

MIL 41000

Heavy Duty Cage Guided Control Valves





Table of Contents

Introduction	01
Features	02 - 03
Typical Applications	03
Technical Information	04 - 12
<ul style="list-style-type: none"> • Model Decodification • Standard Sizes / Ratings • Standard End Connections • General Data • Seat Leakage Class / Temperature Range • Flow Coefficients (Rated Cv) 	
Construction	13 - 16
Dimensions and Weights	17 - 18



Introduction

Hallmarks of exceptional service requirements of control valves are four fold: high pressure drop capability, high capacity, tight shut-off and high temperature capability. MIL 41000 series exhibits these characteristics in all valve sizes. The rugged cage guiding, optional pressure balancing and a host of custom-engineered trim designs make these valves suitable for higher pressure drops and other severe applications, where conventionally designed control valves fail to perform satisfactorily.



Features

Higher Allowable Pressure Drops

41000 series control valves provide exceptional and dependable performance over a wide range of pressure drops typical of severe services. Just as important, it handles a vast majority of all shut-off pressures with standard pneumatic spring-diaphragm actuators.

Greater Capacity with Low Recovery

Rated capacity for each 41000 series valve is at top levels established for contemporary cage guided valves. These unusually high capacities are attained with minimum pressure recovery, as indicated by the high critical flow factors, which minimises possibility of cavitation in liquid service.

Tight Shut-off

41000 series valves can provide single seat leak tightness of Class IV in accordance with FCI 70.2, or the exceptional leak tightness of Class V.

Wide Temperature Range

Standard 41000 series valves handle temperatures from -30°C to 566°C . Standard bonnet is designed with a moderately finned extension, so no bonnet change is necessary in this temperature range. Optional designs makes 41000 series control valves suitable for operations up to -196°C and above 566°C .

High Performance Material as Standard

Without exception, the material specified as standard for 41000 series valves have been tested and selected to provide trouble free operation in services with high pressures and extreme temperatures. The superior trim material employed ensures durability of the valve for any severe application.



Simple, High Performance Trim Design

Every valve is available with standard and reduced Cv cages. For balanced design, common plug and seat result in reduced spare parts inventory. For applications where cavitation or high noise is anticipated, standard cage is replaced with multi-hole cage. Clamped seat and cage facilitate easy trim removal and valve maintenance.



Variety of Specially Engineered Trim Packages Lo-dB / Anti-cavitation Single Stage Trim

Provides excellent noise attenuation for compressible fluids and cavitation protection for liquid service. Lo-dB / Anti-cavitation Multi-stage Trim is designed for noise control on gas or steam at high pressure drop ratios and high pressure drops for liquid service.

Auxiliary Shut-off Pilot Plug

Used for tight shut-off requirements, with a pilot plug closing the balancing holes in shut-off condition.

Typical Applications

MIL 41000 series heavy duty cage guided control valves are engineered for the most demanding applications in process industries, ranging from power generation to integrated petroleum and chemical processing plants and a host of other modern process industries. These valves provide complete solution for all application needs in core sectors. A few of the critical typical applications for which these valves are employed includes:

Utility/Captive Power plants

- Feed water regulation
- Condensate pump recirculation
- Spray water control and block
- Deaerator pegging steam control
- Soot blower pressure reduction
- Heater drain etc.

Hydrocarbon processing

- Compressor antisurge
- Separator letdown
- Gas gathering and metering stations
- Make-up hydrogen & hydrogen quench
- Cold & hot recycle gas control
- Reactor feed & stripping steam
- Reformed gas vent, hydrocarbons to flare, etc.

Pressure Energized Dynamic Seal Ring

Tight shut off attained by arresting the leakage through the seal ring by means of a pressure energised polymeric seal ring located in the plug pressing against the walls of the cage.

Static Seal Ring

Designed for high pressure tight shut-off and continuous throttling applications. The special seal ring with a longer heel located in the cage imparts excellent dynamic stability while throttling.

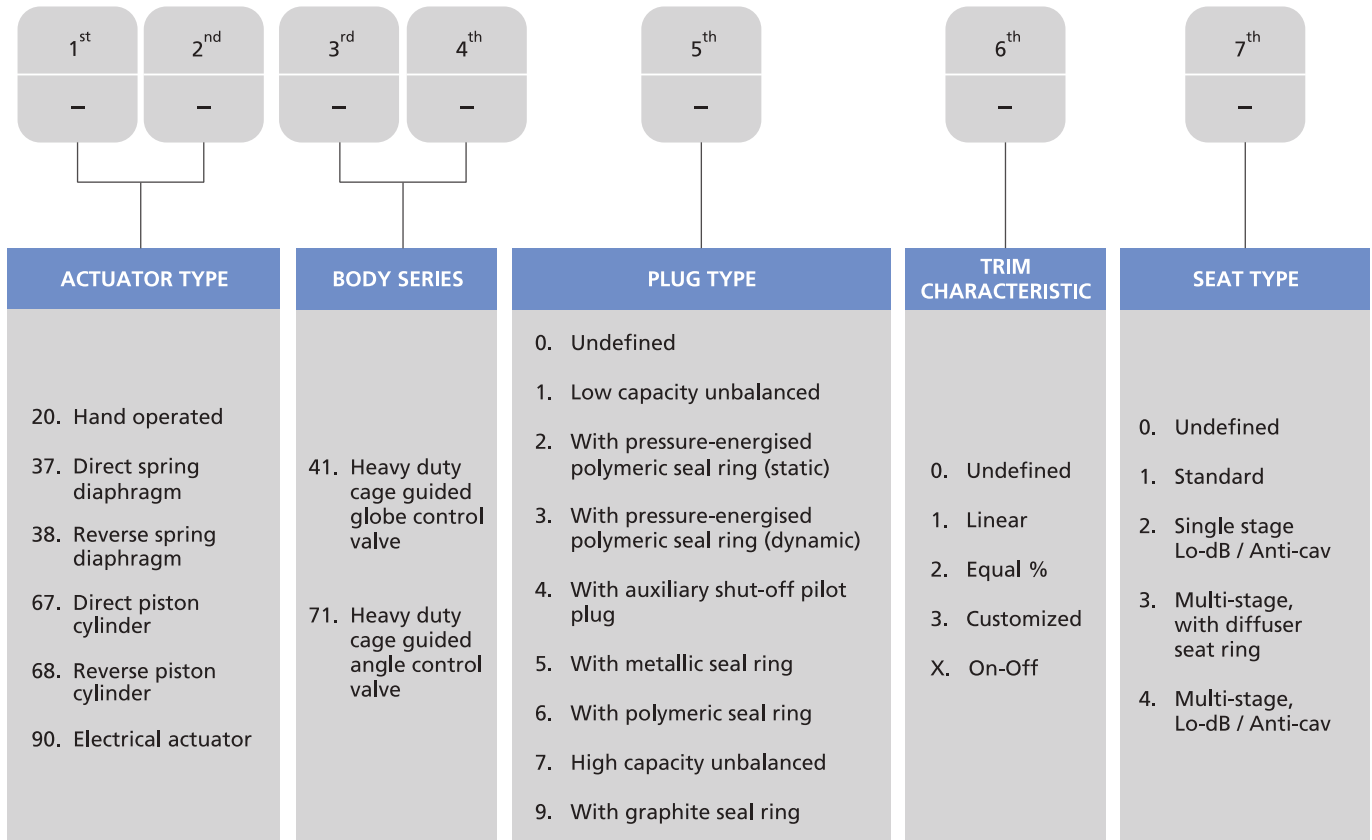


MIL 41000, 12" 300# ASME for Charge Gas Compressor Antisurge Valve for Petrochemical Complex, Panipat, Haryana



