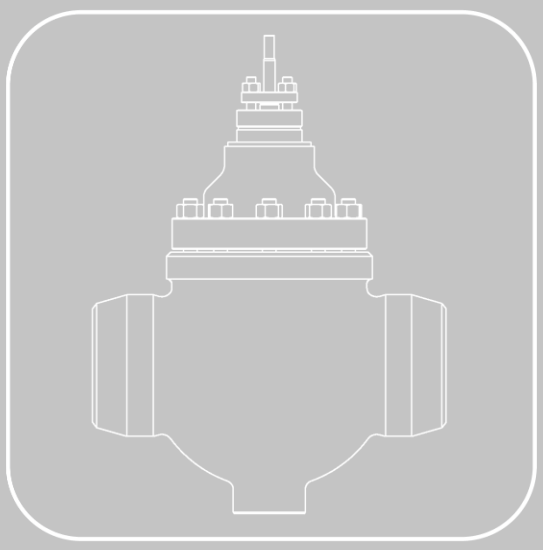


GLOBE CONTROL VALVES



CV-8451 Straightway-body control valve DN 8” Class 900 with micro-drilled low noise cage trim PTFE balanced.

CV-8451 Straightway-body control valve DN 6” BW connection for steam conditioning service with electric actuator and AST desuperheater installed downstream.

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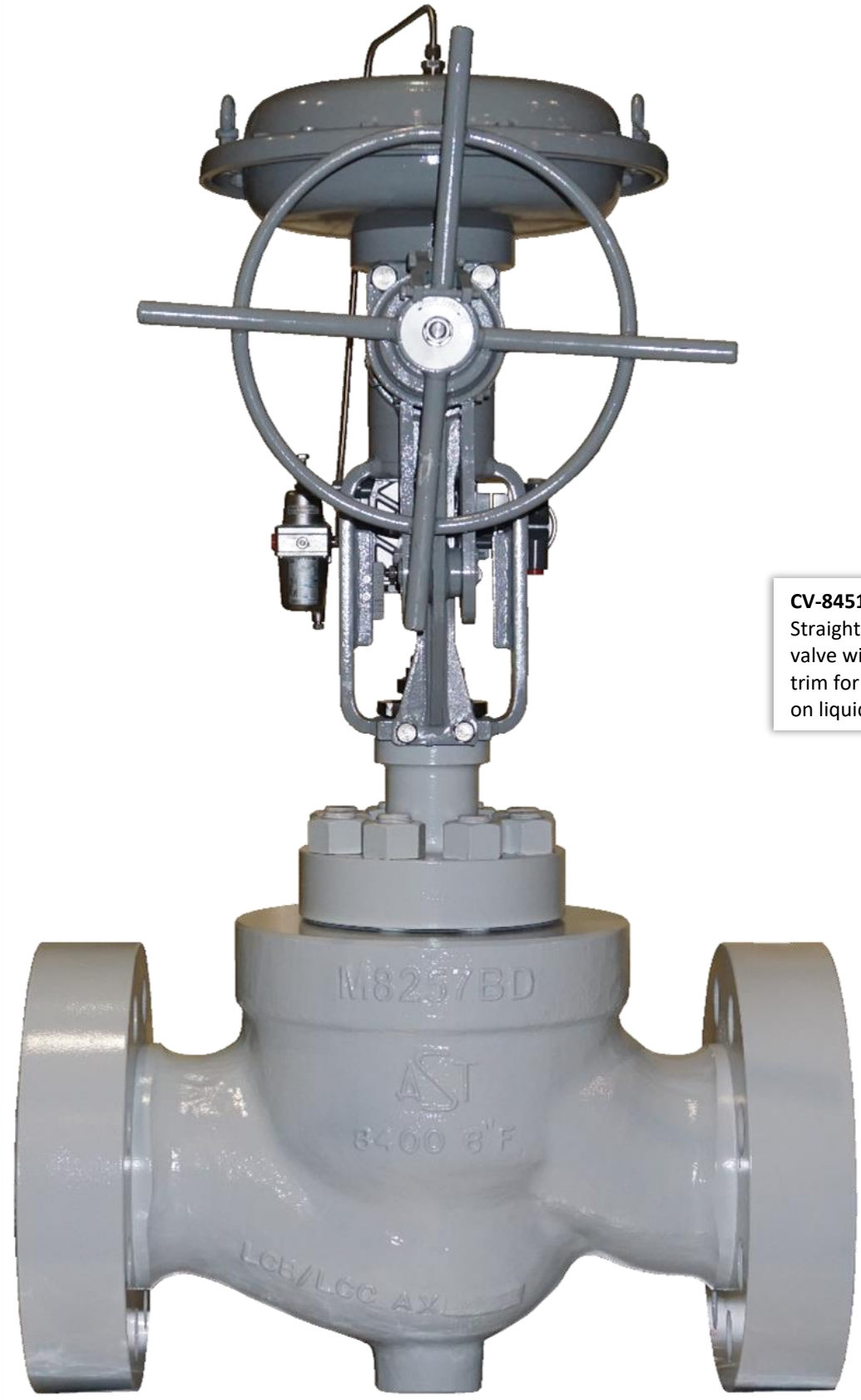
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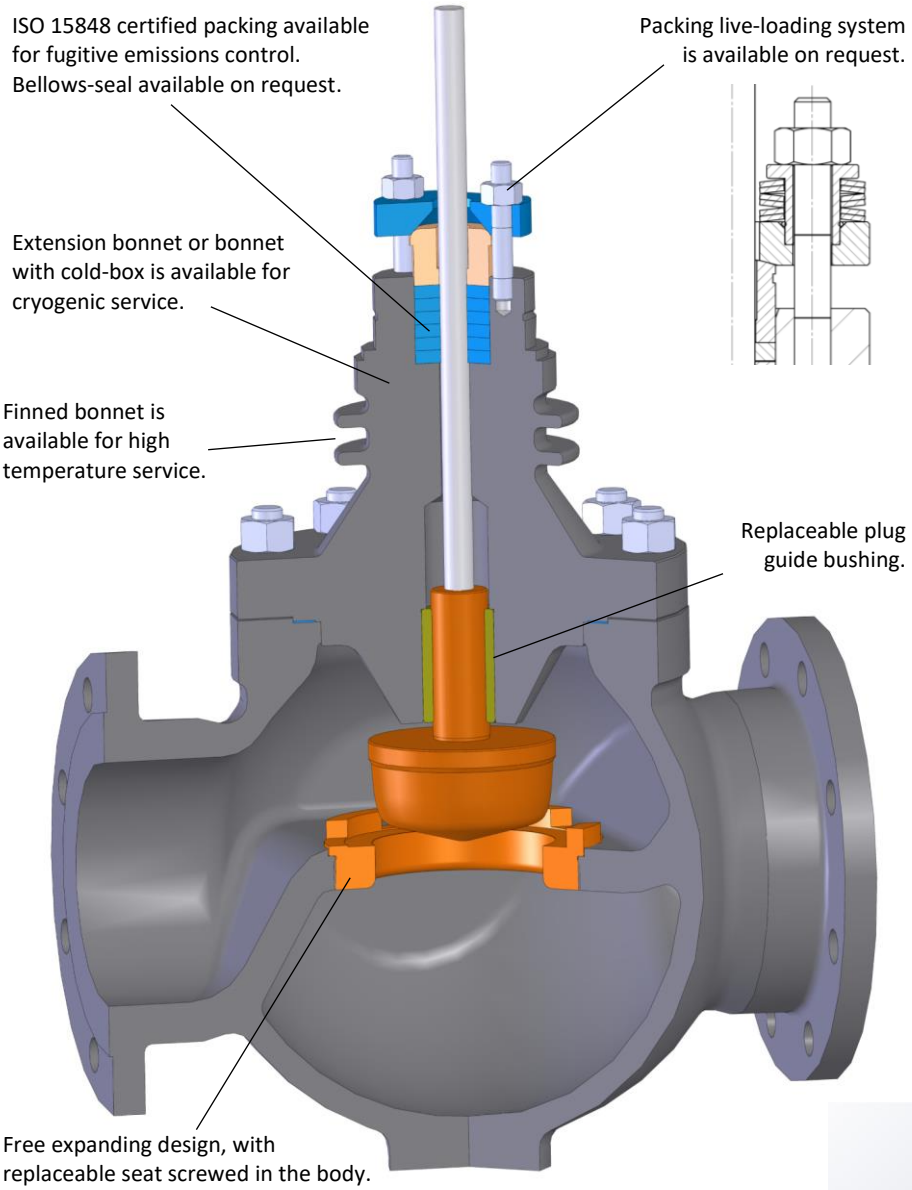
1. FOREWORD

