.1	6.00	14.0	182	2400
150	267	459	152	356	83	
8	11.50	21.0	8.00	14.0	246	4500
200	292	533	203	356	112	
10	13.00	24.6	10.00	16.0	436	7000
250	330	625	254	406	198	
12	14.00	28.2	12.00	18.0	605	10500
300	356	717	305	457	274	



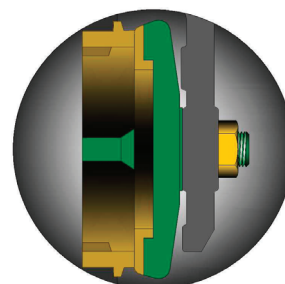
**C** = Center to top open and closed

**WT** = Weight

**C<sub>v</sub>** = Flow Coefficient



Rubber Disc Ring



Bronze Disc Ring

Class	Fig. No.
200 W.O.G.	763U

#### STANDARD MATERIALS

PART	MATERIALS
Body	A126-B
Cap	A126-B
Disc	A536
Disc Ring	EPDM
	B62
Seat Ring	B62
Gasket	Non-Asbestos
Carrier	A536
Carrier Pin	B16
Disc Nut	B16
Disc Washer	A536
Eyebolt	Steel
Body / Cap Stud	Steel
Body / Cap Nut	Steel
Hanger Plug	B16

#### Design Specifications

Item	Applicable Specification
Wall thickness	ASME B16.1
Pressure - temperature ratings	MSS SP-71
General valve design	MSS SP-71
End to End dimensions	ASME B16.10
Flange design	ASME B16.1
Fire Service	UL 312
Safety	FM 1210
Materials	ASTM

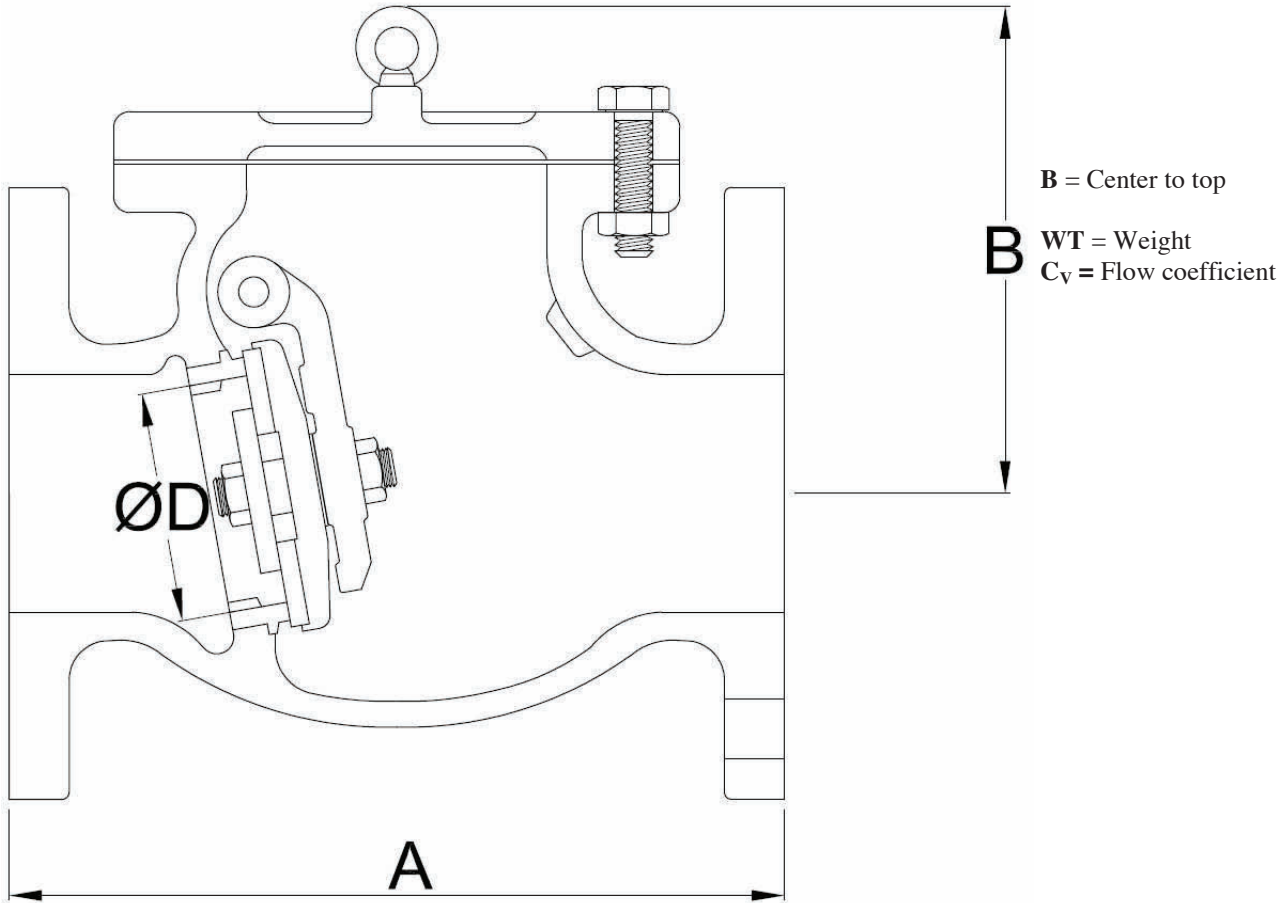
#### DESIGN FEATURES:

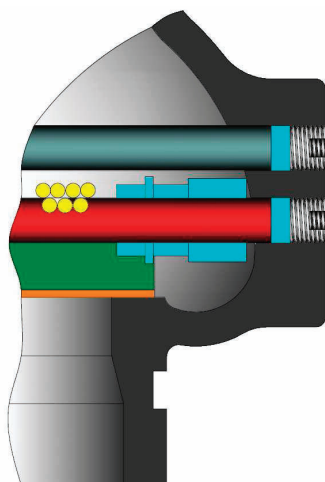
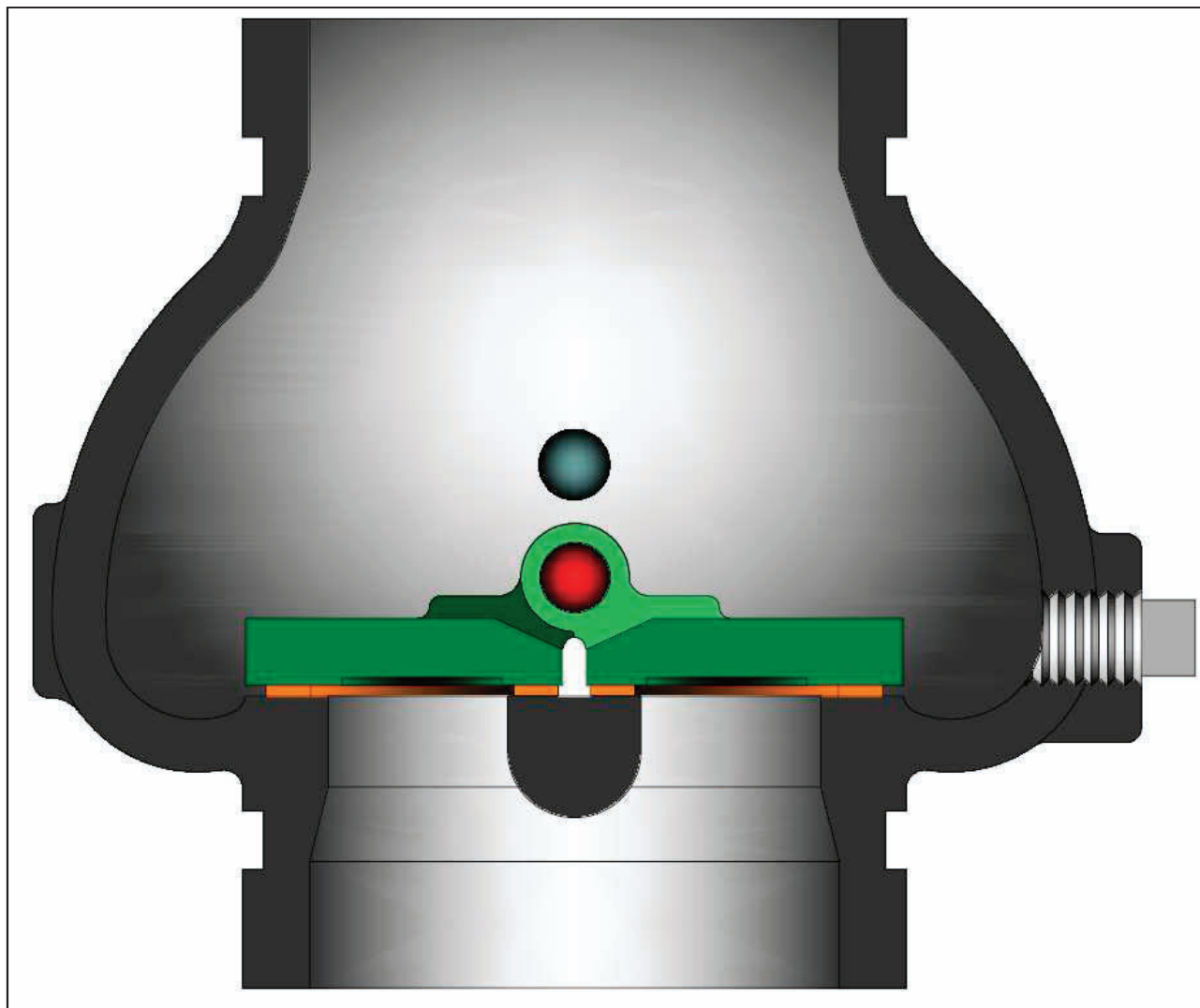
- **Seat faces** lapped for smooth finish and superior sealing.
- **Wall thickness** per heavy wall ASME B16.1 requirements.
- **Swivel disc** for improved seat alignment and longer life.
- **Each** valve is shell and seat pressure tested per industry standard MSS SP-71.
- **Check** valve are suitable for service in horizontal line with cap vertical or in a vertical line with flow upward.
- **UL and FM** approved fire protection valves.



