

# Masoneilan™ 71000 Series

High Pressure Drop,  
Streamlined Angle  
Control Valve



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## Features

Masonilan 71000 Series angle body valves are designed for special applications such as hydrocarbon service involving severe operating conditions where high temperatures and/or high pressures, high pressure drops, severe coking conditions and flashing liquids are encountered. They are particularly adapted to pressure or level control systems and emergency blowdown or dropout service.

The inner body contours are streamlined to give maximum throat efficiency and freedom from erosion and to eliminate pockets causing flow reversal and eddy currents.

Provision is made for the introduction of a flushing medium which may be necessary when passing fluids containing solid particles, or to prevent coke formation in refinery service at extremely high temperatures.

For applications involving high pressures, an equalizing connection can be provided to equalize the off-balance force resulting from the single seated design.

The direct actuator is used air-to-push-down action and the reverse actuator for air-to-push-up action.

Direct or reverse actuator can be used, depending on action desired.

## Quench Control Valve:

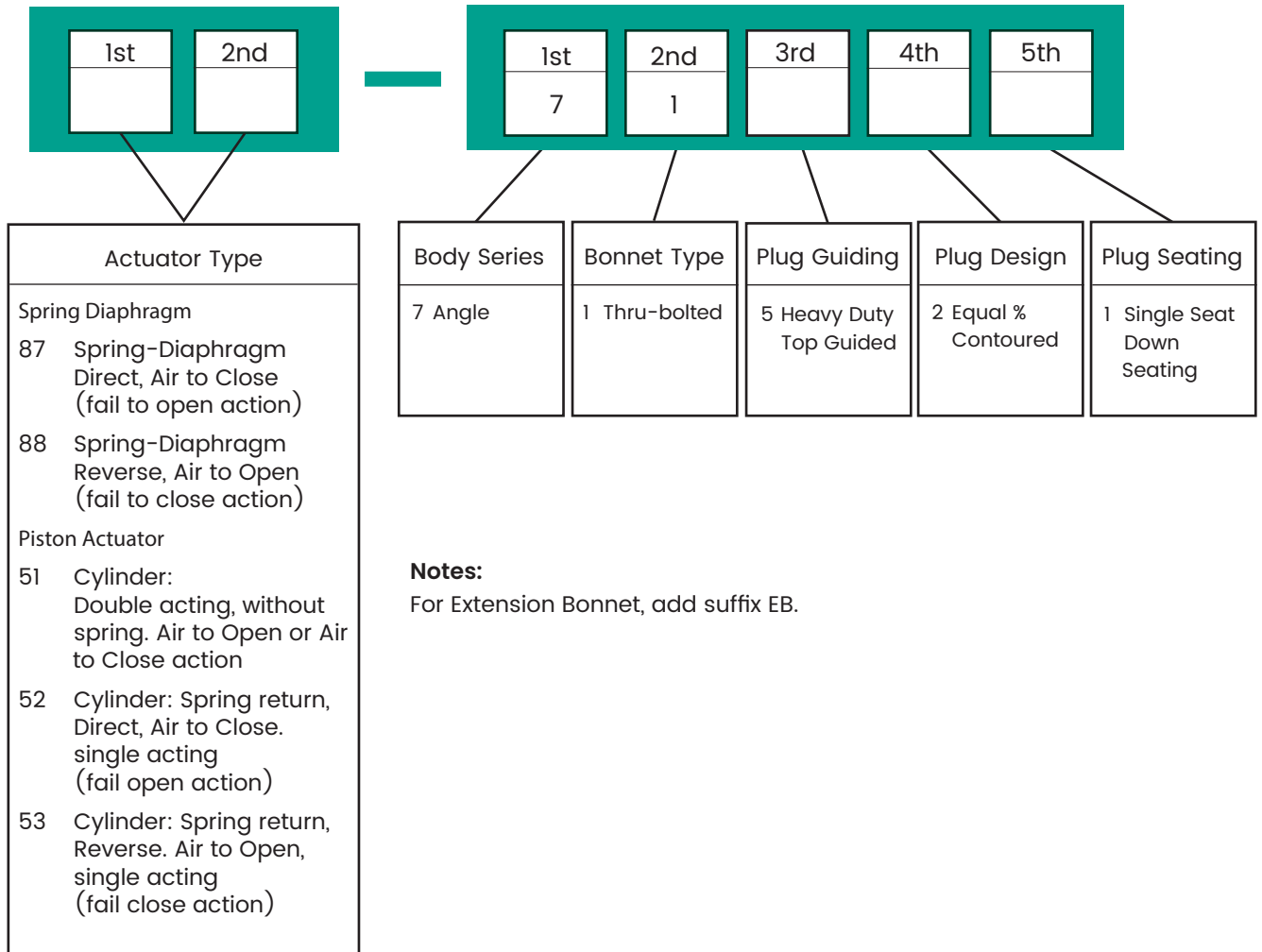
Visbreaker control valves 71000 Quench design: These valves are designed with a unique internal gas oil quench feature that simultaneously reduces furnace oil outlet pressure and introduces quench oil before the process fluid leaves the valve.