Established in 1951, AST S.p.A. is one of the first Italian manufacturers of spring-loaded safety relief valves and changeover valve systems. In the following years, since early 80's the production range has been extended by the introduction of control valves for critical services.
In the recent years heavy duty control valves with special low noise and anti-cavitation solutions and complementary products such as steam desuperheaters and steam conditioning systems for power generation applications have been added to complete the production range.



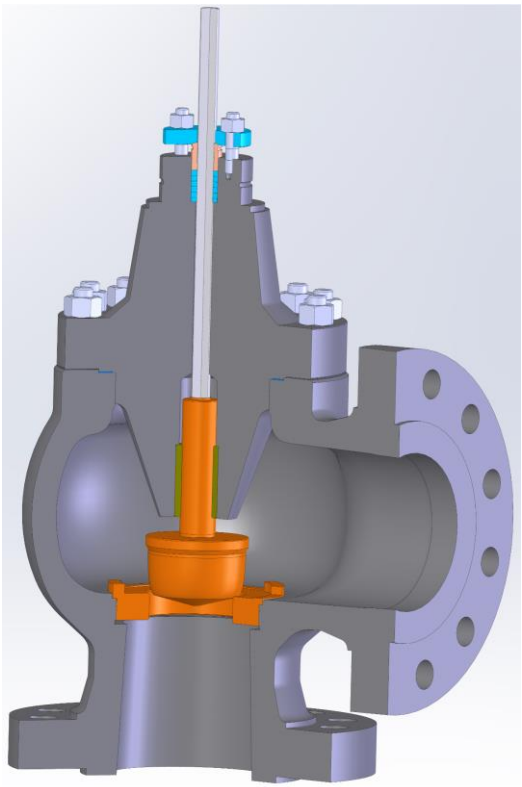
CV-8451 DN 6" Class 2500 RJ
Straightway body control valve with cage, balanced, trim for High pressure service on liquid ammonia.