Technical Information

Model Decodification



Standard Sizes / Ratings

RATING ⁽¹⁾ (ASME CLASS)	VALVE SIZE (inch) ⁽¹⁾																		
	0.75, 1	1.5	2	2.5	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32
150# - 600#	U	U B	U B	U	U S B	U S B	U B	U B	B	B	B	B	B	B	B	B	B	B	B
900# - 1500#	U	U S	U S B	U S	S B	S B	S B	B	B	B	B	B	B	B	-	-	-	-	-
2500# - 4500#	U	U S	U S B	U S	S B	S B	S B	B	B	B	B	B	B	-	-	-	-	-	-

U : Unbalanced - 41100/41700

B: Balanced - 41300 / 41400 / 41500 / 41600 / 41900

S: Static Seal - 41200

⁽¹⁾ : Other sizes or rating can also be given, consult MIL.



Standard End Connections ⁽²⁾

VALVE SIZE (inch)	RATING (ASME CLASS) ⁽²⁾			
	150# - 600#	900# - 1500#	2500#	> 2500#
0.75 - 2	F S B	F S B	F S B	B
2.5 - 18	F B	F B	F B	B
20 - 24	F B	F B	B	B
26 - 32	F B	-	-	-

F: Flanged (RF, RTJ, T&G, FF) S: Socket Weld B: Butt Weld

⁽²⁾: DIN, JIS, BS or other rating and end connection can be usually supplied. Consult MIL.

General Data

BODY	
Type	: High Capacity Globe or Angle
Recommended Flow Directions:	
Unbalanced valves (411/41700)	: FTO ⁽³⁾ / FTC ⁽⁴⁾
Pressure-energised seal rings (412/300)	: FTO
Auxiliary shut-off pilot plug (41400)	: FTC
Balanced valves (415/6/900) (Liquid)	: FTC
Balanced valves (415/6/900) (Gas/Steam)	: FTO
Single stage low noise valves (41002)	: FTO
Single stage anti-cavitation valves (41002)	: FTC
Anti-cav/lo-dB valves with diffuser (41003)	: FTC
Multi-stage Lo-dB valves (41004)	: FTO
Note: Special Engineered options available with different flow directions, consult MIL	
GLAND SEAL	
Type	: Adjustable double sealed packing box with PTFE or Graphite moulded split rings
Option	: Eco lock (varying density for low emission, PTFE or Graphite) or PTFE V rings
Temperature range	: ≤ 180°C PTFE, > 180°C Graphite

TRIMS	
Type	: Single stage / Multi-stage (Anti-cav / Lo-dB)
Plug type	: Balanced or Unbalanced
	<ul style="list-style-type: none"> • Pressure balanced with spring-energised, Metallic, Polymeric or Graphite seal rings. • Pressure balanced with auxiliary shut-off pilot plug • Unbalanced without seal rings
Seat type	: Clamped (quick change)
Guiding	: Cage guiding
Rangeability	: 100 : 1 for standard trims 50 : 1 for Lo-dB/ Anti-cav trims
Characteristic	: Standard - Linear, Equal % or On-off Anti-cav / Lo-dB - Linear, Mod. Equal% (on request)
BONNET	
Type	: Stud bolted with moderately finned extension
Temperature Range	:
Standard bonnet	: -29°C to 566°C
Extension bonnet(AB)	: -30°C to -100°C
Cryogenic bonnet(CB)	: -101°C to -196°C

⁽³⁾: Flow to open

⁽⁴⁾: Flow to close



Seat Leakage Class / Temperature Range

MODEL	TEMPERATURE RANGE (°C) ⁽⁵⁾		VALVE SIZE (inch)	SEAT LEAKAGE CLASS (FCI 70.2)	
	MIN.	MAX.		STANDARD	OPTIONAL
41100	-196	566	0.75 - 3	IV	V ⁽⁹⁾
41200 ⁽⁶⁾	-46	315	1.5 - 6	IV	V ⁽⁹⁾
41300 ⁽⁷⁾	-46	315	1.5 - 32	IV	V ⁽⁹⁾
41400	-196	566	3 - 32	IV	V ⁽⁹⁾
41500	-196	566	1.5 - 4	II	-
			6 - 32	III	
41600 ⁽⁸⁾	-30	150	1.5 - 32	IV	
41700	-27	427	0.75 - 8	IV	V ⁽⁹⁾ , VI
41900	-196	566	1.5 - 4	III	-
			6 - 32	IV	

Class II : 0.5% of maximum rated capacity at 50 psig to atmosphere
 Class III : 0.1% of maximum rated capacity at 50 psig to atmosphere
 Class IV : 0.01% of maximum rated capacity at 50 psig to atmosphere
 Class V : 5×10^{-4} ml per minute of water per inch of orifice diameter per psi differential

⁽⁵⁾: Special designs available for applications outside the given temperature range, consult MIL.

⁽⁶⁾: For 41200, max. working pressure : 400 bar

⁽⁷⁾: For 41300, max. working pressure: 200 bar

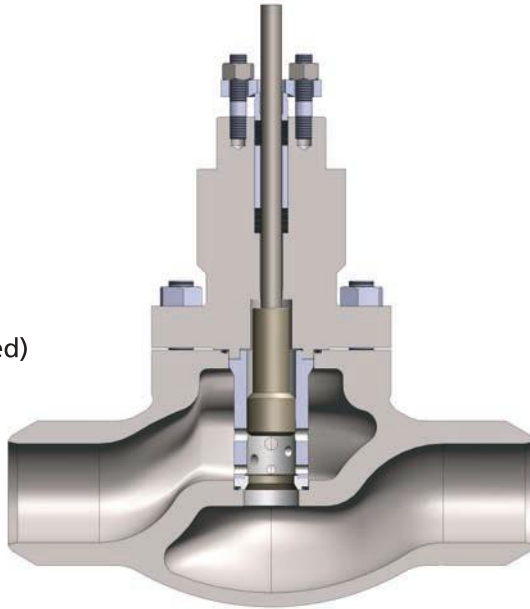
⁽⁸⁾: Special designs available upto 305 °C and ≤ 4 " valve size, consult MIL.

⁽⁹⁾: This class is usually specified for critical applications where the control valve may be required to be closed for long periods of time with high differential pressure across the seating surfaces.