UL AND FM SWING CHECK VALVE DIMENSIONS (CLASS 125).

SIZE	FIG 763U					
in	A	B	D	WT	lb	C <sub>V</sub>
mm					kg	
3	9.50	7.6	3.00	46		175
80	241	194	75	21		
4	11.50	8.4	3.87	81		300
100	292	214	100	37		
6	14.00	10.2	5.87	150		730
150	356	258	150	68		
8	19.50	12.3	7.87	254		1360
200	495	312	200	115		
10	24.50	13.8	9.75	443		2090
250	622	352	250	201		
12	27.50	15.3	12.00	640		3250
300	699	389	305	290		





Pin Area Cut-Away

Class	Ends	Fig. No.
200 W.O.G.	Grooved	453UG
250 W.O.G.	Flanged	453UF

**DESIGN FEATURES:**

- **Flanged** ends available following ASME B16.1 class 125 standards.
- **Grooved** end dimensions follow AWWA C-606 standards for steel pipe.
- **UL and FM** approved fire protection valves.
- **Working** temperature range of 15° to 250° F (-10° to 120° C).

STANDARD MATERIALS	
PART	MATERIALS
Body	A536
Seat Ring	EPDM
Disc Plate	A351 CF8
Spring	SS 316
Hinge Pin	SS 316
Washer	Teflon
Thrust Washer	Teflon
Plug	Steel
Square Plug	Steel
Packing	Graphite

**UL AND FM DUAL CHECK VALVE DIMENSIONS (CLASSES 200 AND 250).**

SIZE	FIG 453UG				FIG 453UF			
in	A	C	WT	lb	A	C	WT	lb
mm				kg				kg
3	6.6	7.5	21		5.1	3.5	9	
80	168	191	10		130	89	4	
4	7.5	9.0	33		5.6	4.5	12	
100	191	229	15		143	114	6	
6	9.0	11.0	56		7.0	6.6	28	
150	229	279	25		178	168	13	
8	10.5	13.5	88		8.3	8.6	48	
200	267	343	40		210	219	22	

**C** = End Diameter

**WT** = Weight

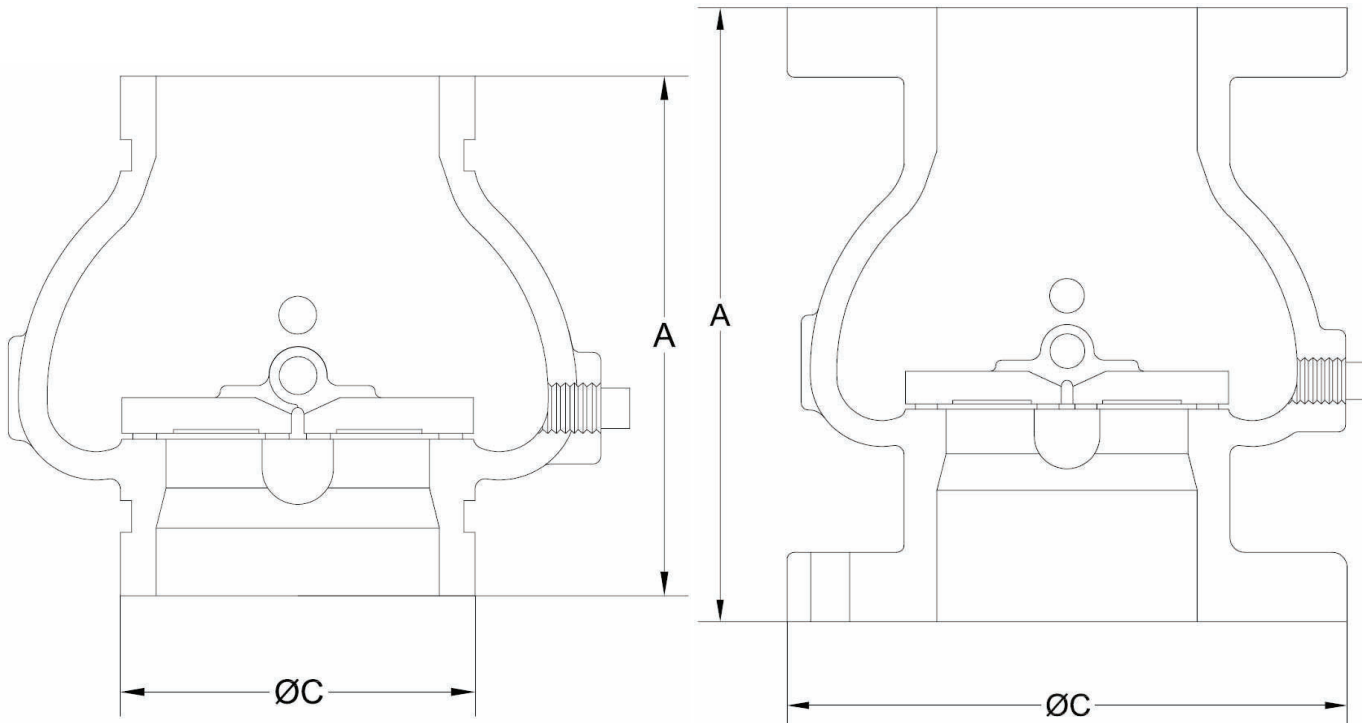


Fig. 453UG  
200 LB

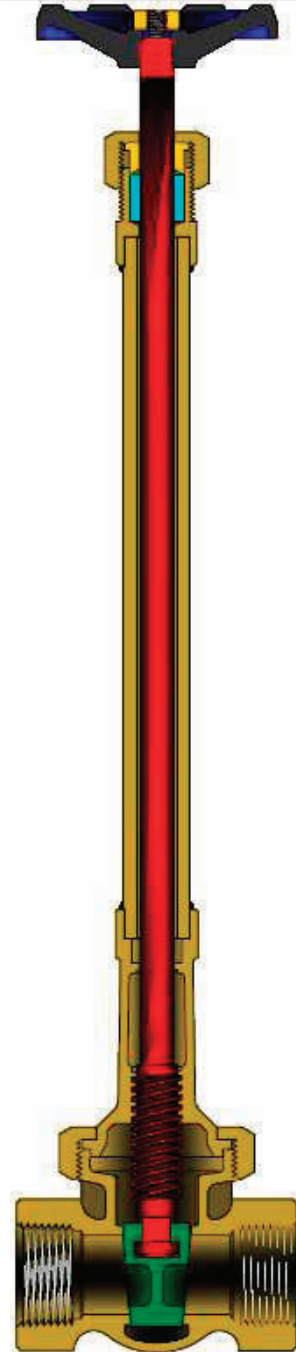
Fig. 453UF  
250 LB

# CRYOGENIC VALVES

Valves in cold service can present an engineering challenge because of the fragility of the packing at continuously low temperatures. To combat this, Powell Valves offers an assortment of cryogenic valves that all come standard with an extended bonnet and stem. These extensions help to keep the packing away from the low temperatures of the cryogenic fluid and thus function safely and efficiently.