2. CV-8407 / CV-8707 – CONVENTIONAL - GLOBE - CONTOURED PLUG CONTROL VALVES



Available flow capacities

NPS	Stroke *mm*	Cv max
1/2"	13	3.5
3/4"	13	6
1"	13	13
1 1/2"	20	28
2"	25	50
3"	40	110
4"	40	190
6"	60	440
8"	80	650
10"	100	970



Straightway body CV-8407 and angle body CV-8707 valves, are the basic series proposed by AST for control applications.
Main characteristic of these valves are the very simple design and reduced number of components.
The seat is screwed into the valve body, the control function is realized through the contoured plug, throttling inside the seat and guided in the valve bonnet through its post. The stem is screwed inside the plug post and **locked by a pin**.
The not balanced plug design for the standard series and the trim typology limits the application of this series to light or moderate services.
For special applications with large size ports and relevant shutoff pressure, when cage or quick-change seat are not recommended, series CV-840B or CV-870B, with balanced contoured plug and seat screwed in the body, can be supplied.
For more severe applications, special multistage contoured plug trim or cage guided CV-8450 / CV-8750 series are recommended.

2.1. Available Size and Rating Range

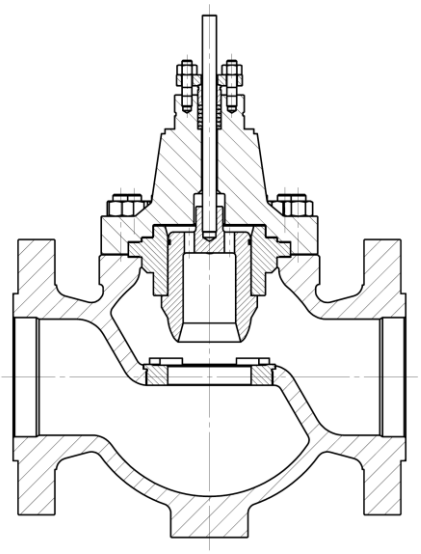
Valve body NPS and rating Class available as **standard** are reported in the following table, both for straight-way and angle body layout.

Class		150	300	600	900	1500
PN		*10/16*	*25/40*	*63/100*	*160*	
Valve NPS	*1/2 "*	●	●	●	●	●
	3/4 "	● / □	● / □	● / □	●	●
	1"	● / □	● / □	● / □	●	●
	1 1/2"	● / □	● / □	● / □	● / □	● / □
	2"	● / □	● / □	● / □	● / □	● / □
	3"	● / □	● / □	● / □	● / □	● / □
	4"	● / □	● / □	● / □	●	●
	6"	● / □	● / □	● / □	●	●
	8"	● / □	● / □	● / □	●	●
	10"	●	●	●	●	●

● = Straightway body □ = Angle body

2.2. Materials of Construction

A wide range of construction materials for valve boundary pressure parts and trim, from ASME or EN standards, is available allowing to comply with process conditions, fluid chemical composition and Customer specifications.
Cast or forged carbon steel, Cr-Mo steels (Gr. 11, Gr. 22), series 300 Stainless Steels, Duplex Steels, Inconel, Monel or Titanium are available for body and bonnet. Other materials are available on request.
Valve trim is available made of series 300 Stainless Steel with or without hard facing, surface hardened (1100 HV) 13-4 Cr steel, Duplex Steel, Inconel Monel or Titanium.



CV-840B
Straight-way body, balanced contoured plug trim.

2.3. Available Sizes and Pressure Classes

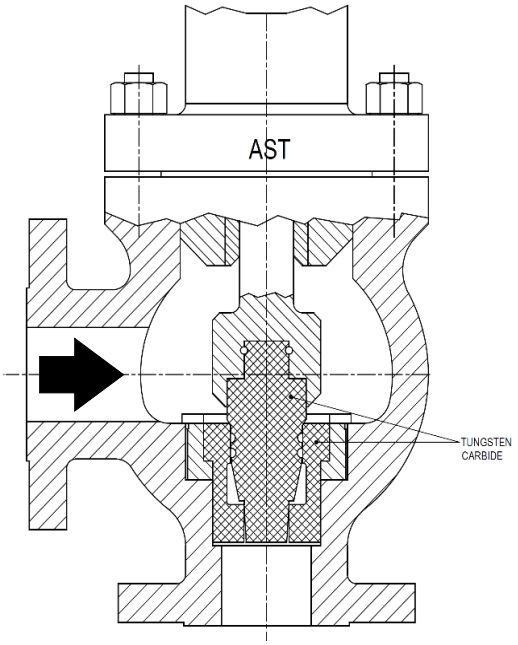
Standard series is available from NPS 1/2” to NPS 10” for rating classes 150 to 1500.
Higher dimensions with different combination of rating classes are available on request.