Flow Coefficients (Rated Cv)

MIL 41100 Design
(Low Capacity, Unbalanced)



MIL 41100 Single Stage Low Capacity Unbalanced Valves (Linear / Equal % / On-off)

Critical Flow Factor (C_c or F_c) at full open position : 0.90

VALVE SIZE (inch)	STROKE (inch)	RATING (ASME CLASS)	ORIFICE DIAMETER (inch) Vs RATED Cv						
			0.375	0.5	0.625	0.812	1	1.25	1.375
0.75 & 1	0.75	150# - 2500#	1.7, 2.5	3.8	6, 8	10	-	-	-
1.5	0.75 ⁽¹⁰⁾	150# - 2500#	1.7, 2.5	3.8	6, 8	10	12, 16	20 ⁽¹⁰⁾	-
2	0.75 ⁽¹⁰⁾	150# - 2500#	1.7, 2.5	3.8	6, 8	10	12, 16	20 ⁽¹⁰⁾	25 ⁽¹⁰⁾ , 30 ⁽¹⁰⁾
2.5	0.75 ⁽¹⁰⁾	150# - 2500#	-	-	8	10	12, 16	20 ⁽¹⁰⁾	25 ⁽¹⁰⁾ , 30 ⁽¹⁰⁾
3	1.5	150# - 600#	-	-	-	-	-	-	25, 30

⁽¹⁰⁾ : Cv 20, 25, 30 with 1.5" stroke

Other Cv's on request

MIL 41102 Single Stage Low Capacity Lo-dB / Anti-cavitation Valves

Critical Flow Factor (C_c or F_c) at full open position : 0.94

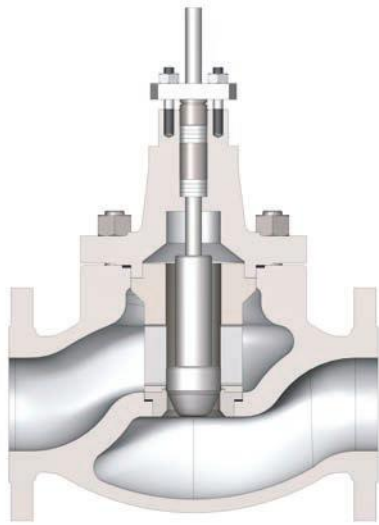
VALVE SIZE (inch)	STROKE (inch)	RATING (ASME CLASS)	ORIFICE DIAMETER (inch) Vs RATED Cv						
			0.5	0.625	0.812	1	1.25	1.375	1.625
0.75 & 1	0.75	150# - 2500#	1.7, 2.5, 3.8	6	8	10	-	-	-
1.5	0.75 ⁽¹¹⁾	150# - 2500#	1.7, 2.5, 3.8	6	8	10	12, 16	20 ⁽¹¹⁾	-
2	0.75 ⁽¹¹⁾	150# - 2500#	1.7, 2.5, 3.8	6	8	10	12, 16	20 ⁽¹¹⁾	25 ⁽¹¹⁾ , 30 ⁽¹¹⁾
2.5	0.75 ⁽¹¹⁾	150# - 2500#	-	6	8	10	12, 16	20 ⁽¹¹⁾	25 ⁽¹¹⁾ , 30 ⁽¹¹⁾
3	1.5	150# - 600#	-	-	-	-	-	-	25, 30

⁽¹¹⁾ : Cv 20, 25, 30 with 1.5" stroke

Other Cv's on request



MIL 41000



MIL 41700 Design
(High Capacity, Unbalanced)

MIL 41700 Single Stage High Capacity Unbalanced Valves (Linear / Equal % / On - Off)

Critical Flow Factor (C, or F,) at full open position : 0.90

VALVE SIZE (inch)	STROKE (inch)	RATING (ASME CLASS)	ORIFICE DIAMETER (inch) Vs RATED Cv											
			0.25 (min.)	0.375	0.5	0.812	1.25	1.625	2	2.625	2.95	3.5	5	6.25
0.75, 1	0.75	150# - 600#	1.7	2.5, 3.8	5.2, ⁽¹²⁾ 6	9,10, ⁽¹²⁾ 12	16 ⁽¹²⁾	-	-	-	-	-	-	-
1.5	0.75	150# - 600#	1.7	2.5, 3.8	6	10, 13	20, 25	35	-	-	-	-	-	-
2	0.75	150# - 600#	1.7	2.5, 3.8	6	10,11, 12,15	21, 26	35, 46	-	-	-	-	-	-
3	1.5	150# - 600#	-	-	-	-	31	47	65	75,80, 110	-	-	-	-
4	1.5	150# - 600#	-	-	-	-	-	49	66	95,110 113	140	195	-	-
6	2	150# - 600#	-	-	-	-	-	-	68	126	-	208	275 ⁽¹³⁾ , 300, 320, 400	-
8	2	150# - 600#	-	-	-	-	-	-	-	-	-	224	415	640

⁽¹²⁾ : Cv available for 1" valve only

⁽¹³⁾ : Cv 275 with 4" orifice diameter

Other Cv's on request

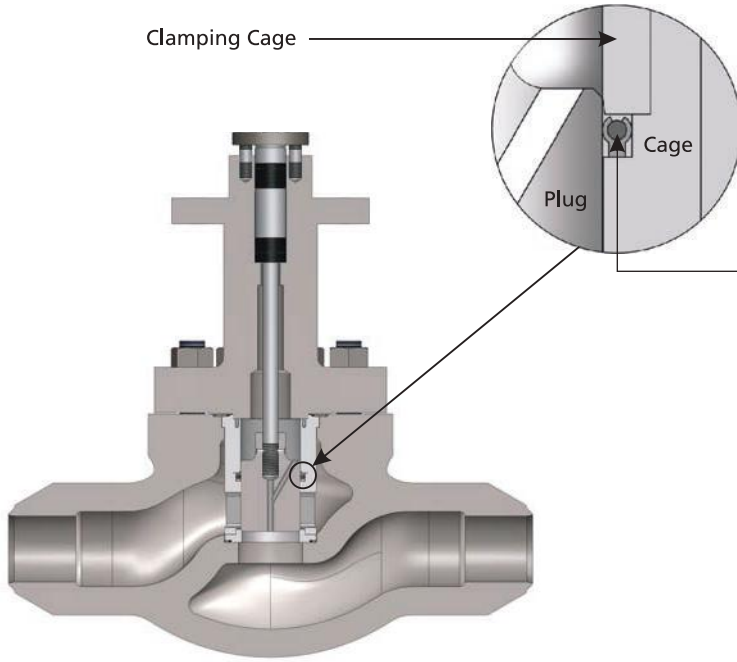
MIL 41700 Single Stage High Capacity Lo-dB / Anti-cavitation Valves

Critical Flow Factor (C, or F,) at full open position : 0.94

VALVE SIZE (inch)	STROKE (inch)	RATING (ASME CLASS)	ORIFICE DIAMETER (inch) Vs RATED Cv								
			1.25	1.625	2	2.25	2.625	3.5	5	6.25	
0.75, 1	0.75	150# - 600#	1.7 ⁽¹²⁾ , 2.5, 4, 6, 8	-	-	-	-	-	-	-	-
1.5	0.75	150# - 600#	1.7, 2.5, 4, 6, 8, 15	20, 25	-	-	-	-	-	-	-
2	0.75	150# - 600#	1.7, 2.5, 4, 6, 8, 15	20, 25, 30	-	-	-	-	-	-	-
3	1.5	150# - 600#	-	10,15,25	30	45,35	40, 50, 60, 75	-	-	-	-
4	1.5	150# - 600#	-	-	30	45	40, 65, 75	100	-	-	-
6	2	150# - 600#	-	-	-	-	-	100	200, 225, 240	-	-
8	2	150# - 600#	-	-	-	-	-	-	-	300, 415	-

⁽¹²⁾ : Cv available for 1" valve only

Other Cv's on request



MIL 41200 Design
(Tight Shut-off, with Static Seal Ring)

