550G
560G

KOSO

MULTI-HOLE CAGE GUIDED CONTROL VALVE

Standard Specifications

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Overview

The 550G (Globe) / 560G (Angle) series control valves meet low noise and anti-cavitation requirements by incorporating a multi-hole type cage, instead of standard ported cage. All the parts except the multi-hole cage are interchangeable with the parts of 501G / 511G series ported cage guided control valves. For severe duty applications that cannot be covered by this series, KOSO Vector™ Series are available for selection.

Key Features & Benefits

Quick Change Trim	The quick-change trim design has a clamped-in seat ring using valve bonnet. It allows the trim parts to be removed and re-installed while the valve body is still in the pipeline. This results in quicker maintenance and inspection.
Anti - Cavitation Trim	Anti-cavitation design eliminates the potential for premature damage to the valve internals in liquid applications, while eliminating the potential for excessive noise in gaseous applications.
Characterization	Inherently characterized trims are available with Linear, Equal percentage and Modified Equal percentage. Special Cv options are available on request.
Low Noise Design	Low noise trim design by small drilled hole cage reduces noise by lowering energy of the fluid jets leaving the valve trim and creating a higher frequency noise which is harder to pass through the walls of the valve and piping.
Fine Flow Control	Small drill hole cages are characterized to provide fine flow control and high rangeability. Further customization can be made to meet specific application requirements.
Flow Capacity	High flow capacity with better controllability.

Product specifications

Design Standard & Material Standard	• Valve design - ASME B16.34 • Flange design - ASME B16.5 & ASME B16.47 • Butt weld end connection - ASME B16.25 • Socket weld end connection - ASME B16.11 • Material compliance to ASME, ASTM, EN or Custom standards
Industry Served	• Power, Oil & Gas • FPSO, Onshore, Offshore • LNG, Fertilizer, Steel • Refinery, Petrochemical
Quality Standard Compliance	• Quality management system as per ISO 9001 • Quality management system as per API Spec Q1 • PED/CE as per 2014/68/EU & ATEX 2014/34/EU
Type of Actuation	• Pneumatic actuator • Hydraulic actuator • Electrical actuator
Key Applications	• Steam isolation valve, Anti-surge valve • Deaerator level control valve • Deaerator steam pegging valve • Gland seal steam control valves, LP-Vent valve • Cryogenic valves, High temperature valve • Condensate extraction pump minimum recirculation valve • Gas to flare
Certification	• IBR, SIL • PED/CE Marking, ATEX • CRN, TRCU

About Small Drilled-Hole Cage

KOSO's Small drilled-hole cage technology is an advanced trim design where the flow is broken into many smaller paths (through drilled holes in the cage) to achieve better flow control, especially under severe service conditions. It combines good rangeability and stability (because of cage guidance) that provide good durability and ability to handle challenging fluid conditions. The technology refers to a cage-guided trim design that incorporates numerous small radial drilled holes (instead of or in addition to larger port openings). The cage guided design gives good plug support and guidance and reduces oscillation and vibration, which are important under high pressure drops. The cage with multiple small holes is a part of the guided trim concept. This technology fits well for the majority of process control applications in Power, Oil & Gas, LNG, Fertilizers, Refinery, Chemical plants etc., It is a low pressure recovery design, which gives advantages of both cavitation reduction and noise control when compared with standard profiled trim designs (Example: Ported Cages and Contour design).