## Features:

- ⇒ All cryogenic valves are specially processed and carefully cleaned and degreased in specialized clean areas. They are then sealed to prevent contamination.
- ⇒ Cryogenic valves are offered in bronze or stainless steel and can serve in temperatures as low as  $-423^{\circ}\text{F}$ .
- ⇒ Powell welcomes the development of custom designs needed to accommodate unique customer needs.
- ⇒ Extended bonnets and stems provide an adequate distance for the packing to maintain the safety, integrity and efficiency of the valve.
- ⇒ Powell also provides non-extended cryogenic valves, but recommends their use in only intermittent and non-extreme cold uses.
- ⇒ At the customers' request, Powell also offers bonnet chamber ventilation in order to prevent excess pressure build up caused by trapped cryogenic liquids.



Cryogenic Gate Valve

All the quality and benefits expected of all Powell valves are extended and preserved with its cryogenic line.

*For more information, see Powell's Cryogenic catalog.*

BRONZE and IRON Similarity Chart					
POWELL	MILWAUKEE	CRANE	NIBCO	STOCKHAM	HAMMOND
110	570			B375	
120			T-275-B	B66	IB412
150	590T	7TF	T-235-Y	B22T	IB413T
241	2981	351	F-178-B	G512	IR116
375	1153	422	T-154-A	B135	
377	1182	622E	T-174-A	B144	IB652
500	148	428/1700	T-111	B100	IB640
507	105	438/1701	T-113	B103	IB645
512	1140	437	T-133	B128	IB646
514	1150	431	T-131	B122	IB641
559	2974	373	F-918-B	G931	IR1124
559P	2974-M13	14493		AG931	IR1937
560	508	36	T-453-B	B345	IB944
578	509	37/1707	T-413-B	B319	IB904
650	502	1/1703	T-211-B	B16	IB440
1259	2974M26	373 1/2	F-918-N	G933	IR1126
1787	2882	461	F-619	G612	IR1138
1793	2885	465 1/2	F-617-O	G623	IR1140
1797	2894	7-1/2E	F-667-O	F667	IR330
1816	2885M26	475 1/2	F-617-ON	G624	IR1146
1893	2885-M13	14477		AG642	IR1913
2375	1174	424		B132	IB651
2377	1184	634E	T-174-SS	B145	IB654
2600	591A	14-1/2P		B29	
2608	592A	212P	T-256-AP	B62	IB434
2612	593A	382P	T-276-AP	B74	IB444
2614	582	384P	T-375-B	B266	
2700	1152	428UB	T-124	B105	IB617
2712	1141		T-136	B130	IB638
2714	1151	431UB	T-134	B120	IB629

**VALVE STANDARDS AND RELATED INFORMATION** 59

**PRESSURE/TEMPERATURE RATINGS** 60

**CHEMICAL AND PHYSICAL PROPERTIES** 61

**BRONZE AND IRON VALVE FLANGE DIMENSIONS** 62-64

**METHOD OF DESIGNATING LOCATION OF AUXILIARY CONNECTIONS** 65

**FLOW DESIGN AND MAINTENANCE RECOMMENDATIONS** 66

**CONVERSION DATA AND EQUIVALENTS** 67-68

NOTE: DATA PROVIDED IN THIS SECTION IS FOR REFERENCE PURPOSES AND IS SUBJECT TO CHANGE. CONSULT CURRENT STANDARDS AND SPECIFICATIONS FOR THE LATEST DATA AND FOR SPECIFIC DETAILS WHICH MAY BE BEYOND THE SCOPE OF THIS CATALOG.

## VALVE STANDARDS AND RELATED INFORMATION

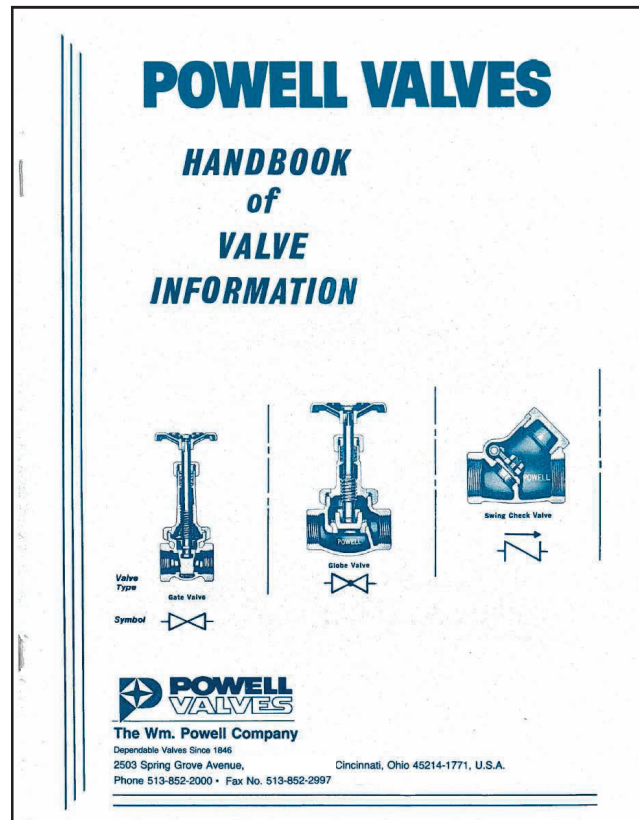
### 1. Bronze and Iron Valves

- (A) MSS SP-80 → Bronze Gate, Globe, Angle and Check Valves
- (B) MSS SP-70 → Cast Iron Gate Valves, Flanged and Threaded Ends
- (C) MSS SP-71 → Cast Iron Check Valves, Flanged and Threaded Ends
- (D) MSS SP-85 → Cast Iron Globe and Angle Valves, Flanged and Threaded Ends
- (E) UL 262 → Gate Valves for Fire-Protection Service
- (F) UL 312 → Check Valves for Fire-Protection Service
- (G) FM 1120/1130 → Approval Standard for Fire Service Water Control Valves (OS&Y and NRS Type Gate Valves)
- (H) FM 1130 → Approval Standard for Swing Check Valves

### 2. Powell Publications and Miscellaneous Information

The *Handbook of Valve Information* contains valve selection, storage, installation, operation, and maintenance information for all Powell Valves.

**NOTE:** Prior to any installation or maintenance, appropriate precautions must be followed. For example, all pressure must be relieved from the valve and affected piping prior to servicing and proper protective clothing and equipment must be worn.



**PRESSURE/TEMPERATURE RATINGS**

**TABLE 1**

**ASTM B61 AND B62 BRONZE**

<b>PRESSURE (c) - psig</b>						
	<b>MATERIAL</b>					
	<b>ASTM B-62</b>			<b>ASTM B-61</b>		
<b>PRESS. CLASS</b>	<b>CLASS 125</b>	<b>CLASS 150</b>		<b>CLASS 200</b>	<b>CLASS 300</b>	
<b>END CONN.</b>	<b>THD</b>	<b>THD</b>	<b>FLG (b)</b>	<b>THD</b>	<b>THD (e)</b>	<b>THD</b>
<b>TEMP. (a) °F</b>						
-20 To 150	200	300	225	400	1000	600
200	185	270	210	375	920	560
250	170	240	195	350	830	525
300	155	210	180	325	740	490
350	140	180	165	300	650	450
400	--	--	--	275	560	410
406	125	150	150	--	--	--
450	120 (d)	145(d)	--	250	480	375
500	--	--	--	225	390	340
550	--	--	--	200	300	300

**NOTES:**

- (a) For Bronze Cryogenic Valves, -20 °F ratings extend to -325 °F
- (b) Pressure - Temperature Ratings—ASME B16.24
- (c) Solder Joint Valve Ratings may be limited by the solder composition. See MSS SP-80 Paragraph 2.4 and Annex A for more information
- (d) Some codes (i.e.-ASME BPVC, Section 1) limit the rating temperatures of the indicated material to 406 °F
- (e) Alternate Ratings for valves sizes 1/8 - 2" having threaded ends and metal to metal union ring body-bonnet joints
- (f) Valves with resilient seat materials, synthetic rubber or urethane, shall have cold water pressure ratings of 33° F to 150° F.