Oil enters the valve through a bonnet flange and then passes into the plug through a series of holes or specific grooves.

Quench oil acts to rapidly quench the process fluid and minimize hard coke deposits inside the valve which eventually causes valve plug binding or sticking.



# Numbering System



# General Data

- Flow Direction**

Flow-to-open  
Flow-to-close

- Body**

Type: Cast Angle, 90°

Sizes: 1-inch to 12-inch (expanding outlets available) (DN 25 to 300)

Ratings: ASME Class 150 to ASME Class 2500

End Connections: Flanged - RF/RTJ (ASME B16.5, JIS, PN)

- Bonnet**

Type: Bolted Standard  
Extended Bonnet Optional

- Materials**

Carbon Steel (WCC)  
Low Carbon Content (LCC) Steel  
Chrome Moly (WC9)  
316 Stainless Steel  
347 Stainless Steel

- Trim**

Guide & Plug Type: Heavy Duty, Single Seat Plug  
Plug and Stem guiding for increased stability and side loading

Seat Ring Type:

Threaded Seat Ring  
Single Seating Surface  
Venturi Style Liner

Trim size:

Full capacity  
Reduced capacity

Seat leakage:

IEC 60534-4 and  
ANSI/FCI 70.2 Class IV or V

Cv Ratio: 50:1

Flow Characteristic: Equal percentage

- Actuator**

Mounting: Direct mount

Type:

Spring-diaphragm  
Spring-return cylinder  
Double-acting cylinder

## Temperature Range / Seat Leakage

Valve Size		Body Rating	Seat Type	Packing Material	Temperature Range				Seat Leakage IEC 60534-4 and ANSI/FCI 70.2 Class	
					Standard Bonnet		Extension Bonnet			
NPS	DN				Min.	Max.	Min.	Max.		
1 to 12	25 to 300	ASME Class 150 to 2500 and equivalent PN	Metal	PTFE based packing	-46°C (-50°F)	+343°C (+650°F)	-46°C (-50°F)	+427°C (+800°F)	IV	V
				Graphite Packing	-46°F (-50°C)	+1050°F (+566°C)	-46°C (-50°F)	+566°C (+1050°F)		

# 71000 Series Specifications

## Ratings and Connections

Valve Size <sup>(4)</sup>		Ratings <sup>(1,2,3)</sup>		
NPS	DN	ASME	JIS	PN
1	25	150 to 600	10K to 40K	10 to 100
1.5	40	150 to 2500	10K to 63K	10 to 400
2	50	150 to 2500	10K to 63K	10 to 400
3	75	150 to 2500	10K to 63K	10 to 400
4	100	150 to 2500	10K to 63K	10 to 400
6	150	150 to 2500	10K to 63K	10 to 400
8	200	150 to 2500	10K to 63K	10 to 400
10	250	150 to 2500	10K to 63K	10 to 400
12	300	150 to 2500	10K to 63K	10 to 400

JIS and PN flange equivalence		
ASME	JIS	PN
150	10K	PN16 and below
300	16K, 20K	PN25, PN40
600	30K, 40K	PN63, PN100
900	63K	-
1500	-	PN160, PN250
2500	-	PN320, PN400

1. Other rating class may be available upon request
2. Only flange end connections are available, no Butt Welding ends available
3. Hub end connections are available upon request
4. Different end connections between inlet and outlet are available upon request (example: 2"x2"x3")