2.4. Seat Leakage

IEC 60534-4 / ISA FCI 70-2 leakage classes IV and V are available as standard in the whole range of temperature.
Class VI is available up to 200 °C with PTFE insert on the valve plug.

2.5. Special Executions

Special **multi step contoured plug trims**, or **fixed head losses** in combination with standard trim valves, can be supplied for cavitating or erosive service.
Tungsten Carbide cladded trim or **full Tungsten Carbide inserts**, both for seat and plug, can be supplied in case of service on erosive particles dragged by process fluid, to maximize time between maintenance, also in combination with **multistage plug solutions**.



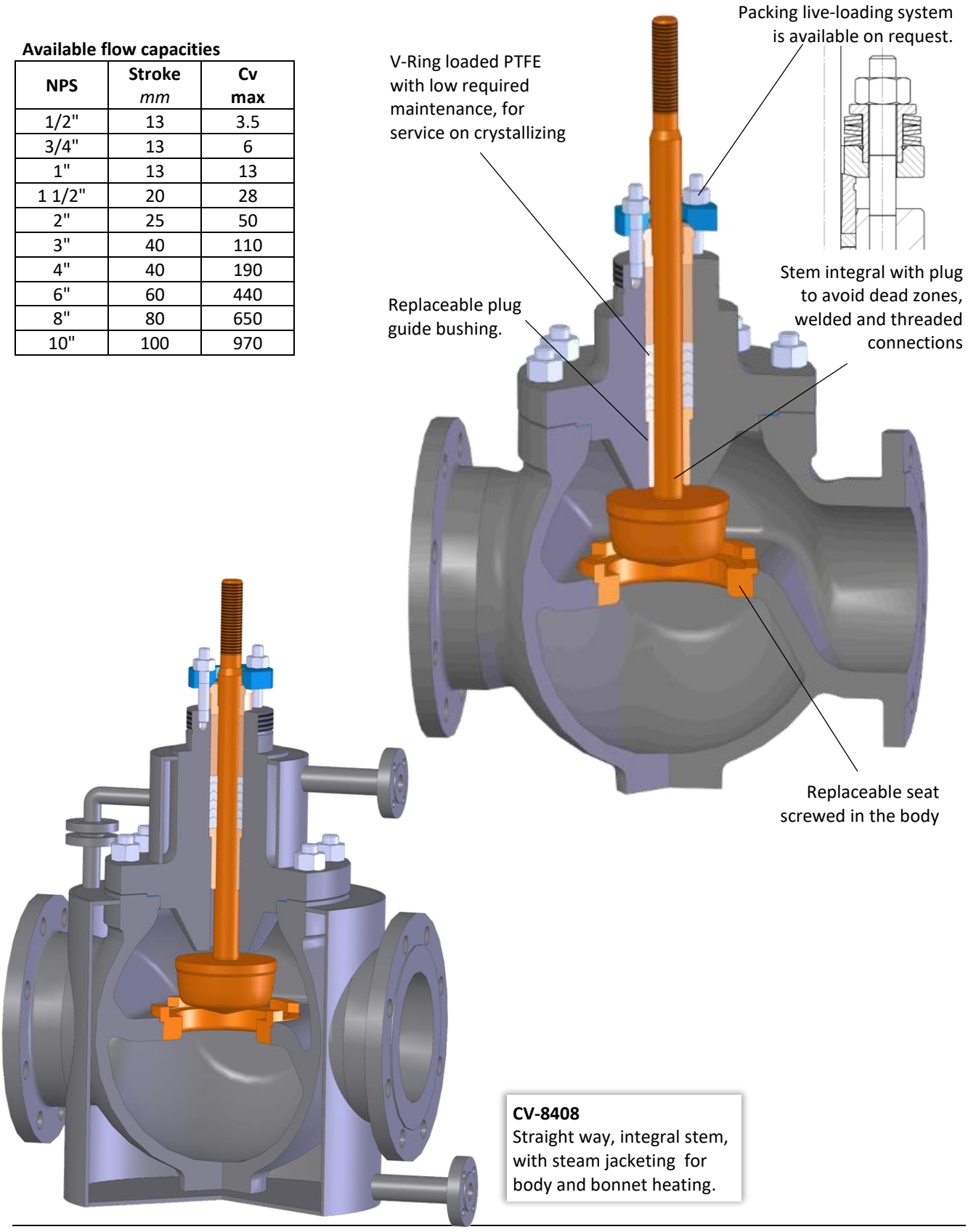
CV-870M
Angle body, multistage contoured plug trim with solid Tungsten Carbide inserts.

3. CV-8408 / CV-8708 – INTEGRAL STEM - GLOBE - CONTOURED PLUG CONTROL VALVES

For applications on **Crystallizing Fluids** where dead zones on valve body are not allowed, CV-8408 / CV-8708 series is available.
Stem is Integral with the plug to avoid threaded or welded connections.
Available NPS and rating classes are the same of CV-8407 / CV-8707.
To avoid fluid crystallization, tease valve series is often supplied with **Steam Jacketing** on the body and, on request, on the bonnet.