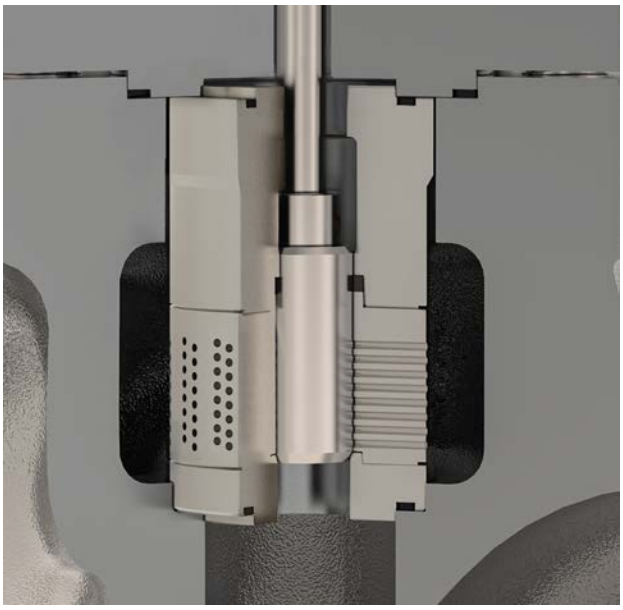


Figure 1: Drilled - Hole Cage Inserted Into Valve Body

The cage is clamped-in between the body and bonnet. The lower part of the cage is drilled with a number of radial holes over the length of the plug travel. The flow is controlled by the plug moving up or down within the cage, covering and uncovering the holes to vary the flow area and consequently the flow rate. The plug is designed to be guided within the cage, therefore, clearances between the cage and plug are critical. In order to ensure there is no galling between the plug and cage, the cage is hard chrome plated or nitrided based on the requirements. Stelliting provides excellent galling resistance. Most of the materials are NACE compliant. On high temperature applications, hardened materials like 400 Series and 17-4 PH Stainless steels are utilised. Again these materials have excellent galling resistance. In general, the flow can be directed either "Flow to Open (FTO)" or "Flow to Close (FTC)".

The plug moves inside the cage and throttles flow by uncovering or covering these multiple holes (or changing the effective flow area), so flow control is effected via many small flow paths rather than one single large path. The cage splits the flow through many small holes and each hole carries a small flow stream at high velocity rather than one large stream. In liquid service, these jets impinge on each other inside the cage by dissipating the energy, which reduces the cavitation potential and erosion. In gas/steam applications, many small jets radiate outwards and expansion and mixing reduce noise by acoustic energy redistribution. Each jet carries only a small fraction of the total energy, so no single jet has enough energy to generate a strong shock wave. Because energy is broken down into many smaller flows, local velocities and pressure recovery effects are moderated; this helps reducing noise in compressible fluids.

This technology supports good rangeability (ratio of maximum to minimum controllable flow) because many small holes allow fine control as the plug uncovers the holes gradually. The flow characteristic (linear, equal percentage and modified equal percentage) curves can be tailored by sizing and spacing of the holes and the cage geometry.

Standard Specification

550G/560G Multi-Hole Cage Guided Control Valves Body & Trims

Series	550G - Globe / 560G - Angle
Body Size	1" ~ 24" (DN25 ~ DN600) (For higher sizes, consult with factory)
Plug Form	Unbalanced & Pressure Balanced
Characteristics	Linear, EQ%, Modified EQ%
Trim Material & Treatment	300 Series, 400 Series,17-4 PH, Alloy steels, Duplex SS, Alloy 625, Alloy 825, Monel, Hastelloy C, Special Hardening treatment - Stellite overlay, (Stellite Seat - SS / Stellite Face - SF)
Body Rating	ASME Class 150, 300, 600, 900, 1500, 2500 & 4500 (For EN Class or PN Class, consult with factory)
Body Connections	Flanged (RF, FF, RTJ), Weld ends (Socket weld end : 2" and below, Butt weld end : 3" and above)
Face to Face Dimension	ISA / KOSO Standard / Special (Consult with factory)
Body & Bonnet Material	WCB, WCC, WC6, WC9, C5, C12A, LCC, LCB, CF8, CF8M, CF3M, CF8C, Duplex SS, Alloy 625, Alloy 825, Monel, Hastelloy C and Copper alloy Steels, Cladding on body internal is available upon request.
NACE (as applicable)	NACE MR0175, NACE MR0103
Bonnet Types	Standard type: -17 °C ~ +230 °C, Fin-Extension type: -45 °C ~ -17 °C or above +230 °C, Long-Extension type: -196 °C ~ -45 °C, Option: Bellow-seal bonnet. (Note : The above temperature limits are based on operating conditions)
Gland Packing	TFE V-ring, TFE carbon fiber, Grafoil and more.
Gaskets	Spiral wound metal, with Grafoil or TFE filler.
Leakage Class	ANSI / FCI 70-2 Class IV, V or VI and MSS-SP-61
Special Testing Requirements (Optional upon request)	FE Prototype test as per ISO 15848-1, Class A, B, C, FE Production test as per ISO 15848-2, Class A, B, C, CV test, Helium leak test, High pressure test, Low temperature test, Cryogenic test, Vacuum test , Dynamic response testing (DRT) .
Marking	As per KOSO standard practices / MSS-SP-25
Options	Forging Body/Bonnet, Steam jacketing, Silencer, Expanders/Diffuser and baffles.