**TABLE 2**

**ASTM A126-B AND A536 IRON (f)**

<b>PRESSURE (psig)</b>				
<b>TEMP. °F.</b>	<b>CLASS 125</b>		<b>CLASS 250</b>	
	<b>NPS 2-12</b>	<b>NPS 14-24</b>	<b>NPS 2-12</b>	<b>NPS 14-24</b>
-20 to 150	200	150	500	300
200	190	135	460	280
225	180	130	440	270
250	175	125	415	260
275	170	120	395	250
300	165	110	375	240
325	155	105	355	230
350	150	100	335	220
375	145		315	210
400	140		290	200
425	130		270	
450	125		250	



# CHEMICAL AND PHYSICAL PROPERTIES

## Bronze and Iron

**TABLE 3**

ASTM STANDARD GRADE		ASTM B-61	ASTM B-62	ASTM A126-B (b)	3% NICKEL IRON (b)	ASTM A536 Gr. 65-45-12 (b)
CARBON (C)	(Min)	-	-	3.2	3.2	3.5
	(Max)	-	-	3.4	3.4	3.9
MANGANESE (Mn)	(Min)	-	-	0.6	0.6	0.15
	(Max)	-	-	0.9	0.9	0.35
PHOSPHORUS (P)	(Min)	-	-	-	-	-
	(Max)	0.05	0.05	0.75	0.75	0.05
SULFUR (S)	(Min)	-	-	-	-	0.010
	(Max)	0.05	0.08	0.15	0.15	0.025
SILICON (Si)	(Min)	-	-	1.8	1.8	2.25
	(Max)	0.005	0.005	2.2	2.2	2.75
COPPER (Cu)	(Min)	86.0	84.0	-	-	-
	(Max)	90.0	86.0	-	-	-
NICKEL (Ni)	(Min)	-	-	-	3.0	-
	(Max)	1.0	1.0	-	4.0	-
TIN (Sn)	(Min)	5.5	4.0	-	-	-
	(Max)	6.5	6.0	-	-	-
IRON (Fe)	(Min)	-	-	Remainder	Remainder	Remainder
	(Max)	0.25	0.30	Remainder	Remainder	Remainder
ZINC (Zn)	(Min)	3.0	4.0	-	-	-
	(Max)	5.0	6.0	-	-	-
LEAD (Pb)	(Min)	1.0	4.0	-	-	-
	(Max)	2.0	6.0	-	-	-
ANTIMONY (Sb)	(Min)	-	-	-	-	-
	(Max)	0.25	0.25	-	-	-
ALUMINUM (Al)	(Min)	-	-	-	-	-
	(Max)	0.005	0.005	-	-	-
TENSILE STRENGTH (Ksi)	(Min)	34	30	31	31	65
YIELD STRENGTH (Ksi)	(Min)	16	14	-	-	45
ELONGATION (%)	(Min)	24	20	-	-	12
TEMPERATURE (°F)	(Min)	-20 (a)	-20 (a)	-20	-20	-20
	(Max)	550	450	450	450	450

(a) For Cryogenic Bronze Valves, -20°F ratings extend to -325°F

(b) Chemistry is typical values.

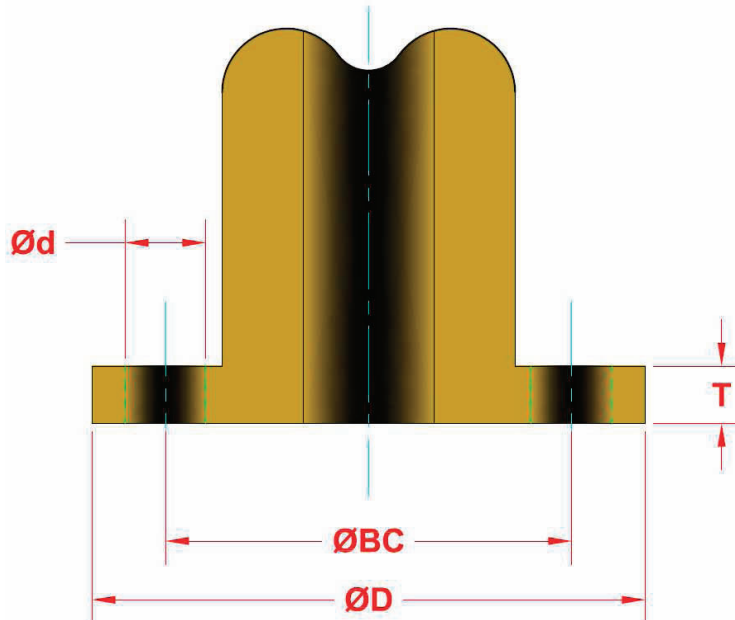
NOTE: Chemical Compositions Are In Units Of Percent.

## BRONZE VALVE FLANGE DIMENSIONS

**TABLE 4**

All Dimensions in Units of Inches

**CLASS 150**



NPS	Diameter of Flange, (D)	Bolt Circle, (BC)	Diameter of Bolt Hole (d)	Number of Bolts	Minimum Thickness of Flange, (T)
2	6.00	4.75	3/4	4	0.50
2 ½	7.00	5.50	3/4	4	0.56
3	7.50	6.00	3/4	4	0.62
3 ½	8.50	7.00	3/4	8	0.69
4	9.00	7.50	3/4	8	0.69
5	10.00	8.50	7/8	8	0.75
6	11.00	9.50	7/8	8	0.81
8	13.50	11.75	7/8	8	0.94
10	16.00	14.25	1	12	1.00
12	19.00	17.00	1	12	1.06

**NOTES:**

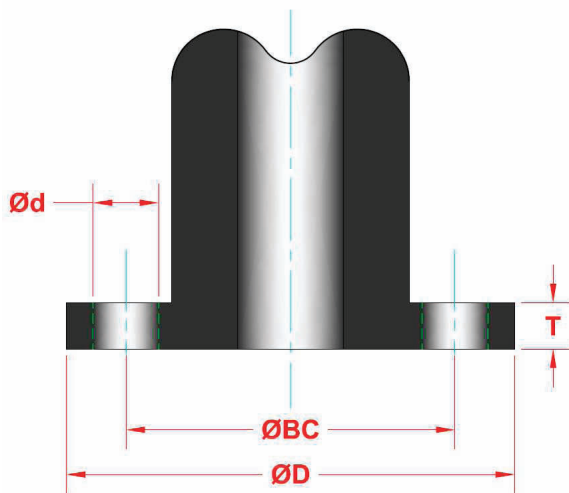
Table is excerpt from Table I-2 of ASME B16.24.

## IRON VALVE FLANGE DIMENSIONS

All Dimensions in Units of Inches

**TABLE 5**

**CLASS 125**



NPS	Diameter of Flange (D)	Diameter of Bolt Circle (BC)	Diameter of Bolt Holes (d)	Number of Bolts	Minimum Thickness of Flange, (T)
2	6.00	4.75	3/4	4	0.62
2 ½	7.00	5.50	3/4	4	0.69
3	7.50	6.00	3/4	4	0.75
3 ½	8.50	7.00	3/4	8	0.81
4	9.00	7.50	3/4	8	0.94
5	10.00	8.50	7/8	8	0.94
6	11.00	9.50	7/8	8	1.00
8	13.50	11.75	7/8	8	1.12
10	16.00	14.25	1	12	1.19
12	19.00	17.00	1	12	1.25
14	21.00	18.75	1 1/8	12	1.38
16	23.50	21.25	1 1/8	16	1.44
18	25.00	22.75	1 1/4	16	1.56
20	27.50	25.00	1 1/4	20	1.69
24	32.00	29.50	1 3/8	20	1.88

**NOTES:**

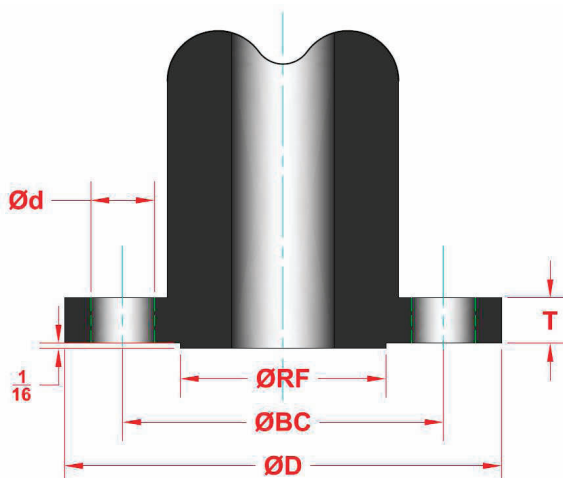
(1) Table is excerpt from Table 4 of ASME B16.1.