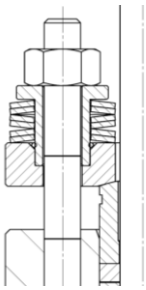
Available flow capacities

NPS	Stroke *mm*	Cv max
1/2"	13	3.5
3/4"	13	6
1"	13	13
1 1/2"	20	28
2"	25	50
3"	40	110
4"	40	190
6"	60	440
8"	80	650
10"	100	970



CV-8408
Straight way, integral stem, with steam jacketing for body and bonnet heating.

4. CV-8450 / CV-8750 – QUICK CHANGE CAGE CONTROL VALVES



Packing live-loading system available on request.

ISO 15848 certified packing available for fugitive emissions control. Bellows-seal available on request.

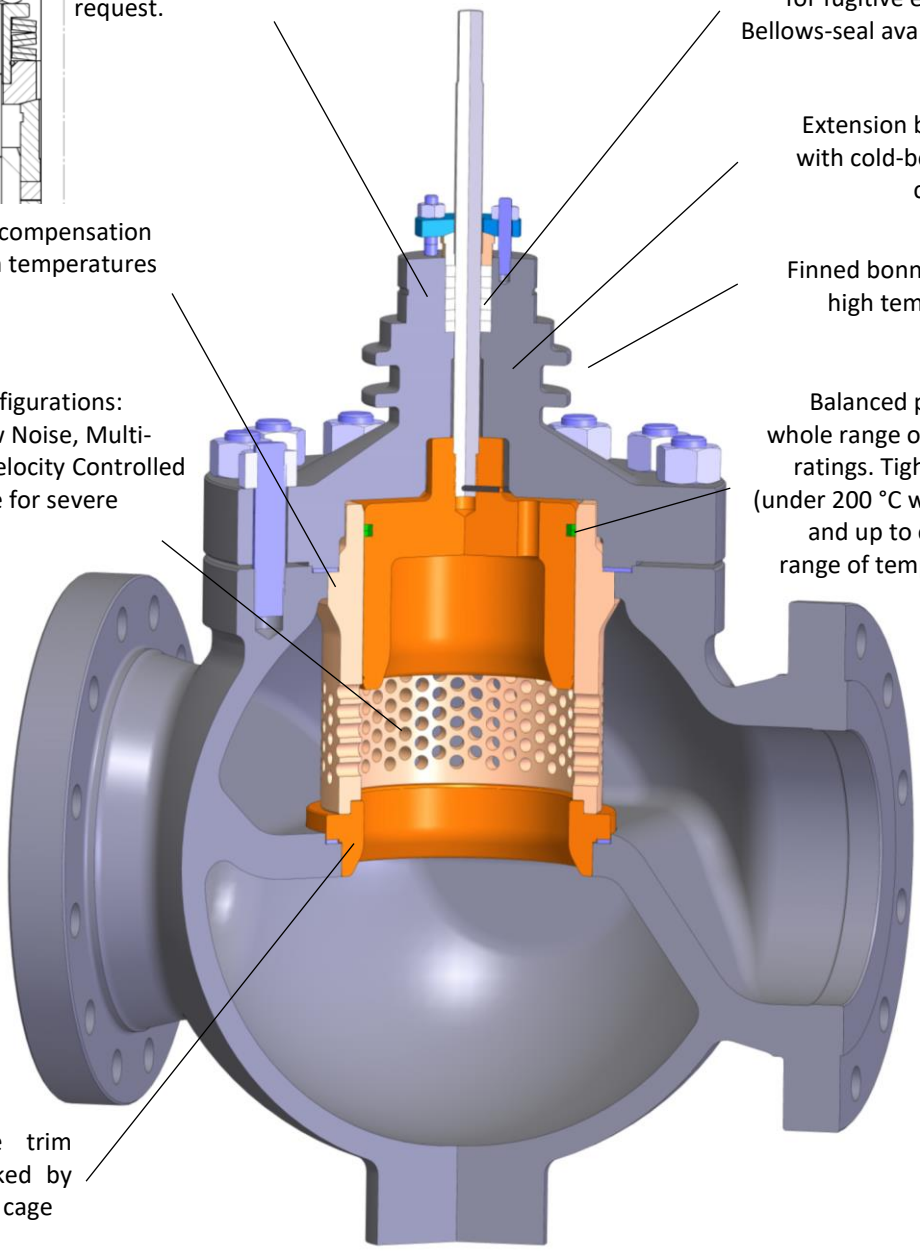
Extension bonnet or bonnet with cold-box is available for cryogenic service.

Finned bonnet is available for high temperature service.