Static Seal Ring ⁽¹⁴⁾

⁽¹⁴⁾ **Seal Ring (Static)** : The special seal ring with a longer heel located in the cage imparts excellent dynamic stability during throttling, while proceeding FCI 70.2 Class V leak tightness in the closed position

MIL 41200 Static Seal Ring Valves (Linear / Equal % / On-off)

Critical Flow Factor (C_f or F_c) at full open position : 0.90

VALVE SIZE (inch)	STROKE (inch)	RATING (ASME CLASS)	ORIFICE DIAMETER (inch) Vs RATED Cv							
			1.25	1.375	2.24	2.68	2.28	3.62	2.75	4.93
1.5	0.75	900# - 2500#	20	-	-	-	-	-	-	-
2	0.75	900# - 1500#	-	16, 20, 25, 30, 40 ⁽¹⁵⁾	-	-	-	-	-	-
	1.5	2500#	-		-	-	-	-	-	-
2.5	1.5	900# - 2500#	-	-	20, 25, 30, 35, 40 ⁽¹⁵⁾ , 54 ⁽¹⁵⁾	-	-	-	-	-
3	1.5	150# - 600#	-	-	-	30, 47, 65, 75 ⁽¹⁵⁾	-	-	-	-
	2		-	-	-	120	-	-	-	-
3	1.5	900# - 1500#	-	-	-	25, 30, 47, 65, 75 ⁽¹⁵⁾	-	-	-	-
			2	-	-	-	95	-	-	-
	0.75	2500#	-	-	-	-	25, 50 ⁽¹⁵⁾ , 60 ⁽¹⁵⁾	-	-	-
			1.5	-	-	-	-	30, 75 ⁽¹⁵⁾	-	-
4	2	150# - 600#	-	-	-	-	-	95, 120, 140, 170	-	-
		900# - 1500#	-	-	-	-	-	-	-	-
		2500#	-	-	-	-	-	-	90, 120, 140, 155 ⁽¹⁵⁾	-
6	2	900# - 1500#	-	-	-	-	-	-	-	225

⁽¹⁵⁾ : Cv available for On-Off Valves only

Other Cv's on request



MIL 41000

MIL 41300/41400/41500/41600/41900 Single Stage Valves

Critical Flow Factor (C_v or F_L) for Linear / Equal % at full open position : 0.90
 Critical Flow Factor (C_v or F_L) for Lo-dB / Anti-cav at full open position : 0.94

VALVE SIZE (inch)			ORIFICE DIAMETER (inch)	STROKE (inch)	RATED C _v		
150#-600#	900#-1500#	2500#			LINEAR / ON - OFF	EQUAL %	Lo-dB / ANTI-CAV
1.5	2	-	1.84	0.75	12,16,30,40	14 ,35	8,12,16,25,30
-	-	2	1.84	1.5	12,16,40	14 ,35	12,25,30
2	-	-	2.5	1.5	26,30,35,65,75	16,26,35,50,65	15,25,50,65
3x2	-	-	2.5	1.5	30,35,75	16,26,30,35,50,65,90	15,25,30,35,50,65
-	-	3	2.5	1.5	26,30,65	16,26,35,50,65	15,25,50,65,75
-	3	-	3.25	2	30, 45, 60,75,95,130	35,56,90,110,120	30,45,95,120
3	-	-	3.25	2	30, 45, 60,75,95,130,140,155	35,56,90,110,140	30,45,70,95,120
4x3	4x3	-	3.25	2	30, 45, 60,75,95,155	35,56,90,110,140	30,45,95,120
-	-	4	3.25	2	30, 45, 60,75,95,155	35,56,90,110,140	30,45,65,95,120
-	6x3	6x4	3.25	2	30, 45, 60,75,95,155,190	35,56,90,110,140	30,45,95,120
-	4	-	4.375	2	95, 160, 205	45, 90,140,170	45,70,95,120,145,180
4	-	-	4.375	2	30,45,60,95,160, 205,240	45, 90,140,170,200,225	45,55,70,95,120,145,195
6x4	6x4	-	4.375	2	60, 70,95,155,160,205,240	45, 56, 90,110, 140, 170,225	45,70,95,110,120, 145,195
-	-	6	4.475	2.5	205, 240,260 ⁽¹⁶⁾	155, 170,225	145,195
-	6	-	5.125	2	160, 205, 250, 300, 360	144,255,300,360	130, 145
-	-	-	5.125	2.5	-	-	105, 210, 255, 300
6	-	-	5.125	2	160, 205,300,350, 400	144,170,175,205,255,300,360	70,125,130,145
-	-	-	5.125	2.5	-	400	105, 210, 255, 300
-	-	8	6.5	2	160, 204, 300, 350, 400	144,255,360	130,145
-	-	-	6.5	2.5	425	300,400, 425	105,210,255,300,425 ⁽¹⁷⁾
-	8	-	6.5	2.5	260, 380, 500,575	230,300,400	105,210,255,300
-	-	-	6.5	3	-	575	155, 175, 315, 400,450
8	-	-	6.5	2.5	260,380,500,640	230,300,400	105,210,255,300
-	-	-	6.5	3	-	575,640	155,175,315,400,500, 550
10x8	-	-	6.5	2.5	260,380,500,640	230,300,400	105,210,255,300
-	-	-	6.5	3	-	575,640	155,175,315,400,500
-	-	12x8	6.5	2.5	260,380,500,640	230,300,400	105,210,255,300
-	-	-	6.5	3	-	575,640	155,175,315,400,500
-	-	10	6.9	3	400,750	360,650	300,650
-	-	-	6.9	3.5	-	750	250,500,750
-	10	-	8	3	400,750	360,650	300,650
-	-	-	8	3.5	900	800,900	250, 500, 750, 900
10	-	-	8	3	400,750	360,650	250,300, 500, 650
-	-	-	8	3.5	900, 1000	800, 900, 1000	750, 850, 900, 1000
-	-	12x10	6.9	3	400,750	360,650	300,650
-	-	-	6.9	3.5	-	750	250,500,750
-	-	14x10	8	3	400,750	360,650,900	250, 500, 650
-	-	-	8	3.5	900, 1000	800, 1000	750, 1000
-	-	12	8	3.5	860	820	820
-	12	-	9.75	4	700, 1050, 1260	500, 750, 900, 1150	580, 725, 1100, 1260
12	-	-	9.75	4	700, 900, 1050, 1260, 1400	500, 750, 900, 1250	315,580,625,725,1100,1400
-	-	14	9.75	4	1100	1000	1050
-	14	-	12	4	1950	1760	1600
14	-	-	12	4	1600,1830,2150	1600,1960	725,1400, 1800
16	-	-	13	4	1800, 2000	-	1800
-	-	-	13	6	2500	2250	2000,2200
18x16	-	-	13	4	2600,2750 ⁽¹⁶⁾	1600, 2450	1800,2100
-	-	-	13	6	2750	2250	2200
20	-	-	17	4	2500,3100,3400 ⁽¹⁶⁾	1960, 2750	2100
-	-	-	17	6	3500, 3800 ⁽¹⁶⁾	3100	3500
24	-	-	22	8	5000, 6000 ⁽¹⁶⁾	2300, 4500	4500
32	-	-	31	12	-	9000	-