# Flow Capacity and $F_L$

## ASME Class 150 to 1500 – EQ% – FTC Models

Travel (Percent)							10*	20	30	40	50	60	70	80	90	100
FL							0,90	0,89	0,84	0,80	0,74	0,70	0,65	0,61	0,57	0,56
Valve size (NPS)	Trim size (NPS)	Orifice Dia.		Factor	Travel		Rated $C_V$									
		In	mm		in	mm										
1	1	0.5	12.7	Red.	0.75	19.05	0.1	0.5	1.8	3.4	5.1	6.8	8.1	9.1	9.7	10
	1	0.75	19.05	Full.	0.75	19.05	0.2	0.5	2.4	5.2	8	11	14	16	18	20
1.5	1	0.75	19.05	Full.	0.75	19.05	0.2	0.5	2.4	5.2	8	11	14	16	18	20
	1.5	0.812	20.64	Red.	1	25.4	0.2	1.4	4.6	8.9	13	18	21	24	25	26
	1.5	1.125	28.56	Full.	1	25.4	0.3	1.1	6.0	13	21	28	34	40	45	50
2	1.5	0.812	20.64	Red.	1	25.4	0.2	1.4	4.6	8.9	13	18	21	24	25	26
	2	1.125	28.56	Red.	1.5	38.1	0.4	2.6	8.9	17	26	34	41	46	49	50
	2	1.562	39.68	Full.	1.5	38.1	0.5	2.6	14	30	47	64	79	92	103	115
3	2	1.125	28.56	Red.	1.5	38.1	0.4	2.6	8.9	17	26	34	41	46	49	50
	2	1.562	39.68	Full.	1.5	38.1	0.5	2.6	14	30	47	64	79	92	103	115
	3	1.687	42.85	Red.	1.5	38.1	0.6	5.2	18	34	51	68	81	91	97	100
	3	2.375	60.33	Full.	1.5	38.1	0.8	5	24	52	82	112	138	160	180	200
4	3	1.687	42.85	Red.	1.5	38.1	0.6	5.2	18	34	51	68	81	91	97	100
	3	2.375	60.33	Full.	1.5	38.1	0.8	5	24	52	82	112	138	160	180	200
	4	2.250	57.15	Red.	2	50.8	1.3	11	37	72	108	142	170	191	204	210
	4	3.187	80.95	Full.	2	50.8	1.9	11	56	119	189	257	317	368	414	460
6	4	2.250	57.15	Red.	2	50.8	1.3	11	37	72	108	142	170	191	204	210
	4	3.187	80.95	Full.	2	50.8	1.9	11	56	119	189	257	317	368	414	460
	6	3.375	85.73	Red.	2	50.8	3.2	19.4	66	126	190	250	300	337	360	370
	6	3.875	98.43	Red.	2	50.8	3.6	26.2	89	171	257	338	406	455	486	500
	6	4.75	120.65	Full.	2	50.8	4.5	17	91	195	308	418	516	600	675	750
8	6	3.375	85.73	Red.	2	50.8	3.2	19.4	66	126	190	250	300	337	360	370
	6	3.875	98.43	Red.	2	50.8	3.6	26.2	89	171	257	338	406	455	486	500
	6	4.75	120.65	Full.	2	50.8	4.5	17	91	195	308	418	516	600	675	750
	8	5.625	142.88	Full.	2.5	63.5	5.6	25	133	285	452	614	757	881	990	1100
10	8	5.625	142.88	Full.	2.5	63.5	5.6	25	133	285	452	614	757	881	990	1100
	10	6.375	161.925	Full.	4	101.6	6.3	32	169	363	576	781	964	1121	1260	1400
12	10	6.375	161.925	Full.	4	101.6	6.3	32	169	363	576	781	964	1121	1260	1400
	12	7.5	190.5	Full.	4	101.6	7.4	43	230	493	781	1060	1308	1521	1710	1900

1. Minimum operable CV: the first 10% corresponds to dead stroke to protect the seating area. Below this opening, the flow will not be controllable.



= Maximum capacity for each valve size.