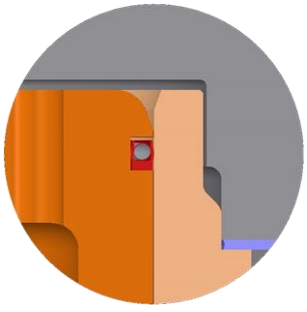
Thermal differential compensation system for operation temperatures up to 570 °C

Wide range of trim configurations: Performance Cage, Low Noise, Multi-Step Anti-Cavitation, Velocity Controlled Multi-Path, Multi-Stage for severe service applications

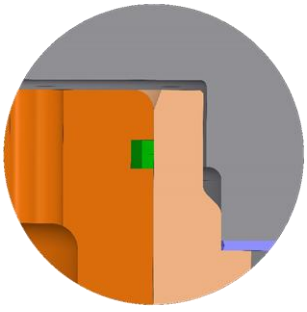
Balanced plug available in the whole range of temperatures and ratings. Tightness up to class VI (under 200 °C with seat soft insert) and up to class V in the whole range of temperature (up to 570



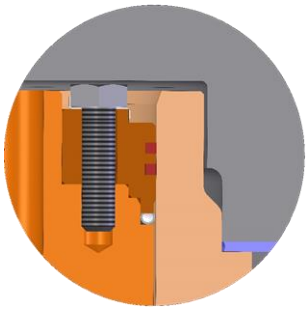
Quick change trim with seat locked by bonnet trough cage



***Carbon-graphite loaded, PTFE lip seal**, up to **class VI** – T max 315 °C*



***Carbon-graphite rings**, up to **class IV** No temperature limitations*



***Metal C-Ring**, up to **class V** No temperature limitations*

4.1. Main Features

Straightway body **CV-8450** and angle body **CV-8750** cage valves have simple, robust and reliable construction specially designed for heavy duty applications.
Seat and cage are retained by bonnet making very easy valve disassembling and trim removal. Thanks to an **internal thermal compensation system** these valves can extend working temperature up to 600°C with appropriate materials selection.
The valve can be equipped with a wide range of low-noise, anti-cavitation and anti-erosion trim solutions, with balanced or unbalanced plug.
Wide range of **plug balancing solutions** allows to comply with all sealing classes up to extreme pressure and temperature values.

DN	Seat *mm*	Travel *mm*	Cv 100%
3/4" - 1"	19	20	11.1
1 1/2"	38	40	35.4
2"	64	40	59.3
3"	82	50	129
4"	103	60	199
6"	130	60	374
8"	160	80	609
10"	215	100	1 070
12"	244	120	1 430
14"	294	150	1 980
16"	342	200	2 630
20"	440	250	4 300
24"	520	300	6 640

4.2. Materials of Construction

Complete range of construction materials, from ASME or EN standards, is available for valve envelope and for inside parts to comply with process conditions, fluid chemical composition and Customer specifications.
Plug: Series 300 Stainless Steel with or without hard facing, surface hardened (1100 HV) 13-4 Cr steel, Duplex Steels, Inconel, Monel.
Seat: Series 400 hardened Stainless Steel, 13-4 Cr or AISI 316 with or without hard facing, Duplex Steels, Inconel, Monel.
Cage: Series 300 Cr plated Stainless Steel or 13-4 Cr steel with surface hardening treatment up to over 1100 HV.
VeCo Labyrinth Trim: AISI 300 or 400 Stainless Steel sheets, solid Inconel 718 by additive manufacturing for small trims with micro labyrinths.

4.3. Available Sizes and Rating Range

Standard series is available from NPS 3/4" to NPS 24" for rating class 150 to 600, up to NPS 12" for rating class 900 and 1500, and up to NPS 6" for rating class 2500, higher dimensions with different combination of rating classes are available on request.

Table 2 – CV-8450 available NPS and ratings

Class		150	300	600	900	1500	2500
PN		10/16	15/40	63/100	160		
Valve NPS	*3/4"*	●	●	●	●	●	●
	1"	●	●	●	●	●	●
	1.1/2"	●	●	●	●	●	●
	2"	●	●	●	●	●	●
	3"	●	●	●	●	●	●
	4"	●	●	●	●	●	●
	6"	●	●	●	●	●	●
	8"	●	●	●	●	●	○
	10"	●	●	●	●	●	○
	12"	●	●	●	●	●	○
	14"	●	●	●	○	○	○
	16"	●	●	●	○	○	○
	20"	●	●	●	○	○	○
	24"	●	●	●	○	○	○

● Standard ○ On request

4.4. Seat Leakage

IEC 60534-4 / ISA FCI 70-2 leakage classes IV and V are available as standard in the whole range of temperature with balanced or unbalanced plug.
Class VI with **seat PTFE insert** is available up to **200 °C**.
CV-8454 balanced trim with pilot plug is available for **high temperature** steam service applications, when **zero leakage** is required.
Unbalanced plug, flow to close with **double plug trim**, warranting perfect seal up to maximum operating temperatures, is available for DN within the range 1" to 3" (**CV-8459 / CV-8759**).