⁽¹⁶⁾ : C_v available for On-Off Valves only

⁽¹⁷⁾ : C_v 425 with 3" stroke

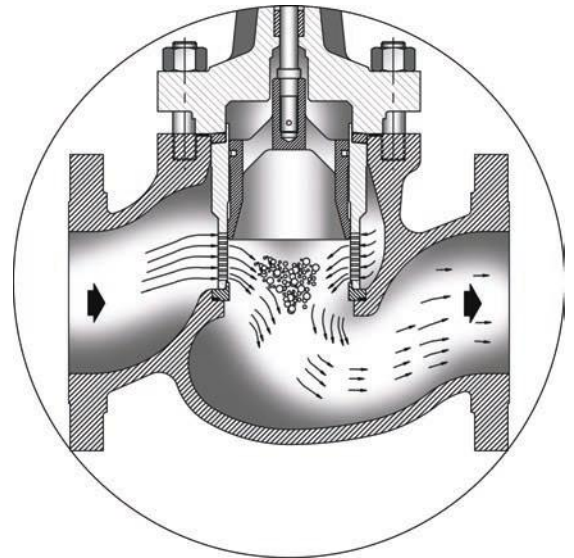
Other C_v's on request



Multi-hole Trims for Noise / Cavitation Attenuation

In compressible fluid flow, Multi-hole trim attenuates noise, by shifting the peak frequency outside the audible range. Also the fluid acoustic energy is lowered by reduction in size of fluid jets.

For cavitation control in incompressible flow, multi-hole trim design is used in flow to close direction where flow is divided into small jets which allows cavitation to occur at the center of cage, away from all metal surfaces, avoiding damages to trim parts.

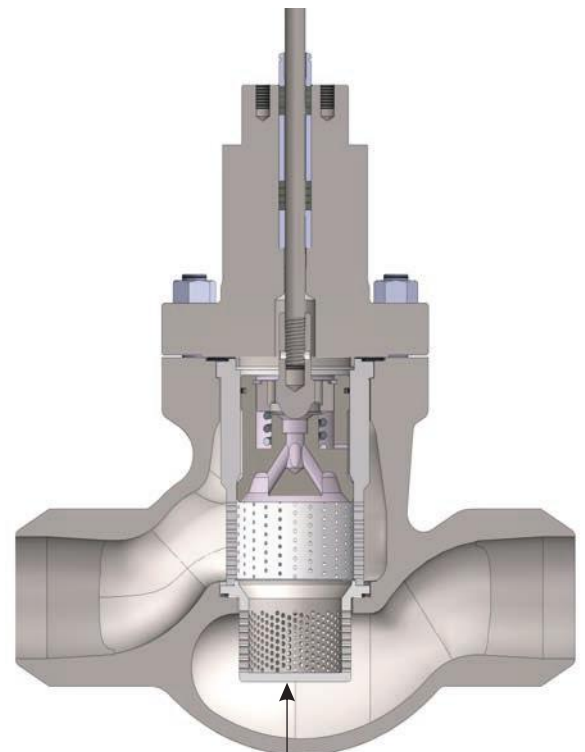


MIL 41003 - Multi Stage Lo-dB / Anti-cavitation Valves with Diffuser Seat

Critical Flow Factor (C_v or F_L) at full open position : 0.95

VALVE SIZE (inch)	RATING (ASME CLASS)	STROKE (inch)	RATED C_v
3	150# - 600#	2	35, 45, 65, 75
	900# - 1500#	2	35, 40, 45, 65, 75, 100
4	150# - 600#	2	30, 42, 55, 70, 85, 100, 120
	900# - 1500#	2	30, 42, 45, 55, 65, 70, 100, 120
	2500#	2	45, 60, 75, 80, 90, 95
4x3	150# - 600#	2	45
	900# - 1500#	2	42, 95
6	150# - 1500#	2	55, 80, 95, 105, 145, 195
	2500#	2	95
6x4	150# - 1500#	2.5	120
		2	45, 75
	2500#	2	45, 65, 70, 95
8	150# - 600#	3	155, 195, 290
		2.5	155, 195, 300
	2500#	2.5	155
		3	215, 300
10	150# - 600#	3.5	250, 430, 500
	900# - 1500#	3	250, 430, 500
10x8	900# - 1500#	3	400
12	150# - 600#	4	650, 725
20	150# - 600#	4	2000

Other C_v 's on request

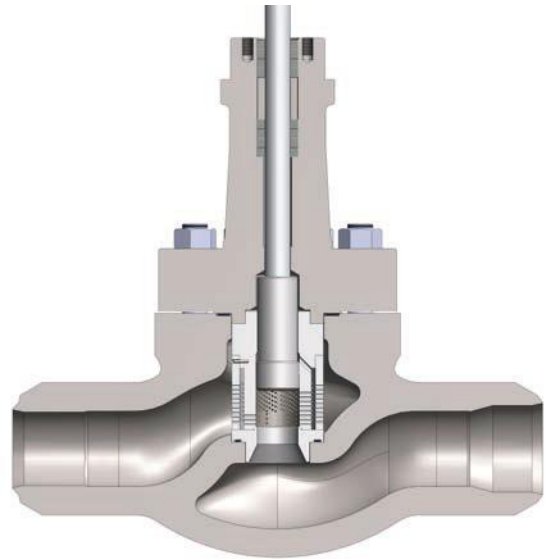


Lo-dB / Anti-cavitation Multi-stage Trim with Diffuser : Designed to provide additional noise and cavitation attenuation properties in "Flow to close" applications.



MIL 41004 Design (Multi-stage Low Noise Valves)

Multi-stage Lo-dB Trim: Designed to provide noise attenuation for gas or steam applications at high pressure drop ratios.



MIL 41104 Unbalanced Multi-stage Lo-dB Valves

Critical Flow Factor (C_v or F_v) at full open position : 0.95

VALVE SIZE (inch)	STROKE (inch)	RATING (ASME CLASS)	ORIFICE DIAMETER (inch) Vs RATED Cv						
			0.5	0.625	0.812	1	1.25	1.375	1.625
1	0.75	150# - 600#	2.5	3.8	-	-	-	-	-
1	0.75	900# - 2500#	1, 1.7, 2	3.8	-	-	-	-	-
1.5	1.5 ⁽¹⁸⁾	900# - 2500#	-	1.7, 2, 3.8, 6 ⁽¹⁸⁾	8 ⁽¹⁸⁾	10	12, 16	20	-
2.0	1.5 ⁽¹⁸⁾	900# - 2500#	-	2 ⁽¹⁸⁾ , 3.8 ⁽¹⁸⁾ , 6 ⁽¹⁸⁾	8 ⁽¹⁸⁾	10	12, 16	20	25
2.5	1.5 ⁽¹⁸⁾	900# - 2500#	-	-	8 ⁽¹⁸⁾	10	12, 16	20	25
3.0	1.5	900# - 2500#	-	-	-	10	16	20	25, 30