# Flow Capacity and $F_L$

## ASME Class 150 to 1500 – EQ% – FTO Models

							Travel (Percent)										
							10 <sup>(1)</sup>	20	30	40	50	60	70	80	90	100	
							FL	0.90	0.89	0.82	0.75	0.75	0.79	0.81	0.84	0.89	0.92
Valve Size (NPS)	Trim Size (NPS)	Orifice Dia.		Factor	Travel		Rated $C_V$										
		In.	mm.		in.	mm.											
1	1	0.5	12.7	Red.	0.75	19.05	0.1	0.2	1.0	2.2	3.4	4.4	5.1	5.6	5.9	6.3	
	1	0.75	19.05	Full.	0.75	19.05	0.2	0.3	1.9	4.1	6.4	8.3	9.8	11	11	12	
1.5	1	0.75	19.05	Full.	0.75	19.05	0.2	0.3	1.9	4.1	6.4	8.3	9.8	11	11	12	
	1.5	0.812	20.64	Red.	1	25.4	0.2	0.5	2.9	6.2	9.6	12	15	16	17	18	
	1.5	1.125	28.56	Full.	1	25.4	0.3	0.8	4.8	10	16	21	24	27	28	30	
2	1.5	0.812	20.64	Red.	1	25.4	0.2	0.5	2.9	6.2	9.6	12	15	16	17	18	
	2	1.125	28.56	Red.	1.5	38.1	0.4	1.0	6.6	14	22	28	33	37	39	41	
	2	1.562	39.68	Full.	1.5	38.1	0.5	1.7	11	23	36	47	55	61	64	68	
3	2	1.125	28.56	Red.	1.5	38.1	0.4	1.0	6.6	14	22	28	33	37	39	41	
	2	1.562	39.68	Full.	1.5	38.1	0.5	1.7	10.9	23	36	47	55	61	64	68	
	3	1.687	42.85	Red.	1.5	38.1	0.6	2.3	14	31	48	62	73	80	85	90	
	3	2.375	60.33	Full.	1.5	38.1	0.8	3.9	25	53	83	108	126	138	146	155	
4	3	1.687	42.85	Red.	1.5	38.1	0.6	2.3	14	31	48	62	73	80	85	90	
	3	2.375	60.33	Full.	1.5	38.1	0.8	3.9	25	53	83	108	126	138	146	155	
	4	2.250	57.15	Red.	2	50.8	1.3	4.3	28	59	92	119	140	153	162	172	
	4	3.187	80.95	Full.	2	50.8	1.9	7.3	47	100	155	201	236	259	274	290	
6	4	2.250	57.15	Red.	2	50.8	1.3	4.3	28	59	92	119	140	153	162	172	
	4	3.187	80.95	Full.	2	50.8	1.9	7.3	47	100	155	201	236	259	274	290	
	6	3.375	85.73	Red.	2	50.8	3.2	8.6	55	117	181	236	277	303	321	340	
	6	3.875	98.43	Red.	2	50.8	3.6	8.8	56	121	187	243	285	312	330	350	
	6	4.75	120.65	Full.	2	50.8	4.5	14	91	197	304	396	464	508	538	570	
8	6	3.375	85.73	Red.	2	50.8	3.2	8.6	55	117	181	236	277	303	321	340	
	6	3.875	98.43	Red.	2	50.8	3.6	8.8	56	121	187	243	285	312	330	350	
	6	4.75	120.65	Full.	2	50.8	4.5	14	91	197	304	396	464	508	538	570	
	8	5.625	142.88	Full.	2.5	63.5	5.6	18	117	252	389	507	594	651	689	730	
10	8	5.625	142.88	Full.	2.5	63.5	5.6	18	117	252	389	507	594	651	689	730	
	10	6.375	161.925	Full.	4	101.6	6.3	24	152	328	506	660	773	847	896	950	
12	10	6.375	161.925	Full.	4	101.6	6.3	24	152	328	506	660	773	847	896	950	
	12	7.5	190.5	Full.	4	101.6	7.4	33	209	449	693	903	1058	1159	1227	1300	

1. Minimum operable CV: the first 10% corresponds to dead stroke to protect the seating area. Below this opening, the flow will not be controllable.