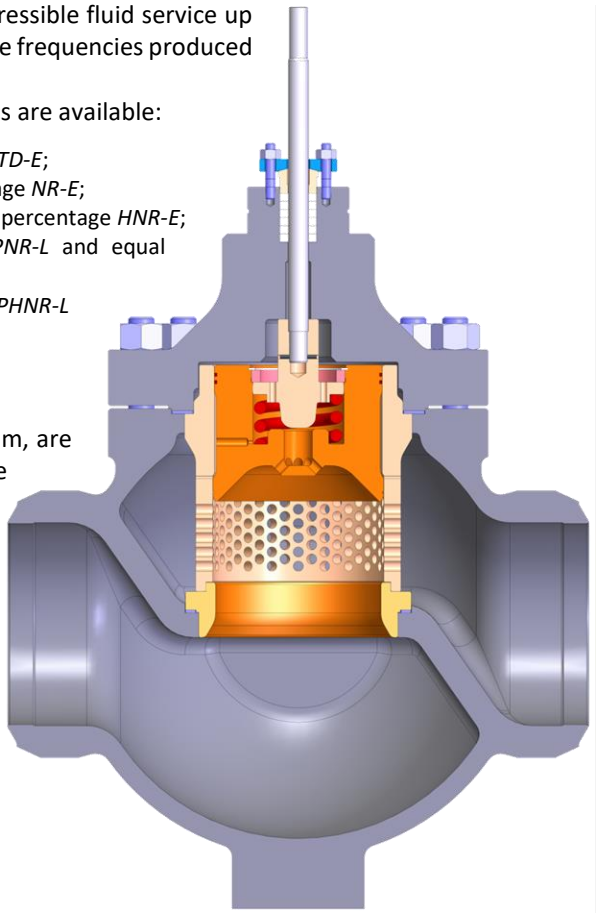
4.5. CV-8450 - Available Trims

CV-8450 valves can be equipped with a wide range of trim configurations: single cage, performance and low-noise, multistage anti-cavitation and anti-erosion trims, maintaining quick change design, in the flow capacity range from Cv 0.05 to over 6000, with equal percentage linear and modified linear flow characteristic.
The complete series of trim allow to withstand practically all process conditions with high reliability and reduced maintenance.
A complete range of plug balancing inserts is available to reduce actuating forces and allowing reach highest sealing classes in the whole range of operating temperatures.

4.5.1. CV-8451 and CV-8454 Single-Cage Trims

AST single stage trims are available with standard drilled or ported cage and with low noise ***NR*** and extra low noise ***HNR*** cage. NR and HNR trims allow to reduce produced noise on compressible fluid service up to 20 dBA with reference to conventional cages, thanks to high noise frequencies produced by small jets inside micro drilled cages.
For all trim solutions linear or equal percentage flow characteristics are available:

- **STD:** drilled or ported single cage linear *STD-L* and equal percentage *STD-E*;
- **NR:** micro drilled low-noise single cage linear *NR-L* and equal percentage *NR-E*;
- **HNR:** micro drilled extra low-noise single cage linear *HNR-L* and equal percentage *HNR-E*;
- **PNR:** pilot balanced, micro drilled low-noise single cage linear *PNR-L* and equal percentage *PNR-E*;
- **PHNR:** pilot balanced, micro drilled extra low-noise single cage linear *PHNR-L* and equal percentage *PHNR-E*.

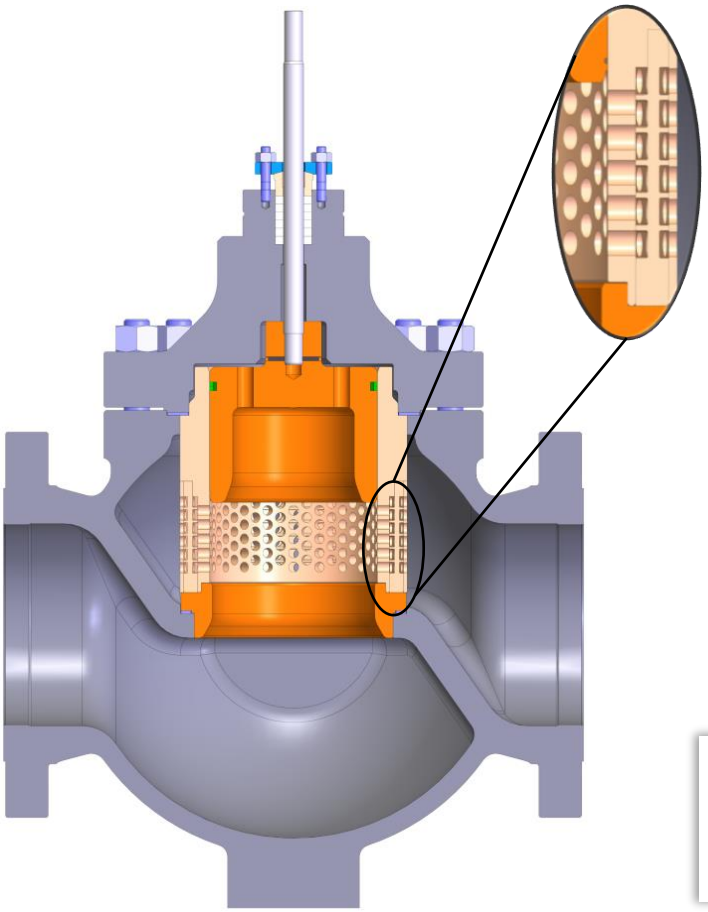


CV-8454:
Straightway cage with pilot-balanced plug for perfect and reliable seal at elevated temperature.