⁽¹⁸⁾: Cv 1.7, 2, 3.8, 6, 8 with 0.75" stroke

Other Cv's on request

MIL 41004 Balanced Multi-stage Lo-dB Valves

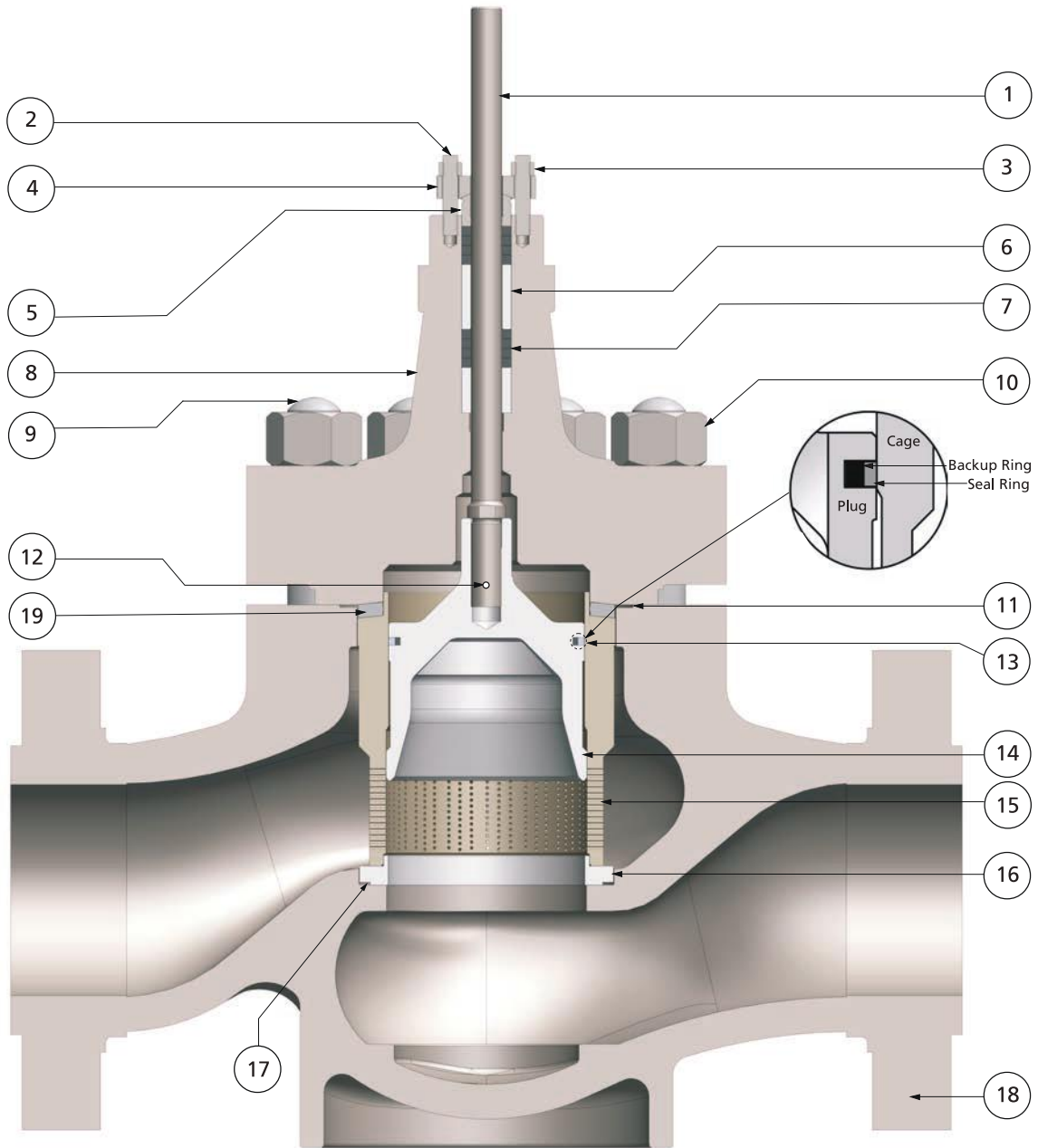
Critical Flow Factor (C_v or F_v) at full open position : 0.95

VALVE SIZE (inch)	RATING (ASME CLASS)	ORIFICE DIAMETER (inch)	STROKE (inch)	STANDARD RATED Cv's
2	150# - 1500#	2.5	1.5	12, 16
3	150# - 1500#	3.25	2	12, 16, 20, 70
4	150# - 1500#	4.375	2	25, 45, 95, 105
	2500#	3.25	2	45, 80
6	150# - 1500#	5.125	2	105
	2500#	4.375	2.5	120, 160
8	150# - 1500#	6.46	2.5	120, 160
			3	210, 290, 300
10	150# - 1500#	8	3	300, 375, 500
12	150# - 1500#	9.75	4	520, 625
14	150# - 1500#	12	4	720