Body & Trim Sectional View

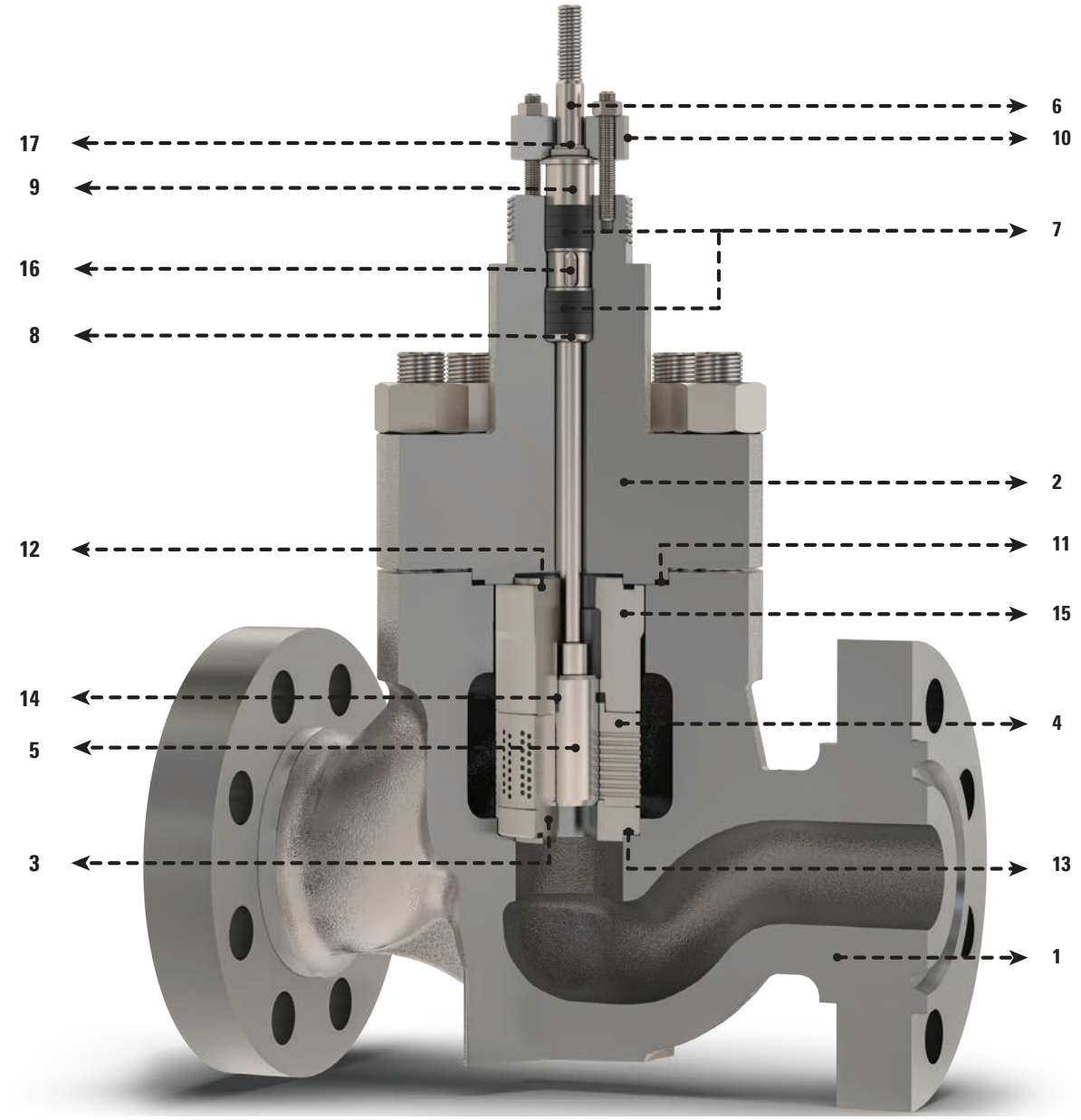


Figure 2: 550G - Globe Valve Body Trim Sectional View

SR.NO.	LABEL
1	BODY
2	BONNET
3	SEAT RING
4	CAGE
5	PLUG
6	STEM
7	GLAND PACKING
8	PACKING SEAT
9	GLAND RING

SR.NO.	LABEL
10	GLAND FLANGE
11	BODY - BONNET GASKET
12	PRESSURE BALANCE GASKET
13	SEAT GASKET
14	BALANCE SEAL
15	BALANCE CYLINDER
16	LANTERN RING
17	WIPER