## IRON VALVE FLANGE DIMENSIONS

All Dimensions in Units of Inches

**TABLE 6**

**CLASS 250**



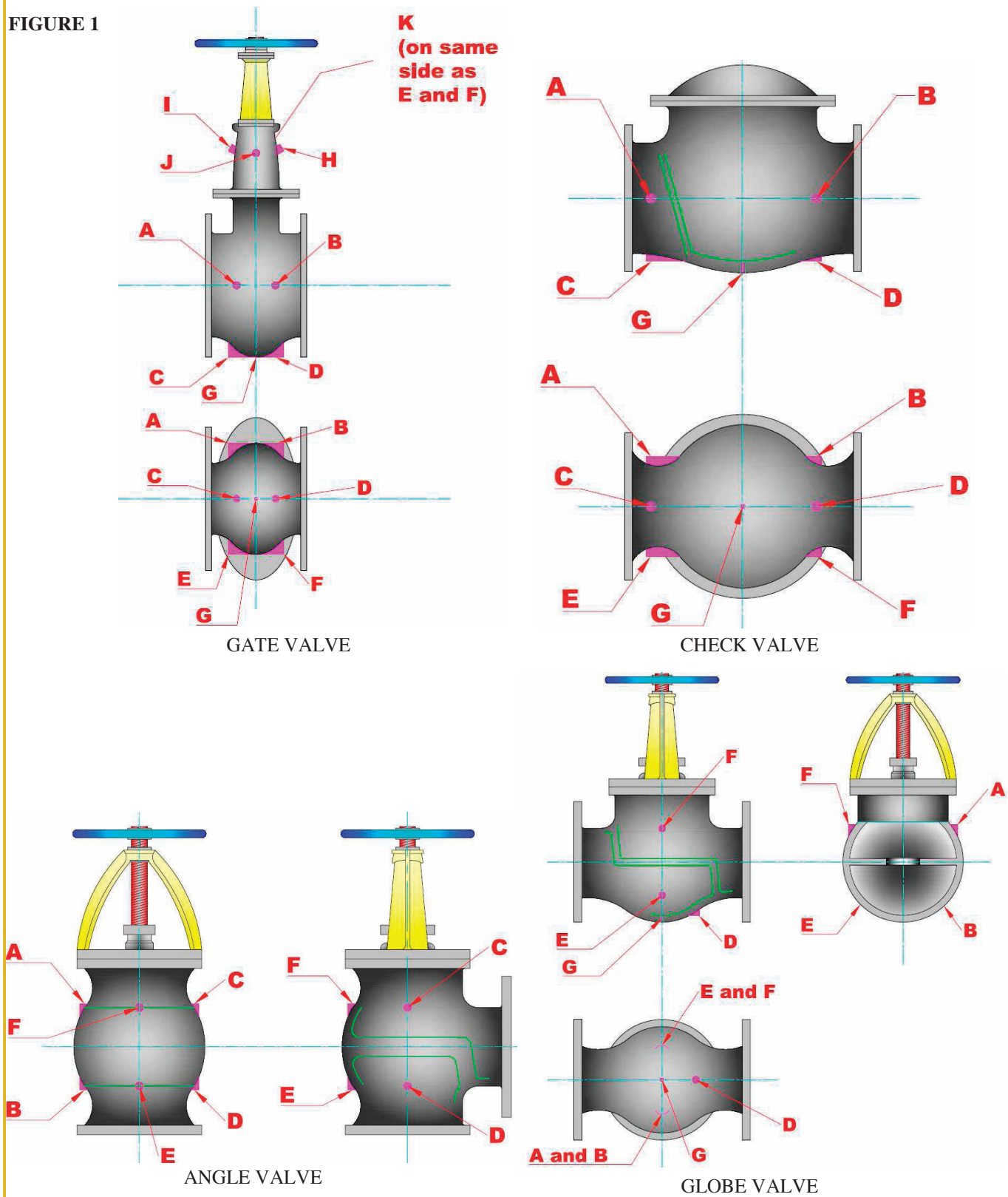
NPS	Diameter of Flange (D)	Diameter of Bolt Circle (BC)	Diameter of Bolt Holes (d)	Number of Bolts	Minimum Thickness of Flange, (T)	Diameter of Raised Face (RF)
2	6.50	5.00	3/4	8	0.88	4.19
2 ½	7.50	5.88	7/8	8	1.00	4.94
3	8.25	6.62	7/8	8	1.12	5.69
3 ½	9.00	7.25	7/8	8	1.19	6.31
4	10.00	7.88	7/8	8	1.25	6.94
5	11.00	9.25	7/8	8	1.38	8.31
6	12.50	10.62	7/8	12	1.44	9.69
8	15.00	13.00	1	12	1.62	11.94
10	17.50	15.25	1 1/8	16	1.88	14.06
12	20.50	17.75	1 1/4	16	2.00	16.44
14	23.00	20.25	1 1/4	20	2.12	18.94
16	25.50	22.50	1 3/8	20	2.25	21.06
18	28.00	24.75	1 3/8	24	2.38	23.31
20	30.50	27.00	1 3/8	24	2.50	25.56
24	36.00	32.00	1 5/8	24	2.75	30.31

**NOTES:**

(1) Table is excerpt from Table 6 in ASME B16.1.

**METHOD OF DESIGNATING LOCATION OF AUXILIARY  
CONNECTIONS WHEN SPECIFIED**

**FIGURE 1**



**GENERAL NOTE:**

The above sketches represent valves with symmetrical shapes. Sketches are illustrative only and do not imply design.

## FLOW DESIGN AND MAINTENANCE RECOMMENDATIONS

- (1) SWING CHECK VALVES- Minimum  $\frac{1}{2}$  psi differential pressure across valve to maintain proper “full open” position.
- (2) LIFT CHECK AND NON-RETURN VALVES- Minimum 2 psi differential pressure across valve to maintain proper “full open” position
- (3) Recommended length of straight pipe before and after check and non-return valves to be 10 times pipe diameter to avoid flow turbulence at valve.
- (4) For metal seated check valves at low pressure applications (approximately 50 psi or less), seat leakage may be significantly greater than normal seat test allowable limit.
- (5) RECOMMENDED MAXIMUM FLOW VELOCITIES (APPROXIMATE):

<u>VALVE SIZE</u>	<u>WATER</u>	<u>SATURATED STEAM</u>	<u>SUPERHEATED STEAM</u>
	(FT/MIN)	(FT/MIN)	(FT/MIN)
3" and UNDER	1200	7200	9000
4	1200	8800	11000
6	1620	10400	13000
8	1860	12000	15000
10	2100	14400	18000
12	2220	15200	19000
14	2400	16000	20000
16	2400	17600	22000
18	2400	19200	24000
20" and LARGER	2400	20800	26000

- (6) GATE VALVES — Not to be used in throttling services. Open and closed service only.
- (7) GLOBE VALVES — Not to be throttled under 20% open.

**FOR MAINTENANCE AND SAFETY INFORMATION, SEE THE POWELL  
HANDBOOK OF VALVE INFORMATION, AS DESCRIBED ON PAGE 59.**

**COMPARISON CHART OF VALVE SIZE/NOMINAL PIPE SIZE**

**TABLE 7**

<b><u>METRIC NOMINAL SIZE</u></b> <b>(DN)</b>	<b><u>ENGLISH NOMINAL SIZE</u></b> <b>(NPS)</b>
8	1/4
10	3/8
15	1/2
20	3/4
25	1
32	1-1/4
40	1-1/2
50	2
65	2-1/2
80	3
100	4
150	6
200	8
250	10
300	12
350	14
400	16
450	18
500	20
600	24

**CONVERSION FACTORS**

	<b>TO CONVERT FROM</b>	<b>TO</b>	<b>MULTIPLY BY</b>
LENGTH	INCHES (IN)	MILLIMETERS (MM)	25.4
	INCHES (IN)	CENTIMETERS (CM)	2.54
	FEET (FT)	INCHES (IN)	12
WEIGHT	POUNDS (LB)	KILOGRAMS (KG)	0.4536
	POUNDS (LB)	NEWTONS (N)	4.448
PRESSURE*	PSI	KILOGRAMS/M <sup>2</sup>	703
	PSI	KILOGRAMS/CM <sup>2</sup>	0.0703
	PSI	KILOGRAMS/MM <sup>2</sup>	0.000703
	PSI	BAR	0.0689
	PSI	ATMOSPHERE	0.068
	PSI	KILOPASCAL	6.895
	PSI	MEGAPASCAL	0.006895
	PSI	NEWTON/MM <sup>2</sup>	0.006895
	PSI	IN. WATER**	27.68
	PSI	FT. WATER**	2.307
	PSI	IN. MERCURY**	2.036
	PSI	PSF	144
AREA	SQ. INCH (IN <sup>2</sup> )	SQ. CENTIMETERS (CM <sup>2</sup> )	6.452

**TEMPERATURE**

TO CONVERT FROM DEGREES CENTIGRADE (C) TO DEGREES FAHRENHEIT (F):  $F = 1.8 \times C + 32$

TO CONVERT FROM FAHRENHEIT (F) TO DEGREES CENTIGRADE (C):  $C = 0.556 \times (F - 32)$

NOTE: MOST FACTORS ARE ROUNDED OFF AND NOT EXACT CONVERSIONS.