 = Maximum capacity for each valve size.

# Flow Capacity and $F_L$

## ASME Class 2500 – EQ% – FTC Models

							Travel (Percent)										
							10 <sup>(1)</sup>	20	30	40	50	60	70	80	90	100	
							FL	0,90	0,89	0,84	0,80	0,74	0,70	0,65	0,61	0,57	0,56
Valve Size (NPS)	Trim Size (NPS)	Orifice Dia.		Factor	Travel		Rated Cv										
		In.	mm.		in.	mm.											
1.5	1	0.5	12.7	Red.	0.75	19.05	0.1	0.5	1.8	3.4	5.1	6.8	8.1	9.1	9.7	10	
	1	0.75	19.05	Full.	0.75	19.05	0.2	0.5	2.4	5.2	8	11	14	16	18	20	
2	1	0.5	12.7	Red.	0.75	19.05	0.1	0.2	1.2	2.6	4.1	5.6	6.9	8.0	9.0	10	
	1	0.75	19.05	Full.	0.75	19.05	0.2	0.5	2.4	5.2	8	11	14	16	18	20	
	1.5	0.812	20.64	Red.	1	25.4	0.2	1.4	4.6	8.9	13	18	21	24	25	26	
	1.5	1.125	28.56	Full.	1	25.4	0.3	1.1	6.0	13	21	28	34	40	45	50	
3	1.5	0.812	20.64	Red.	1	25.4	0.2	1.4	4.6	8.9	13	18	21	24	25	26	
	2	1.125	28.56	Red.	1.5	38.1	0.4	2.6	8.9	17	26	34	41	46	49	50	
	2	1.562	39.68	Full.	1.5	38.1	0.5	2.6	14	30	47	64	79	92	103	115	
4	2	1.125	28.56	Red.	1.5	38.1	0.4	2.6	8.9	17	26	34	41	46	49	50	
	2	1.562	39.68	Full.	1.5	38.1	0.5	2.6	14	30	47	64	79	92	103	115	
	3	1.687	42.85	Red.	1.5	38.1	0.6	5.2	18	34	51	68	81	91	97	100	
	3	2.375	60.33	Full.	1.5	38.1	0.8	5	24	52	82	112	138	160	180	200	
6	3	1.687	42.85	Red.	1.5	38.1	0.6	5.2	18	34	51	68	81	91	97	100	
	3	2.375	60.33	Full.	1.5	38.1	0.8	5	24	52	82	112	138	160	180	200	
	4	2.250	57.15	Red.	2	50.8	1.3	11	37	72	108	142	170	191	204	210	
	4	3.187	80.95	Full.	2	50.8	1.9	11	56	119	189	257	317	368	414	460	
8	4	2.250	57.15	Red.	2	50.8	1.3	11	37	72	108	142	170	191	204	210	
	4	3.187	80.95	Full.	2	50.8	1.9	11	56	119	189	257	317	368	414	460	
	6	3.375	85.73	Red.	2	50.8	3.2	19.4	66	126	190	250	300	337	360	370	
	6	3.875	98.43	Red.	2	50.8	3.6	26.2	89	171	257	338	406	455	486	500	
	6	4.75	120.65	Full.	2	50.8	4.5	17	91	195	308	418	516	600	675	750	
10	6	3.375	85.73	Red.	2	50.8	3.2	19.4	66	126	190	250	300	337	360	370	
	6	3.875	98.43	Red.	2	50.8	3.6	26.2	89	171	257	338	406	455	486	500	
	6	4.75	120.65	Full.	2	50.8	4.5	17	91	195	308	418	516	600	675	750	
	8	5.625	142.88	Full.	2.5	63.5	5.6	25	133	285	452	614	757	881	990	1100	
12	6	3.375	85.73	Red.	2	50.8	3.2	19.4	66	126	190	250	300	337	360	370	
	6	4.75	120.65	Full.	2	50.8	4.5	17	91	195	308	418	516	600	675	750	
	8	5.625	142.88	Full.	2.5	63.5	5.6	25	133	285	452	614	757	881	990	1100	
	10	6.375	161.925	Full.	4	101.6	6.3	32	169	363	576	781	964	1121	1260	1400	