Table 1: Cv Value - 550G Globe Valve - Pressure Class 150#, 300#, 600#

Nominal Valve Size		Nominal Trim Size	Travel	Linear	Modified EQ%
in	mm	mm	mm	Cv	Cv
1	25	18	20	5.4	4.4
		31	20	13.4	11
1 1/2	40	31	20	17.7	14.6
		40	25	23.4	17.3
		50	25	30.3	25
2	50	50	25	23.8	16.3
		50	25	36	26.3
		62	30	54	44.8
3	80	62	30	71	56.7
		75	40	92.4	69.9
		90	40	120	99.2
4	100	90	40	109	77.8
		90	40	146	114
		115	50	212	174
6	150	115	50	242	189
		140	60	310	230
		160	60	413	316
8	200	160	60	428	323
		180	80	543	410
		205	80	712	542
10	250	205	80	528	371
		205	80	723	547
		245	90	997	749
12	300	245	90	707	492
		245	90	997	749
		300	100	1410	1040
14	350	300	100	1060	738
		300	100	1410	1040
		335	130	1890	1450
16	400	335	130	1550	1110
		335	130	1920	1460
		360	150	2310	1780
18	450	360	150	1990	1460
		360	150	2310	1780
		400	150	2700	2030

Note: The given Cv are for standard valve and trim combinations. KOSO has done extensive developments and tests for extended Cv ranges. Please contact us for custom Cv ranges.

Table 2: Cv Value - 550G Globe Valve - Pressure Class 900#, 1500#

Nominal Valve Size		Nominal Trim Size	Travel	Linear	Modified EQ%
in	mm	mm	mm	Cv	Cv
1	25	18	20	5.4	4.5
1 1/2	40	31	20	17.8	14.6
		40	20	25.1	20.7
2	50	31	20	17.8	14.6
		40	20	28.5	22.7
		50	25	45.9	37.4
3	80	50	30	48.3	39.9
		62	40	69.6	55
		75	40	100	81.4
4	100	62	40	74.6	61.2
		75	50	109	89.1
		90	50	161	132
6	150	90	50	161	132
		115	70	246	194
		140	70	371	299
8	200	140	80	397	327
		160	80	494	396
		180	80	593	464
10	250	160	90	516	424
		180	90	626	501
		205	90	767	598
12	300	180	100	651	534
		205	100	804	641
		245	100	1060	813

Note: The given Cv are for standard valve and trim combinations. KOSO has done extensive developments and tests for extended Cv ranges. Please contact us for custom Cv ranges.

Table 3: Cv Value - 550G - Globe Valve - Pressure Class 2500#

Nominal Valve Size		Nominal Trim Size	Travel	Linear	Modified EQ%
in	mm	mm	mm	Cv	Cv
1 1/2	40	31	20	16.7	13.8
2	50	31	20	17.8	14.7
		40	25	30.1	24.9
3	80	40	25	30.5	25.2
		50	40	45.7	36.5
		62	40	67.9	56.1
4	100	50	40	48.5	40
		62	40	73.5	59.8
		75	50	110	90.3
6	150	75	50	106	84.5
		90	50	161	132
		115	70	255	211
8	200	90	50	161	132
		115	70	254	204
		140	90	397	328

Note: The given Cv are for standard valve and trim combinations. KOSO has done extensive developments and tests for extended Cv ranges. Please contact us for custom Cv ranges.

Table 4: Cv Value - 560G - Angle Valve - Pressure Class 150#, 300#, 600#

Nominal Valve Size		Nominal Trim Size	Linear	Modified EQ%
in	mm	mm	Cv	Cv
1	25	18	6.5	4.9
		31	16.5	12.5
1 1/2	40	31	21.7	16.6
		40	26.2	18.3
		50	37.3	28.6
2	50	50	24.9	16.6
		50	39.9	27.7
		62	66.6	51.3
3	80	62	84.7	63
		75	105	75.1
		90	147	113
4	100	90	118	81
		90	172	125
		115	259	198
6	150	115	284	208
		140	347	244
		160	476	342
8	200	160	487	346
		180	618	439
		205	822	585
10	250	205	566	383
		205	828	589
		245	1130	800
12	300	245	750	506
		245	1130	800
		300	1570	1100
14	350	300	1130	758
		300	1570	1100
		335	2180	1560
16	400	335	1680	1150
		335	2200	1570
		360	2670	1930
18	450	360	2210	1540
		360	2670	1930
		400	3060	2180

Note: The given Cv are for standard valve and trim combinations. KOSO has done extensive developments and tests for extended Cv ranges. Please contact us for custom Cv ranges.