\*- PSI = POUNDS PER SQUARE INCH AND PSF = POUNDS PER SQUARE FOOT.

\*\* - WATER AT 60F. MERCURY AT 32F.

# MEASUREMENT EQUIVALENTS

FRACTION				DECIMAL	MILLIMETERS
			1/64	0.0156	0.3969
		1/32		0.0313	0.7938
				0.0394	1.0000
			3/64	0.0469	1.1906
	1/16			0.0625	1.5875
			5/64	0.0781	1.9844
				0.0787	2.0000
		3/32		0.0938	2.3813
			7/64	0.1094	2.7781
				0.1181	3.0000
1/8				0.1250	3.1750
			9/64	0.1406	3.5719
		5/32		0.1563	3.9688
				0.1575	4.0000
			11/64	0.1719	4.3656
	3/16			0.1875	4.7625
				0.1969	5.0000
			13/64	0.2031	5.1594
		7/32		0.2188	5.5563
			15/64	0.2344	5.9531
				0.2362	6.0000
1/4				0.2500	6.3500
			17/64	0.2656	6.7469
				0.2756	7.0000
		9/32		0.2813	7.1438
			19/64	0.2969	7.5406
	5/16			0.3125	7.9375
				0.3150	8.0000
			21/64	0.3281	8.3344
		11/32		0.3438	8.7313
				0.3543	9.0000
			23/64	0.3594	9.1281
3/8				0.3750	9.5250
			25/64	0.3906	9.9219
				0.3937	10.0000
		13/32		0.4063	10.3188
			27/64	0.4219	10.7156
				0.4331	11.0000
	7/16			0.4375	11.1125
			29/64	0.4531	11.5094
		15/32		0.4688	11.9063
				0.4724	12.0000
			31/64	0.4844	12.3031
1/2				0.5000	12.7000

FRACTION				DECIMAL	MILLIMETERS
				0.5118	13.0000
			33/64	0.5156	13.0969
		17/32		0.5313	13.4938
			35/64	0.5469	13.8906
				0.5512	14.0000
	9/16			0.5625	14.2875
			37/64	0.5781	13.6844
				0.5906	15.0000
		19/32		0.5938	15.0813
			39/64	0.6094	15.4781
5/8				0.6250	15.8750
				0.6299	16.0000
			41/64	0.6406	16.2719
		21/32		0.6563	16.6688
				0.6693	17.0000
			43/64	0.6719	17.0656
	11/16			0.6875	17.4625
			45/64	0.7031	17.8594
				0.7087	18.0000
		23/32		0.7188	18.2563
			47/64	0.7344	18.6531
				0.7480	19.0000
3/4				0.7500	19.0500
			49/64	0.7656	19.4469
		25/32		0.7813	19.8438
				0.7874	20.0000
			51/64	0.7969	20.2406
	13/16			0.8125	20.6375
				0.8268	21.0000
			53/64	0.8281	21.0344
		27/32		0.8438	21.4313
			55/64	0.8594	21.8281
				0.8661	22.0000
7/8				0.8750	22.2250
			57/64	0.8906	22.6219
				0.9055	23.0000
		29/32		0.9063	23.0188
			59/64	0.9219	23.4156
	15/16			0.9375	23.8125
				0.9449	24.0000
			61/64	0.9531	24.2094
		31/32		0.9688	24.6063
				0.9843	25.0000
			63/64	0.9844	25.0031
1				1.0000	25.4000



**March, 2011 THE WILLIAM POWELL COMPANY**  
**GENERAL TERMS AND CONDITIONS OF SALE**

**1. TERMS EXCLUSIVE:** The terms and conditions of the purchase order or requisition to which these GENERAL TERMS AND CONDITIONS OF SALE (these "Terms and Conditions") relate or are attached (each, an "Order"), are exclusive and represent the full and final agreement of The William Powell Company, an Ohio corporation ("Powell") and the purchaser ("Purchaser") as they relate to the goods, materials, services or labor covered in the Order (all, whether or not tangible property or goods, the "Products"), and may not be added to, modified, superseded or altered except by written agreement or modification signed by Powell's authorized representative, notwithstanding any additional or other proposals, terms and conditions which may now or in the future appear on Purchaser's Orders or other forms (notification of objection thereto being given hereby), in whatever form transmitted, and notwithstanding any shipment of Products, acceptance of payments or other similar acts of Powell.

**2. SALE BY AGENT OR REPRESENTATIVE:** These Terms and Conditions shall govern the liability and obligations of Powell in regard to the transaction in Products, whether the sale was procured directly by Powell or indirectly through an authorized sales representative.

**3. CONTRACT:** Orders may be submitted to Powell in writing (which will include via an electronic transmission) or orally, provided, however, that if Purchaser fails to provide a detailed, formal written Order (a) within ten (10) days of an oral Order or (b) before shipment of the Order, whichever is earlier, then Product descriptions, quantities, specifications, etc., as set forth in Powell's acknowledgement, acceptance and/or invoice, shall be conclusive and binding on both parties, and discrepancies shall be for Purchaser's account. All Orders are subject to credit approval and acceptance by Powell. An Order shall be deemed to have been accepted by Powell upon the first to occur of the following: (i) Powell's first shipment or other tender of the Order or (ii) acceptance thereof by Powell in writing.

**4. PERMISSIBLE VARIATIONS:** Powell has the right, prior to the delivery of Products to Purchaser and without the giving of notice to Purchaser, to make any changes in the composition, fabrication or design of the Products which, in the opinion of Powell, do not affect the general characteristics or properties of the Products. In addition, Powell may make any change or any variation in the Products, whether of quality or quantity, which is within governmental or professional standards or specifications applicable at the time of manufacture without giving notice to Purchaser. Purchaser will accept any Products which may incorporate any changes in the composition, fabrication or design.

**5. PRICES:** Prices for Products are quoted and payable in U.S. dollars ("USD"). Prices stated in general price lists are subject to change without prior notice, at Powell's sole discretion. Prices that are provided in a specific quotation will remain firm for thirty (30) days of the issued date of the written quotation. All prices are exclusive of freight costs, taxes and duties. All taxes (including, without limitation, sales, use, stamp, value added and other taxes) duties, fees, charges and assessments by whomsoever levied on or with respect to the Products, and whether levied against Purchaser or Powell, are for Purchaser's account and, unless invoiced, shall be paid by Purchaser directly to the appropriate governmental agency.

**6. SHIPPING TERMS:** Delivery of Products to Canada, the United States and Mexico shall be F.O.B. (as defined in the Uniform Commercial Code as in effect in the State of Ohio) Powell's plant of manufacture. Delivery of Products outside of Canada, United States and Mexico shall be Ex Works (as defined by INCOTERMS 2000) Powell's plant of manufacture. All transportation expenses, freight and insurance shall be paid by Purchaser, and risk of delay, loss or damage incurred in transit shall be borne by Purchaser, who shall be responsible to file any such claims with the relevant carrier(s) or insurers.

Upon tender of delivery, title shall pass to Purchaser, subject to Powell's right of stoppage in transit and to Powell's security interest in the Products, as set forth in Section 8.

If the Products are held by Powell subject to receiving instructions from Purchaser or in any case where Powell, in its sole discretion, determines any part of the Products should be held for Purchaser's account, Powell may invoice the Products, and Purchaser agrees to make payment in accordance with these Terms and Conditions. Products invoiced and held at any location by Powell will be held at Purchaser's risk, and Powell may charge for (but is not obligated to carry) insurance and storage.

If Purchaser has declared or manifested an intention not to accept delivery in accordance with these Terms and Conditions, no tender will be necessary, but Powell may, at its option, give notice to Purchaser that Powell is ready and willing to deliver and such notice will constitute a valid tender of delivery.