Other Cv's on request



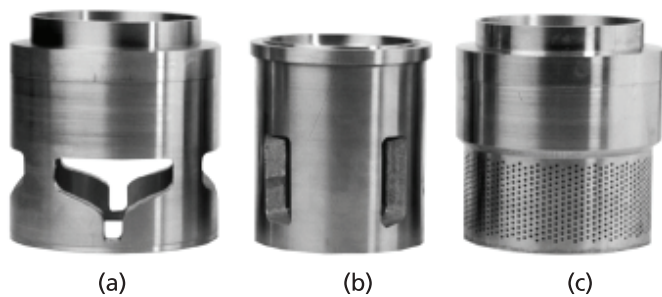
Construction



MIL 41500 / 41600 / 41900
Balanced Construction

Typical Cage Designs

- (a) Equal %
- (b) Linear
- (c) Lo-dB/Anti-cav Linear





Material of Construction

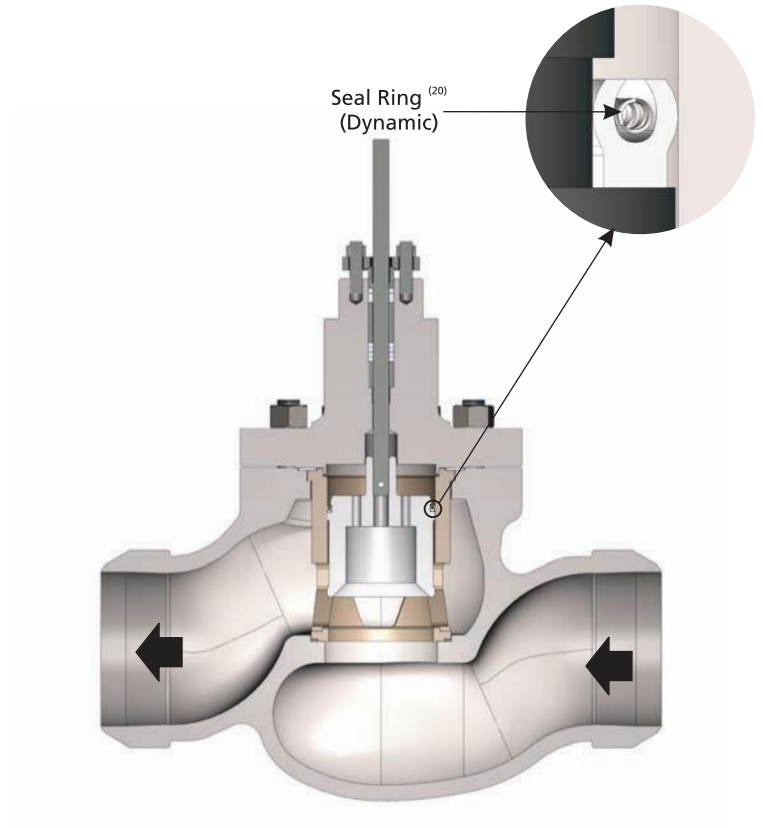
REF. NO.	PART NAME	STANDARD MATERIAL ⁽¹⁹⁾
1	Valve Plug Stem	17.4 PH SST H 1075 (< 343 °C)
		SUPER ALLOY (ASTM A 638 Gr 660) (>343 °C)
2	Packing Flange Stud	ASTM A 193 Gr B8
3	Packing Flange Nut	ASTM A 194 Gr 8
4	Packing Flange	ASTM A 105
5	Packing Follower	304 SST
6	Packing Spacer/Lantern Ring	304 SST
7	Gland Packing	PTFE ≤ 180 °C
		GRAPHITE > 180 °C
8, 18	Bonnet, Body	Carbon Steel : ASTM A 216 Gr WCC
		Alloy Steel : ASTM A 217 Gr WC6
		Alloy Steel : ASTM A 217 Gr WC9
		Alloy Steel : ASTM A 217 Gr C5/C12/C12A
		Stainless Steel : ASTM A 351 Gr CF8/CF8M/CF8C/CF3/CF3M
9	Body Stud	ASTM A 193 Gr B7 (< 454 °C)
		ASTM A 193 Gr B16 (454°C - 538 °C)
		ASTM A 453 Gr 660 (> 538 °C)
10	Body Nut	ASTM A 194 Gr 2H (<454 °C)
		ASTM A 194 Gr 7 (454°C - 538 °C)
		ASTM A 194 Gr 8C (> 538 °C)
11	Body Gasket	316L SST + Graphite (spiral wound)
12	Plug Pin	316 SST
13	Seal Ring	41200
		41300
		414 / 500
		41600
		41900
		Spring energised Ekonol+PTFE
		Spring energised Ekonol+PTFE
		Ni Resist D3
		PTFE
		Graphite
14	Valve Plug	17.4 PH SST H 1075 (< 343 °C)
		CA6NM, Nitrided (> 343 °C)
15	Cage	CF8M Chrome plated (<343 °C)
		CA6NM Nitrided (> 343 °C)
16	Seat Ring Diffuser Seat Ring	410 SST (< 343 °C)
		316 SST + Stellite (> 343 °C)
17	Seat Ring Gasket	316L SST + Graphite (spiral wound)
19	Flat Spring ⁽²²⁾	17.4 PH SST H 1075 (< 343 °C)
		Inconel X 750 (> 343 °C)
20	Pilot Plug (For MIL 41400, ref. page 15)	CA6NM+Stellite No.6, Chrome plated (< 343°C)
		CA6NM+Stellite No.6, Nitrided
21, 22	Circlip / Pilot Spring (For MIL 41400, ref. page 15)	Spring Steel (< 343 °C)
		Inconel X 750 (> 343 °C)

⁽¹⁹⁾: Material indicated above are for reference only. MIL reserves the right to supply alternate material / forms due to constant product upgradation. Other specific material are available on request.

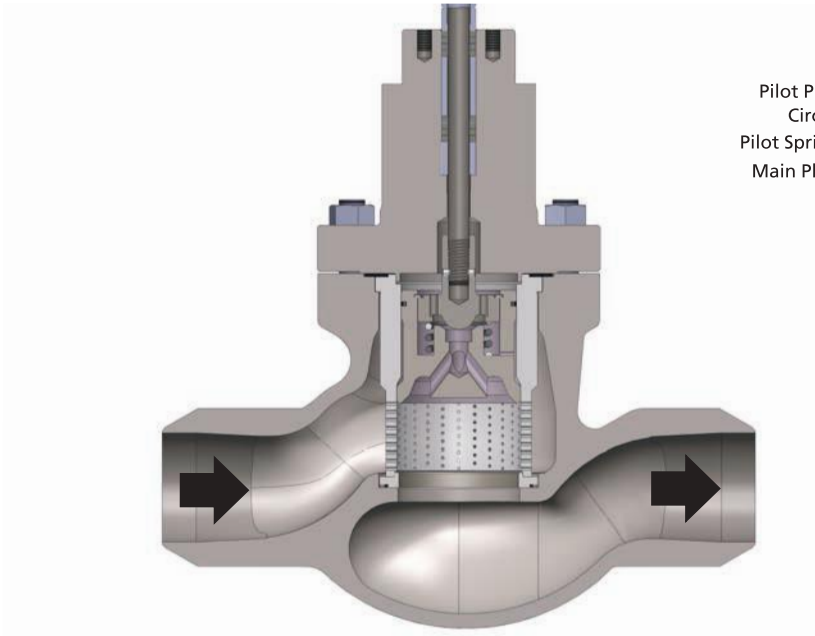


MIL 41300 Construction (Tight Shut-off, with Dynamic Seal Ring)

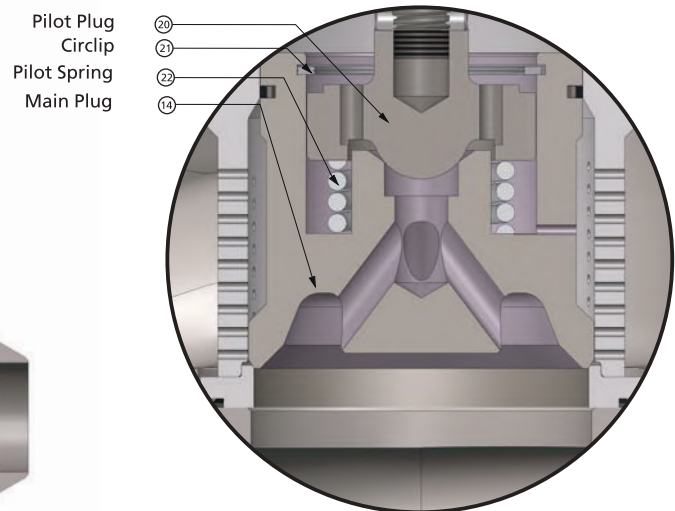
⁽²⁰⁾ **Seal Ring (Dynamic)** : Tight shut-off achieved by arresting the seal ring leakage to FCI 70.2, Class V limits, by using a special pressure energised polymeric seal ring.



MIL 41400 Construction (Tight Shut-off, With Auxiliary Shut-off Pilot Plug)⁽²¹⁾



Valve in Open Position



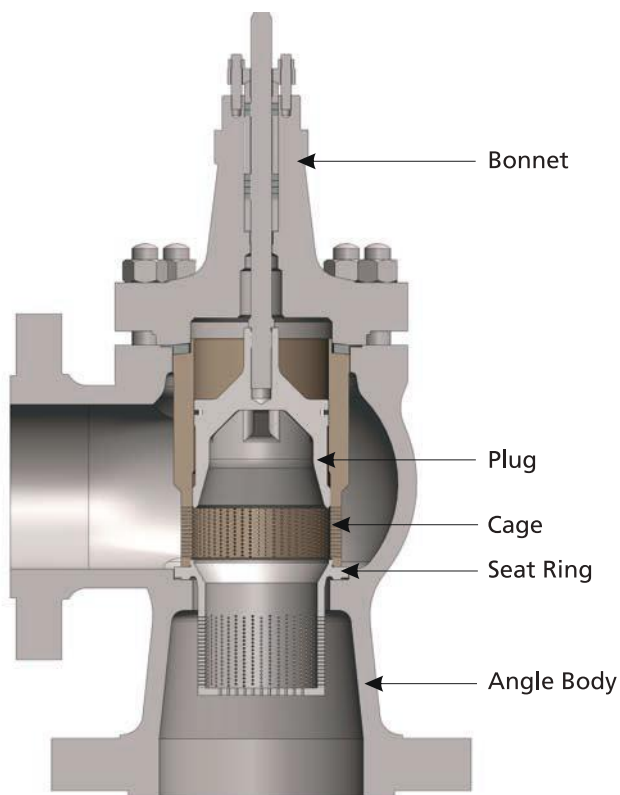
Valve in Closed Position

⁽²¹⁾ **Auxiliary Shut-off Pilot Plug:** Used for applications, where tight shut-off is required in the high temperature service, beyond capabilities of seal rings. The pilot plug closes the balancing holes in shut-off condition. No 'Soft' parts are used for sealing and FCI 70.2, Class V tight shut-off can be ensured even beyond 566 °C.