Table 5: Cv Value - 560G - Angle Valve - Pressure Class 900#, 1500#

Nominal Valve Size		Nominal Trim Size	Travel	Linear	Modified EQ%
in	mm	mm	mm	Cv	Cv
1	25	18	20	6.7	5.1
1 1/2	40	31	20	21.8	16.6
		40	20	30.8	23.6
2	50	31	20	21.8	16.6
		40	20	34	25.2
		50	25	55.7	42.2
3	80	50	30	59.3	45.4
		62	40	82.4	60.7
		75	40	121	91.9
4	100	62	40	91	69.3
		75	50	133	100
		90	50	197	150
6	150	90	50	197	150
		115	70	290	214
		140	70	447	335
8	200	140	80	486	373
		160	80	591	441
		180	80	696	508
10	250	160	90	631	482
		180	90	749	559
		205	90	898	654
12	300	180	100	794	604
		205	100	958	711
		245	100	1220	880

Note: The given Cv are for standard valve and trim combinations. KOSO has done extensive developments and tests for extended Cv ranges. Please contact us for custom Cv ranges.

Table 6: Cv Value - 560G - Angle Valve - Pressure Class 2500#

Nominal Valve Size		Nominal Trim Size	Travel	Linear	Modified EQ%
in	mm	mm	mm	Cv	Cv
1 1/2	40	31	20	20.5	15.7
2	50	31	20	21.9	16.8
		40	25	37	28.4
3	80	40	25	37.4	28.7
		50	40	54.5	40.6
		62	40	83.4	63.9
4	100	50	40	59.5	45.6
		62	40	89	67.3
		75	50	134	103
6	150	75	50	126	94.1
		90	50	197	150
		115	70	313	240
8	200	90	50	197	150
		115	70	304	227
		140	90	487	374

Note: The given Cv are for standard valve and trim combinations. KOSO has done extensive developments and tests for extended Cv ranges. Please contact us for custom Cv ranges.

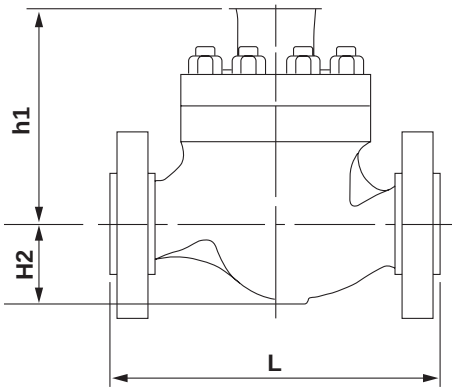
Table 7: Dimension details - 550G Globe Valve - Pressure Class 150#, 300#, 600#

Body Size	Face to Face: L							H2	Standard Bonnet	Fin Extension
in	ASME 150# RF	ASME 300# RF	ASME 600# RF	ASME 300# BW/SW	ASME 300# RTJ	ASME 600# BW	ASME 600# RTJ		h1	h1
1	184	197	210	210	210	210	210	47	157	257
1 1/2	222	235	251	251	248	251	251	60	175	325
2	254	267	286	286	283	286	289	70	196	346
3	298	317	337	317	333	337	340	98	201	351
4	352	368	394	368	384	394	397	113	275	425
6	451	473	508	473	489	508	511	144	305	455
8	543	568	610	568	584	610	613	185	365	515
10	673	708	752	708	724	752	756	225	420	570
12	737	775	819	775	791	819	822	260	480	630
14	889	927	972	927	943	972	975	320	625	775
16	1016	1057	1108	1057	1073	1108	1111	370	720	870
18	1140	1181	1239	1181	1197	1239	1242	420	815	965

Table 8: Dimension details - 550G Globe Valve - Pressure Class 900#, 1500#, 2500#

Body Size	Face to Face: L						H2			Standard Bonnet	Fin Extension
in	ASME 900# BW/RF	ASME 900# RTJ	ASME 1500# BW/RF	ASME 1500# RTJ	ASME 2500# BW/RF	ASME 2500# RTJ	ASME 900#	ASME 1500#	ASME 2500#	h1	h1
1 1/2	333	333	333	333	447	450	72	72	76	260	405
2	375	378	375	378	437	440	93	93	90	280	430
3	440	443	460	463	498	505	125	125	130	350	500
4	510	513	530	533	566	575	132	132	140	420	570
6	715	718	770	776	820	833	199	199	250	450	600
8	854	857	911	920	1279	1295	226	226	340	560	710
10	1251	1254	1327	1336	1778	1800	330	330	456	615	765
12	1311	1314	1400	1416	1422	TBA	450	450	485	840	990
14	1828	TBA	1828	TBA	2137	TBA	680	680	540	610	760

All dimensions are in mm



Note: Above dimensions are approximate and subjected to change during the detailed engineering.

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