**7. INSPECTION AND ACCEPTANCE:** Each shipment shall be inspected by Purchaser for observable damage and/or non-conformity at the time of delivery of the Products. Failure to so inspect shall constitute a waiver of Purchaser's rights of inspection and shall constitute an unqualified acceptance of the Products. If, after such inspection, Purchaser attempts to reject any Products, Purchaser shall fully specify all claimed damage or non-conformity in writing in a notice of rejection sent to Powell within five (5) days of delivery of the Products. Purchaser's failure to so specify shall constitute a waiver of that damage or non-conformity. Partial deliveries shall be accepted by Purchaser and paid for according to these Terms and Conditions.

**8. PAYMENT TERMS:** Payment shall be due net thirty (30) days from the date of invoice. Overdue accounts shall be subject to a carrying charge of one and one-half percent (1.5%) per month or portion of a month on the unpaid balance until paid in full. In the event Purchaser shall default on its obligations hereunder, Purchaser shall be liable for all of Powell's costs and expenses of collection, including reasonable attorneys' fees. Powell may, at its option, cancel and/or sell any unshipped Products should Purchaser fail to fulfill the complete terms of payment. Purchaser will have no right to offset any amounts against any payment or other obligation which Powell may owe to Purchaser. Powell hereby reserves a security interest in the Products to secure Purchaser's payment of the purchase price and any other amounts owed by Purchaser, and Purchaser agrees that Powell may (but is not obligated to) take such action as Powell deems advisable to evidence and perfect such interest and that Purchaser will cooperate with Powell in the taking of such actions.

**9. CREDIT APPROVAL:** Notwithstanding the provisions of Section 8, Powell may at any time decline to make any shipment or delivery or perform any work except upon receipt of payment or upon terms and conditions or security satisfactory to Powell, including, but not limited to, requiring that Purchaser provide Powell one or more letters of credit.

**10. LEAD TIMES:** Estimated lead times, if specified, are approximate only and are not guaranteed. Failure to ship on or near the estimated date shall not entitle Purchaser to any remedy or to cancel the Order without charge. Estimated lead times are provided Ex Works Powell's plant in weeks after receipt of Order. Estimated lead times are stated on a net basis and do not include any additional lead time due to scheduled and/or unscheduled plant shutdowns. Scheduled plant shutdowns include a two (2) week shutdown each winter and each summer. Estimated lead times are quoted on the basis of material availability and plant loading at the time of quotation, which are subject to change. Purchaser should confirm any estimated lead times at time of Order.

**11. MINIMUM ORDER CHARGE:** With respect to any Order that includes spare, replacement or component parts ("Parts") as Products, a minimum Order charge of One Hundred USD (\$100) shall apply. With respect to any Order that includes valves ("Valves") as Products, a minimum Order charge of Three Hundred Fifty USD (\$350) shall apply.

**12. RETURN OF PRODUCTS:** No Products shall be returned to Powell without Powell's prior written agreement. Products returned by Purchaser shall be returned in the same condition as when delivery was affected by Powell. Only Products that are new, unused and in a condition suitable for immediate resale shall be considered for return. Powell reserves the right to assess a minimum thirty-five percent (35%) restocking charge for Products returned for reasons other than defects or non-conformity.

**13. CANCELLATION/SUSPENSION:** Purchaser shall not cancel or suspend an Order without Powell's prior written consent, which such consent Powell shall be under no obligation to provide. In the event of cancellation or suspension of an Order without Powell's prior written consent, in addition to Powell's other rights and remedies available hereunder and under applicable law, Purchaser shall pay cancellation charges as follows: (a) Order entered in Powell's system, but no engineering yet initiated, 5%, (b) Engineering work has begun and orders for casings and/or outside purchased parts have been placed, 25%, (c) Castings poured and/or components made, but not yet received at Powell's location, 75%, (d) Castings poured and/or components made and received at Powell's location, 85%, (e) Manufacturing process started, 95% and (f) Components finished, 100%.

Powell may cancel all or part of an Order immediately upon the happening of any of the following: Purchaser is delinquent on any of its obligations hereunder or under any order or transaction with Powell, insolvency of Purchaser; the appointment of a custodian as that term is defined in Title 11 U.S.C., as amended (the "Bankruptcy Code"), or the commencement of a case under any chapter of the Bankruptcy Code or the bankruptcy, receivership, insolvency or similar laws of any country for, by or against Purchaser; Purchaser's suspension or termination of business or assignment for the benefit of creditors; or any event, whether or not similar to the foregoing, which materially impairs Purchaser's ability to perform hereunder. Powell's rights to cancel or postpone set forth herein may be exercised by Powell without liability.

**14. CORRECTIONS:** Powell reserves the right to make corrections to price lists, quotations, invoices or other contract documents in the event of clerical or typographical errors.

**15. COUNTRY OF ORIGIN:** Powell reserves the right to furnish Products from any of its plants at its sole discretion and does not represent that the Products listed

herein originate from any specific country. Any costs affected by country of origin, including, but not limited to, customs duties, are not included in the purchase price and are for Purchaser's account.

**16. INFORMATION REGARDING PRODUCTS:** Purchaser acknowledges that it has received and is familiar with Powell's and any other manufacturer's labeling and literature concerning the Products and will forward such information to its employees, agents and customers.

**17. POWELL PRODUCT WARRANTY:** For a period of (a) ninety (90) days from tender of delivery with respect to Parts and (b) the earlier of (i) eighteen (18) months from tender of delivery or (ii) twelve (12) months from installation with respect to Valves, Powell warrants to Purchaser that the Parts and/or Valves, as applicable, of its own manufacture are free of defects in material and workmanship, under normal use and proper operation. If any such Products fail to comply with such warranty, Powell, at Powell's option, shall either: (i) replace such defective Products; (ii) furnish replacement parts for repairing Products (iii) issue written authorization for Purchaser or others to replace or repair, without charge to Purchaser, at costs comparable to Powell's normal manufacturing costs, those parts proven defective; or (iv) refund all monies paid by Purchaser to Powell for such Products and, at the sole discretion of Powell, have the Products returned to Powell at Powell's expense. Finished materials and accessories purchased from other manufacturers are warranted only to the extent of the manufacturer's warranty to Powell (to the extent transferable by Powell to Purchaser). Any alteration in material or design of the Products or component parts thereof by Purchaser or others and/or the undertaking of repairs or replacement by Purchaser or its agents without Powell's written consent shall relieve Powell of all responsibility herewith.

Powell's obligations under this warranty shall be conditioned upon (a) Purchaser's notifying Powell of any alleged defect(s) in a writing that references Purchaser's Order number and provides complete identification of any allegedly defective Products within ten (10) days of the discovery of the damage or defect, and (b) Powell's satisfying itself upon inspection that its warranty has been breached. Purchaser may not bring any action under or arising from an Order or these Terms and Conditions unless such action is commenced within one year after the cause of action accrues.

EXCEPT AS SET FORTH IN THIS SECTION 17, POWELL MAKES NO WARRANTY CONCERNING THE PRODUCTS WHATSOEVER; POWELL DISCLAIMS AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF NON-INFRINGEMENT AND THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE OBLIGATIONS SET FORTH IN THIS SECTION 17 ARE POWELL'S SOLE OBLIGATIONS AND PURCHASER'S EXCLUSIVE REMEDY. POWELL SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, AND PURCHASER HEREBY WAIVES, FOR ITSELF AND ITS SUCCESSORS AND ASSIGNS, (A) ANY AND ALL CLAIMS FOR PUNITIVE DAMAGES AND (B) ALL CLAIMS OF NEGLIGENCE OR STRICT LIABILITY OR BOTH. WITHOUT LIMITATION TO THE FOREGOING, IN NO EVENT SHALL POWELL BE LIABLE FOR THE LOSS OF USE OF THE PRODUCT OR FOR THE LOSS OF USE OF ANY OTHER PRODUCT, PROCESS, EQUIPMENT, OR FACILITIES OF PURCHASER OR OF THE END-USER, WHETHER PARTIALLY OR WHOLLY DUE TO DEFECTS IN MATERIAL AND/OR WORKMANSHIP AND/OR DESIGN OF POWELL'S PRODUCT, AND IN NO EVENT SHALL POWELL BE LIABLE FOR REMOVAL OF APPURTENANCES OR INCIDENTALS SUCH AS CONNECTIONS, PIPE WORK AND SIMILAR ITEMS OF OBSTRUCTION OR FOR ANY COSTS BROUGHT ABOUT BY NECESSITY OF REMOVING THE PRODUCT FROM ITS POINT OF INSTALLATION.