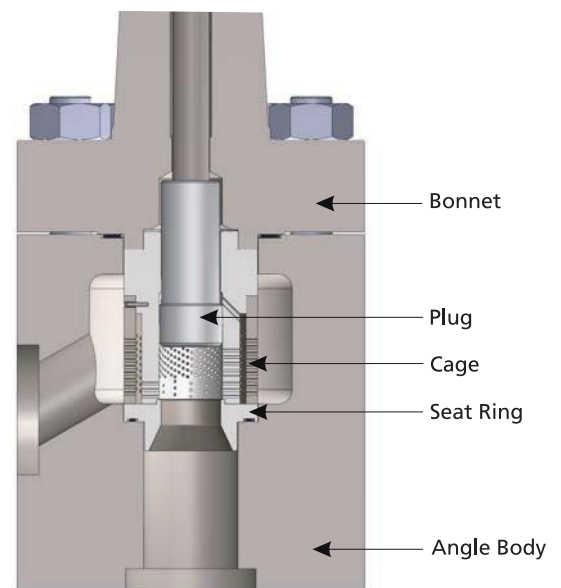


MIL 71000 Angle body valves are tailored for the following applications

- Hydrocarbons to Flare
- Gas gathering and metering stations
- Compressor recycle
- Compressor bypass or antisurge
- Other applications where piping configuration requires an angle body



MIL 71600 Construction
(Angle Valve with Polymeric Seal Ring - Cast Design)



MIL 71104 Construction
(Multi-stage Angle Valve - Forged Design)

Note: MIL 71000 being a custom engineered control valve, the data furnished here is representative rather than inclusive of complete product offering. MIL can specifically design 71000 series to meet any specific application requirements with all possible combinations of inlet and outlet sizes. For compressible fluids, generally angle valves have expanding outlets. The trim variants available in 41000 series described hitherto can be provided for 71000 series also.



Dimensions and Weights

Dimensions (mm) & Shipping Weights (W in kg) for MIL 41000 Body Subassembly⁽²²⁾

VALVE SIZE (Inch)	ASME 150# FLANGED (RF)				ASME 300# FLANGED (RF)				ASME 600# FLANGED (RF)			
	A	B	H	W	A	B	H	W	A	B	H	W
1.5	222	63	216	38	235	78	216	39	251	78	216	39
2	266.5	92	254	43	266.5	92	254	45	285.5	92	254	45
3x2	298	115	288	98	318	115	288	98	337	130	288	98
3	298	115	300	100	318	115	300	100	336.5	130	300	100
4x3	352	137	322	162	368.5	137	322	162	394	150	322	162
4	352	137	330	165	368.5	137	330	165	393.5	150	330	165
6x4	451	174	330	240	473	174	330	240	508	193	330	255
6	451	162	390	245	473	174	390	245	508	193	390	260
8	543	206	496	418	569	206	496	418	609.5	230	496	439
10x8	752	217	534	617	752	237	534	617	752	269	534	650
10	673	225	567	629	708	225	567	629	752	269	564	677
12	737	333	620	980	775	333	620	980	819	342	617	1015
14	889	386	600	1170	927	386	600	1170	972	397	656	1490
16	1016	441	705	1455	1057	459	705	1455	1108	459	718	1506
20	1420	534	782	2765	1420	534	782	2765	1484	547	823	3100
18x16	1120	445	765	1590	1160	445	765	-	1220	465	765	1740
24	1500	561	867	-	1500	561	867	-	-	-	-	-

VALVE SIZE (inch)	ANSI 900# FLANGED (RTJ)				ANSI 1500# FLANGED (RTJ)				ANSI 2500# WELD END (BW)			
	A	B	H	W	A	B	H	W	A	B	H	W
1.5	333.5	89	194	45	333	88.9	194	45	292	50.5	196	45
2	378	123	223	55	378	123	223	55	394	96	215	70
2.5	-	-	-	-	315	135	198	-	394	96	219	125
3x2	394	120	251	105	406	148	251	105	-	-	-	-
3	444	131	283	114	463.5	148	300	114	530	120	294	140
4x3	514	161	322	175	532.5	171	322	175	-	-	-	-
4	514	161	330	185	532.5	171	330	185	575	131	410	250
6x3	-	-	-	-	774	212	330	-	-	-	-	-
6x4	717	205	330	380	774	212	330	380	760	170	411	455
6	717	205	390	395	774	212	390	395	760	182	434	473
8	917	258	521	703	981	258	521	703	1022	232	640	848
10	1095	291	570	800	1179	310	615	805	-	-	-	-
12x8	-	-	-	-	-	-	-	-	1022	283	646	1800
12	1133	350	626	-	1235	373	628	-	-	-	-	-
14x10	-	-	-	-	-	-	-	-	1200	316	690	2300

⁽²²⁾ : Approximate dimensions and weights furnished are for reference only.

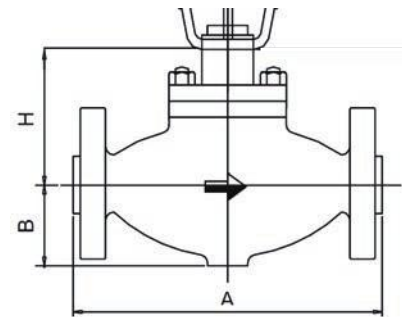


MIL 41000

Dimensions (mm) & Shipping Weights (W in kg) for MIL 41000 Body Subassembly⁽²²⁾

VALVE SIZE (Inch)	ANSI 150/300# WELD END (BW)				ANSI 600# WELD END (BW)				ANSI 900/1500# WELD END (BW)			
	A	B	H	W	A	B	H	W	A	B	H	W
1.5	251	44	216	30	251	44	216	30	-	-	-	-
2	285	67	254	36	285	67	254	36	375	80	223	40
3x2	440	115	288	80	440	115	288	80	406	108	251	105
3	440	115	300	85	440	115	300	85	460	131	300	114
4x3	444	137	322	115	444	137	322	115	530	129	322	175
4	444	137	331	128	444	137	330	128	530	129	330	185
6x3									680	177	330	
6x4	560	162	330	215	560	165	330	215	680	177	330	380
6	560	162	390	235	560	165	390	235	680	177	390	395
8	656	206	496	355	656	201	496	355	860	215	521	703
10	802	225	567	550	802	242	564	550	892	249	582	595
12	822	333	620	950	822	342	617	956	1130	350	626	-
14	1029	386	600	-	-	-	-	-	-	-	-	-
16	1108	459	705	1415	1108	459	718	1415	-	-	-	-
20	1484	534	782	-	-	-	-	-	-	-	-	-

⁽²²⁾ : Approximate dimensions and weights furnished are for reference only.



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