1. Minimum operable CV: the first 10% corresponds to dead stroke to protect the seating area. Below this opening, the flow will not be controllable.



= Maximum capacity for each valve size.



# Flow Capacity and $F_L$

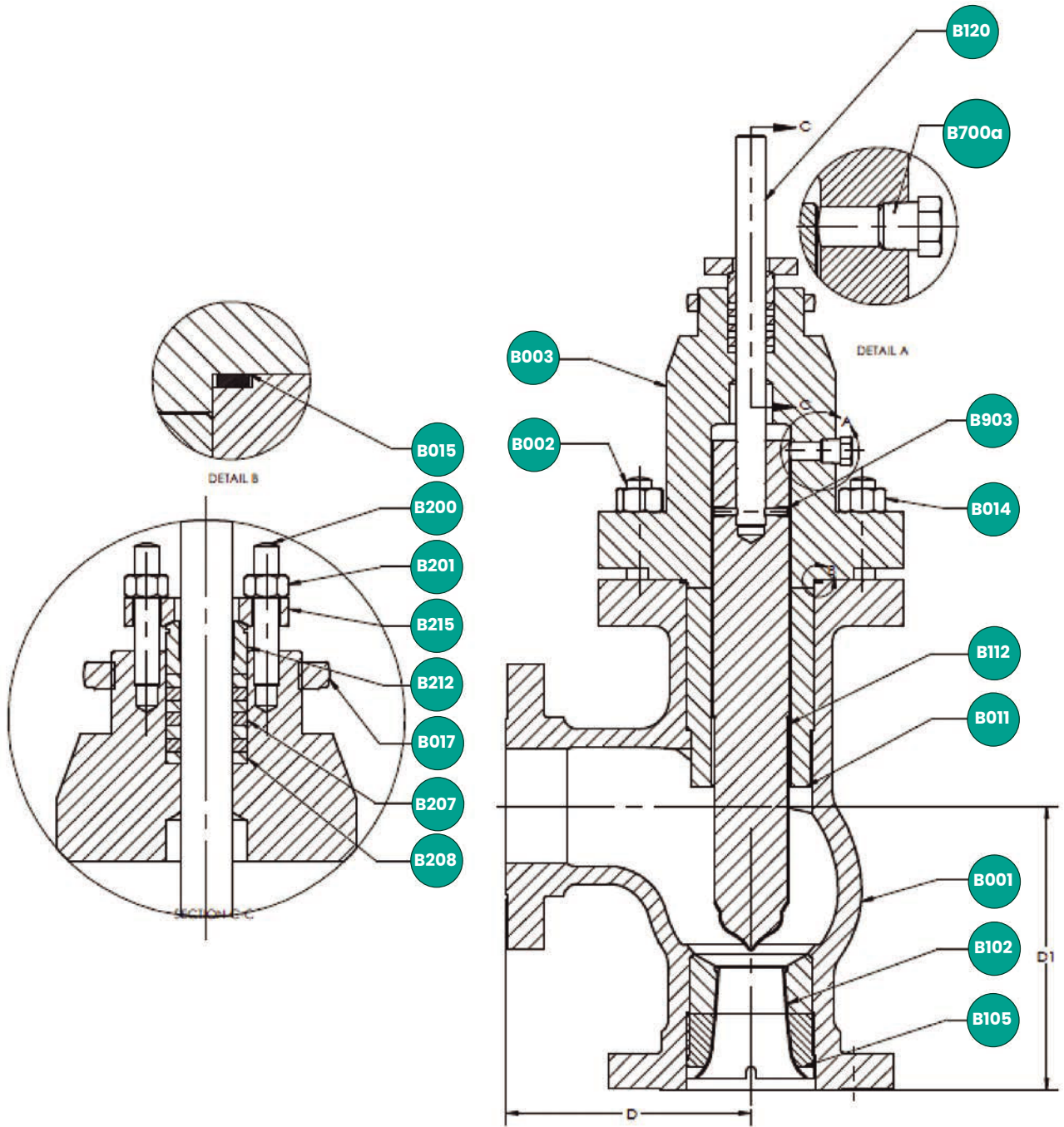
## ASME Class 2500 – EQ% – FTO Models

Travel (Percent)							10 <sup>(1)</sup>	20	30	40	50	60	70	80	90	100
FL							0.90	0.89	0.82	0.75	0.75	0.79	0.81	0.84	0.89	0.92
Valve Size (NPS)	Trim Size (NPS)	Orifice Dia.		Factor	Travel		Rated $C_V$									
		In.	mm.		in.	mm.										
1.5	1	0.5	12.7	Red.	0.75	19.05	0.1	0.2	1.0	2.2	3.4	4.4	5.1	5.6	5.9	6.3
	1	0.75	19.05	Full.	0.75	19.05	0.2	0.3	1.9	4.1	6.4	8.3	9.8	11	11	12
2	1	0.5	12.7	Red.	0.75	19.05	0.1	0.2	1.0	2.2	3.4	4.4	5.1	5.6	5.9	6.3
	1	0.75	19.05	Full.	0.75	19.05	0.2	0.3	1.9	4.1	6.4	8.3	9.8	11	11	12
	1.5	0.812	20.64	Red.	1	25.4	0.2	0.5	2.9	6.2	9.6	12	15	16	17	18
	1.5	1.125	28.56	Full.	1	25.4	0.3	0.8	4.8	10	16	21	24	27	28	30
3	1.5	0.812	20.64	Red.	1	25.4	0.2	0.5	2.9	6.2	9.6	12	15	16	17	18
	2	1.125	28.56	Red.	1.5	38.1	0.4	1.0	6.6	14	22	28	33	37	39	41
	2	1.562	39.68	Full.	1.5	38.1	0.5	1.7	11	23	36	47	55	61	64	68
4	2	1.125	28.56	Red.	1.5	38.1	0.4	1.0	6.6	14	22	28	33	37	39	41
	2	1.562	39.68	Full.	1.5	38.1	0.5	1.7	11	23	36	47	55	61	64	68
	3	1.687	42.85	Red.	1.5	38.1	0.6	2.3	14	31	48	62	73	80	85	90
	3	2.375	60.33	Full.	1.5	38.1	0.8	3.9	25	53	83	108	126	138	146	155
6	3	1.687	42.85	Red.	1.5	38.1	0.6	2.3	14	31	48	62	73	80	85	90
	3	2.375	60.33	Full.	1.5	38.1	0.8	3.9	25	53	83	108	126	138	146	155
	4	2.250	57.15	Red.	2	50.8	1.3	4.3	28	59	92	119	140	153	162	172
	4	3.187	80.95	Full.	2	50.8	1.9	7.3	47	100	155	201	236	259	274	290
8	4	2.250	57.15	Red.	2	50.8	1.3	4.3	28	59	92	119	140	153	162	172
	4	3.187	80.95	Full.	2	50.8	1.9	7.3	47	100	155	201	236	259	274	290
	6	3.375	85.73	0.5	2	50.8	3.2	8.6	55	117	181	236	277	303	321	340
	6	3.875	98.43	0.65	2	50.8	3.6	8.8	56	121	187	243	285	312	330	350
	6	4.75	120.65	Full.	2	50.8	4.5	14	91	197	304	396	464	508	538	570
10	6	3.375	85.73	0.5	2	50.8	3.2	8.6	55	117	181	236	277	303	321	340
	6	3.875	98.43	0.65	2	50.8	3.6	8.8	56	121	187	243	285	312	330	350
	6	4.75	120.65	Full.	2	50.8	4.5	14	91	197	304	396	464	508	538	570
	8	5.625	142.88	Full.	2.5	63.5	5.6	18	117	252	389	507	594	651	689	730
12	6	3.375	85.73	0.5	2	50.8	3.2	8.6	55	117	181	236	277	303	321	340
	6	4.75	120.65	Full.	2	50.8	4.2	14	91	197	304	396	464	508	538	570
	8	5.625	142.88	Full.	2.5	63.5	5.6	18	117	252	389	507	594	651	689	730
	10	6.375	161.925	Full.	4	101.6	6.3	24	152	328	506	660	773	847	896	950

1. Minimum operable CV: the first 10% corresponds to dead stroke to protect the seating area. Below this opening, the flow will not be controllable.