Purchaser (a) recognizes that the limitations contained in this Section 17 are material factors in Powell's sale of the Products at the price(s) specified, and (b) agrees that any accommodation to Purchaser by Powell, whether for sales policy reasons or otherwise, shall not be taken to establish any liability of Powell or any contract term inconsistent with this Agreement.

Purchaser shall neither make nor purport to make (a) any warranty to any person by or on behalf of Powell or (b) any warranty or representation inconsistent with this Section 17.

**18. COMPLIANCE WITH LAWS:** Powell certifies that the Products produced by it, if any, were produced in compliance with all applicable requirements of Sections 6, 7 and 12 of the Fair Labor Standards Act of 1938, as amended, and the Regulations and Orders of the Administrator of the Wage and Hour Division issued under Section 14 thereof. Powell shall endeavor to comply with all applicable Ohio and United States federal laws. Powell is not responsible for compliance with any other laws or regulations, or with any Product standard or specification, whether of general or particular application, unless Purchaser has furnished specific written notice thereof prior to Powell's entry of Purchaser's Order.

All sales of Products are conditioned upon and subject to strict compliance with United States export control laws, rules and regulations, including, without limitation, the Export Administration Act, the Export Administration Regulations, the Arms Control Act, the International Traffic in Arms Regulations, the Trading With the Enemy Act, the International Economic Powers Act and the Foreign Assets Control Regulations, as they may be amended and supplemented from time to time (each, an "Export Law" and collectively, the "Export Laws"). For any sale of Products requiring a license, permit or other approval under any Export Law ("Restricted Products"), Powell shall determine the feasibility of obtaining such license, permit or other approval ("Export Approval") and whether it will fill the order for the Restricted Products in light of required Export Approval. In the event Powell applies for Export Approval for the Restricted Products, it shall do so at Purchaser's cost and expense and Purchaser agrees to reimburse Powell for any cost or expenses (including Powell's reasonable attorneys' fees) incurred by Powell in pursuing Export Approval. Powell shall not be under any obligation to ship any such Restricted Products unless and until such Export Approval is granted, and only in strict compliance with the terms and conditions of such Export Approval. Purchaser shall be responsible for timely obtaining and maintaining any required import license, permit or approval necessary to import any Restricted Products into Purchaser's country and any other required governmental authorization ("Import Approval"). Powell shall not be liable if any Export Approval or Import Approval is delayed, denied, revoked, restricted or not renewed, and Purchaser shall not be relieved thereby of its obligations to pay Powell for the Restricted Products or Powell's costs and expenses of obtaining Export Approval in respect of Restricted Products under the Export Laws.

For Products other than Restricted Products, Purchaser (or its designated export agent) shall be responsible for the timely application for any required export authorization and the payment of any required fees, duties, taxes, tariffs, levies or other charges necessary to export the Products out the United States of America and shall be responsible for timely obtaining and maintaining any required Import Approval and the payment of any required fees, duties, taxes, tariffs, levies or other charges necessary to import the Products into Purchaser's country. Powell shall not be liable if any export authorization or Import Approval is delayed, denied, revoked, restricted or not renewed, and Purchaser shall not be relieved thereby of its obligations to pay Powell for the Products.

Purchaser shall not make any disposition of any Products purchased hereunder, by way of transshipment, reexport, diversion or otherwise, other than in and to the ultimate end user and country of destination specified on Purchaser's order or declared as the ultimate end user and country of ultimate destination on Powell's invoices, except as the Export Laws or Export Approval may expressly permit. Purchaser shall not distribute or resell any Product to or within any country or to any individual, government authority or other entity that is presently or at any time in the future subject to sanctions of the United States government, or is in violation of any Export Laws or other United States federal laws, statutes, codes, Executive Orders, decrees, rules or regulations relating to terrorism, drug trafficking or money laundering, or is designated under any such authority as being subject to sanctions or connected in any way to terrorism, drug trafficking or money laundering, including, without limitation, on the Specially Designated Nationals List and Block Persons List maintained by the Office of Foreign Assets Control (OFAC), United States Department of the Treasury, and the Denied Persons List, the Entity List and the Unverified List maintained by the Bureau of Industry and Security, United States Department of Commerce.

Purchaser shall indemnify and hold harmless Powell from and against any damages, liabilities or expenses of any kind incurred by Powell as a result of Purchaser's direct or indirect breach of any term or condition related to the Export Laws.

**19. SAFETY:** Purchaser warrants that it will comply with all laws, regulations, standards and requirements which are applicable to the use of the Products and Purchaser's business.

**20. CONFIDENTIALITY:** Purchaser will not disclose or otherwise disseminate, directly or indirectly, any of the terms of these Terms and Conditions or any other information of Powell given to or received by Purchaser or its associates or agents, unless Purchaser received Powell's written permission or such information is required to be disclosed by law or becomes part of the public domain through no fault of Purchaser, its associates or agents.

**21. GOVERNING LAW; JURISDICTION AND VENUE:** These Terms and Conditions shall be governed by and construed in accordance with the internal laws of the State of Ohio, without regard to such state's choice of law principles. These Terms and Conditions shall not be governed by or construed in accordance with the United Nations Convention on the International Sale of Goods, 1980, for any purpose. Customer and Powell hereby submit to the jurisdiction and venue of the state and federal courts in Cincinnati, Hamilton County, Ohio over any controversy relating to or arising from these Terms and Conditions. Notwithstanding the foregoing, Powell's right to institute or defend any proceedings in any jurisdiction, in or out of the United State of America, shall not be limited.

**22. SEVERABILITY:** If any of the provisions of these Terms and Conditions are deemed invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions will in no way be affected or impaired thereby.

**23. FORCE MAJEURE:** Delivery of all or any part of the Products is contingent upon Powell's ability to obtain supplies, raw materials and services through its regular and usual sources of supply. If by reason of any contingency beyond Powell's reasonable control, including (but not limited to) war, governmental requests, restrictions or regulations, fire, flood, casualty, accident, or other acts of God, strikes or other difficulties with employees, delay or inability to obtain labor, equipment, material and services through Powell's usual sources, failure or refusal of any carrier to transport materials, delay in transport thereof, or any other similar occurrence, Powell is not able to meet anticipated deliveries, Powell shall not be liable therefore and may, in its discretion without prior notice to Purchaser, postpone the delivery date(s) under this document for a time which is reasonable under all the circumstances. If during the occurrence of any of the foregoing contingencies, Powell holds any of the Products, Powell may invoice and hold the same for the account of Purchaser and Purchaser agrees to make payment at the maturity of the invoice so rendered.

**24. ASSIGNMENT:** No right or interest in the contract arising from these Terms and Conditions shall be assigned by Purchaser and no delegation of any obligation owed by Purchaser shall be made without the prior written permission of Powell. As used herein, "Purchaser" and "Powell" include the respective heirs, executors, personal representatives, successors and permitted assigns of each.

**25. REMEDIES CUMULATIVE; NO WAIVER:** The individual rights and remedies of Powell reserved herein shall be cumulative and additional to any other or further remedies provided in law or equity or in this document. Waiver by Powell of performance or breach of any provision hereof by Purchaser, or failure of Powell to enforce any provision hereof which may establish a defense or limitation of liability, shall not be deemed a waiver of future compliance therewith or a course of performance modifying such provision, and such provision shall remain in full force and effect as written.

**26. LIMITATION OF LIABILITY:** UNDER NO CIRCUMSTANCES SHALL POWELL BE LIABLE TO PURCHASER UNDER OR IN CONNECTION WITH ORDERS FOR PRODUCTS AND THESE TERMS AND CONDITIONS, WHETHER ANY CLAIM FOR RECOVERY IS BASED UPON OR ARISES OUT OF THEORIES OF BREACH OF CONTRACT, BREACH OF WARRANTY, INDEMNIFICATION, NEGLIGENCE, TORT (INCLUDING STRICT LIABILITY) OR OTHERWISE, IN EXCESS OF AN AMOUNT EQUAL TO THE NET CONTRACT VALUE OF THE PRODUCTS PROVIDED BY POWELL TO PURCHASER DURING THE MOST RECENTLY ENDED CALENDAR QUARTER.

The logo for Powell Valves features the word "POWELL" in a bold, solid blue, sans-serif font. Below it, the word "VALVES" is written in a large, white, outlined, sans-serif font. A thick blue horizontal line is positioned directly beneath the word "VALVES".

***Established 1846***





# **POWELL VALVES**

2503 SPRING GROVE AVENUE, CINCINNATI, OHIO 45214-1771, U.S.A.

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