 = Maximum capacity for each valve size.

# 71000 Series Materials



# Materials of Construction

## Standard Construction

Ref. No.	Temperature Range	-46°C [-50°F]	-29°C [-20°F]	343°C [650°F]	427°C [800°F]	538°C [1000°F]	566°C [1050°F]	
		Description						
B001 B003	Body Bonnet	Materials						
		ASTM A216 GR WCC/WCB / EN 1.0619/1.0625						
		ASTM A217 GRADE WC9						
		ASTM A217 GRADE WC6/EN 1.7357 EN 10213						
		ASTM A217 GRADE C5						
		ASTM A352 GR LCC						
B002	Body Stud	ASTM A351 GRADE CF8M / EN 1.4408						
		ASTM A351 GRADE CF8C						
		ASTM A193 GR B7/EN 1.7225			ASTM A193 GR B16			
		ASTM A320 GR L7						
B014	Body Nut	ASTM A193 GR B8 Class 2 or ASTM A453 Grade 660 Class A or B						
		ASTM A194 Grade 2H			ASTM A194 Grade 7			
		ASTM A194 Grade 8						
B102	Seat Ring	HARDENED 410 ST. ST.						
		HARDENED 440C ST. ST.						
		HARDFACING STELLITE NO.6 ON 316 ST. ST. or STELLITE NO.6						
B105	Seat Ring Retainer	SOLUTION ANNEALED 347 ST. ST. + HARDFACING STELLITE 6 or STELLITE NO.6						
		SOLUTION ANNEALED 316 ST. ST.						
		SOLUTION ANNEALED 347 ST. ST.						
		HARDFACING STELLITE NO.6 ON 316 ST. ST. or STELLITE NO.6						
B011	Guide Bushing	SOLUTION ANNEALED 347 ST. ST. + HARDFACING STELLITE 6 or STELLITE NO.6						
		HARDENED 440C ST. ST.						
		HARDFACING STELLITE NO.6 ON 316 ST. ST. or STELLITE NO.6						
B112	Plug	SOLUTION ANNEALED 316 ST. ST.						
		SOLUTION ANNEALED 347 ST. ST.						
		HARDENED 410 ST. ST.						
		HARDENED 440C ST. ST.						
		HARDFACING STELLITE NO.6 ON 316 ST. ST. or STELLITE NO.6						
B120	Plug Stem	SOLUTION ANNEALED 347 ST. ST. + HARDFACING STELLITE 6 or STELLITE NO.6						
		SOLUTION ANNEALED 316 ST. ST.						
		SOLUTION ANNEALED 347 ST. ST.						
		HARDENED ASTM A638 GRADE 660						
		17-4 PH ST. ST. H1075						
ASTM B637 ALLOY N07718 (INCONEL® 718) SOL ANNEALED AND PRECIP HARDENED								

# Materials of Construction

## NACE Construction

Ref. No.	Temperature Range	-46°C [-50°F]	-29°C [-20°F]	343°C [650°F]	427°C [800°F]	538°C [1000°F]	566°C [1050°F]	
		Description						
B001 B003	Body Bonnet	ASTM A216 GR WCC/WCB / EN 1.0619/1.0625						
		ASTM A217 GRADE WC9						
		ASTM A217 GRADE WC6/EN 1.7357 EN 10213						
		ASTM A217 GRADE C5						
		ASTM A352 GR LCC						
		ASTM A351 GRADE CF8M / EN 1.4408						
B002	Body Stud	ASTM A193 GR B7/EN 1.7225 <b>{Non exposed bolting}</b> or ASTM A193 GR B7M ELECTROLESS NICKEL PLATING <b>{Exposed bolting}</b>						
		ASTM A193 GR B16 <b>{Non exposed bolting}</b>						
		ASTM A320 GR L7 <b>{Non exposed bolting}</b> ASTM A320 GR L7M <b>{Exposed bolting}</b>						
		ASTM A193 GR B8 Class 2 <b>{Non exposed bolting}</b> or ASTM A193 GR B8RA Class 1C <b>{Exposed bolting}</b> {Class 300/600 up to 4" & CL900/1500 up to 2" only} or ASTM A453 Grade 660 Class A or B <b>{Non exposed &amp; Exposed bolting}</b>						
B014	Body Nut	ASTM A194 Grade 2H <b>{Non exposed bolting}</b> or ASTM A194 Grade 2HM, Electroless Nickel Plat- ing <b>{Exposed bolting}</b>						
		ASTM A194 Grade 7 <b>{Non exposed bolting}</b> or ASTM A194 Grade 7M Electroless Nickel Plating <b>{Exposed bolting}</b>						
		ASTM A194 Grade 8 <b>{Non exposed bolting}</b> or ASTM A194 Grade 8A <b>{Exposed bolting}</b>						
B102	Seat Ring	HARDFACING STELLITE NO.6 ON 316 ST. ST. or STELLITE NO.6						
		SOLUTION ANNEALED 347 ST. ST., HARDFACING STELLITE 6 or STELLITE NO.6						
B105	Seat Ring Retainer	SOLUTION ANNEALED 316 ST. ST.						
		SOLUTION ANNEALED 347 ST. ST.						
		HARDFACING STELLITE NO.6 ON 316 ST. ST.						
		SOLUTION ANNEALED 347 ST. ST. + HARDFACING STELLITE 6						
B011	Guide Bushing	HARDFACING STELLITE NO.6 ON 316 ST. ST. or STELLITE NO.6						
		SOLUTION ANNEALED 347 ST. ST. + HARDFACING STELLITE 6 or STELLITE NO.6						
B112	Plug	SOLUTION ANNEALED 316 ST. ST.						
		SOLUTION ANNEALED 347 ST. ST.						
		HARDFACING STELLITE NO.6 ON 316 ST. ST. or STELLITE NO.6						
		SOLUTION ANNEALED 347 ST. ST. + HARDFACING STELLITE 6 or STELLITE NO.6						
B120	Plug Stem	SOLUTION ANNEALED 316 ST. ST.						
		SOLUTION ANNEALED 347 ST. ST.						
		HARDENED ASTM A638 GRADE 660						
		17-4 PH ST. ST. H1150M						
ASTM B637 ALLOY N07718 (INCONEL® 718) SOL ANNELAED AND PRECIP HARDENED								

# Materials of Construction

## Severe Erosive Service Construction

Ref. No.	Temperature Range	-46°C [-50°F]	-29°C [-20°F]	343°C [650°F]	427°C [800°F]	538°C [1000°F]	566°C [1050°F]		
		Materials							
B001 B003	Body Bonnet	ASTM A216 GR WCC/WCB / EN 1.0619/1.0625			ASTM A217 GRADE WC9				
		ASTM A217 GRADE WC6/EN 1.7357 EN 10213							
		ASTM A217 GRADE C5							
		ASTM A352 GR LCC			ASTM A351 GRADE CF8M / EN 1.4408				
		ASTM A351 GRADE CF8							
		ASTM A193 GR B7/EN 1.7225 <b>{Non exposed bolting}</b> or ASTM A193 GR B7M, ELECTROLESS NICKEL PLATING <b>{Exposed bolting}</b>							
B002	Body Stud	ASTM A193 GR B16 <b>{Non exposed bolting}</b>							
		ASTM A193 GR B8 Class 2 <b>{Non exposed bolting}</b> or ASTM A193 GR B8RA Class 1C <b>{Exposed bolting}</b> {Class 300/600 up to 4" & CL900/1500 up to 2" only} or ASTM A453 Grade 660 Class A or B <b>{Non exposed &amp; Exposed bolting}</b>							
		ASTM A194 Grade 2H <b>{Non exposed bolting}</b> or ASTM A194 Grade 2HM, Electroless Nickel Plating as <b>{Exposed bolting}</b>							
B014	Body Nut	ASTM A194 Grade 7 <b>{Non exposed bolting}</b> or ASTM A194 Grade 7M, Electroless Nickel Plating <b>{Exposed bolting}</b>							
		ASTM A194 Grade 8 <b>{Non exposed bolting}</b> or ASTM A194 Grade 8A <b>{Exposed bolting}</b>							
		HARDFACING STELLITE NO.12 ON 316 ST. ST. or STELLITE NO.12							
B102	Seat Ring	SOLUTION ANNEALED 347 ST. ST. + HARDFACING STELLITE 12 or STELLITE NO.12							
		HARDFACING STELLITE NO.12 ON 316 ST. ST.							
B105	Seat Ring Retainer	SOLUTION ANNEALED 347 ST. ST. + HARDFACING STELLITE 12							
		HARDFACING STELLITE NO.6 ON 316 ST. ST. or STELLITE NO.6							
B011	Guide Bushing	SOLUTION ANNEALED 347 ST. ST. + HARDFACING STELLITE 6 or STELLITE NO.6							
		17-4PH CONDITION							
		HARDFACING STELLITE NO.12 ON 316 ST. ST. or STELLITE NO.12							
B112	Plug	SOLUTION ANNEALED 347 ST. ST. + HARDFACING STELLITE 12 or STELLITE NO.12							
		HARDFACING STELLITE NO.12 ON 316 ST. ST. or STELLITE NO.12							
B120	Plug Stem	SOLUTION ANNEALED 316 ST. ST.							
		SOLUTION ANNEALED 347 ST. ST.							
		HARDENED ASTM A638 GRADE 660							
		17-4 PH ST. ST. H1150M							
		ASTM B637 ALLOY N07718 (INCONEL® 718) SOL ANNELAED AND PRECIP HARDENED							







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