4.5.2. CV-8452 and CV-8453 Multi-Cage Trims

CV-8452 with double cage and **CV-8453** with three stages cage trim, are available for anti-cavitation service with moderate to high pressure drops (60 to 120 bar).
These trims allow to avoid cavitation on most applications reaching relevant pressure recovery factor values depending on number of stages and expansion factor.
Distributed pressure drops to multiple stages and consequently reduced fluid velocity, together with a proper selection of materials, warrant a long and reliable operation also on critical services.
Available linear or equal percentage flow characteristics:

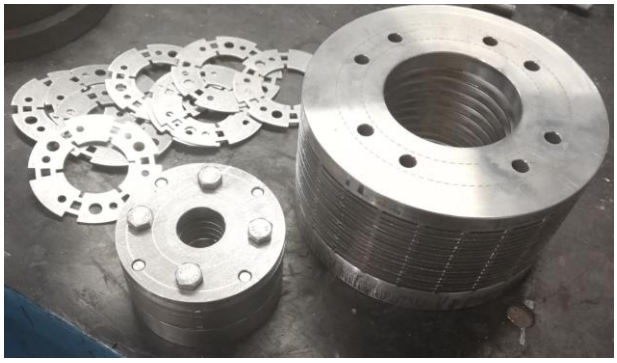
- **ACDC-L:** anti cavitation double cage trim linear;
- **ACDC-E:** anti cavitation double cage trim equal percentage;
- **ACDCE-L:** anti cavitation high F_L double cage trim linear;
- **ACDCE-E:** anti cavitation high F_L double cage trim equal percentage.

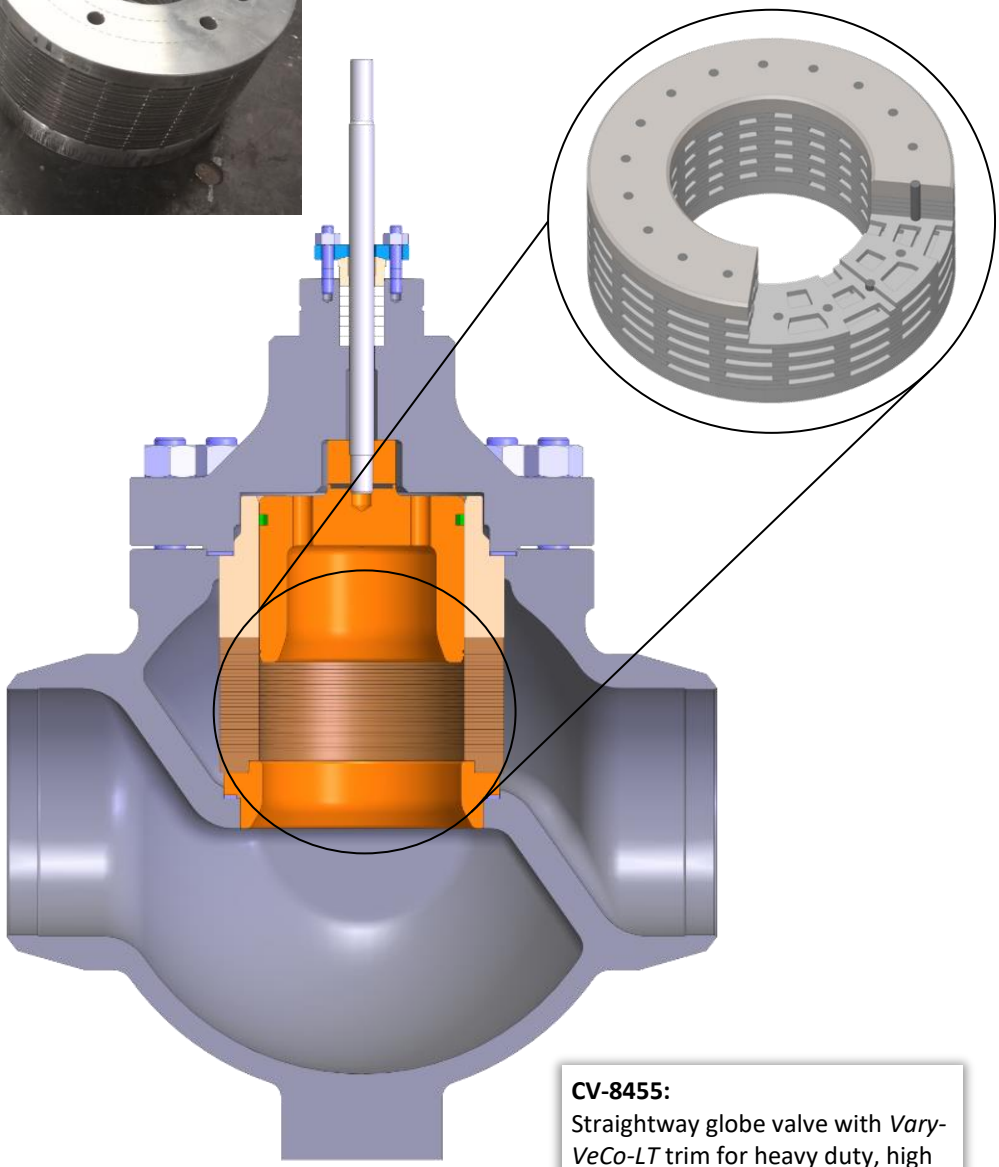


CV-8452 Anti Cavitation Multicage:
Double or Triple cage, high recovery, Anti Cavitation trim valves, for high pressure drop on liquid service and when anti cavitation trim is required.

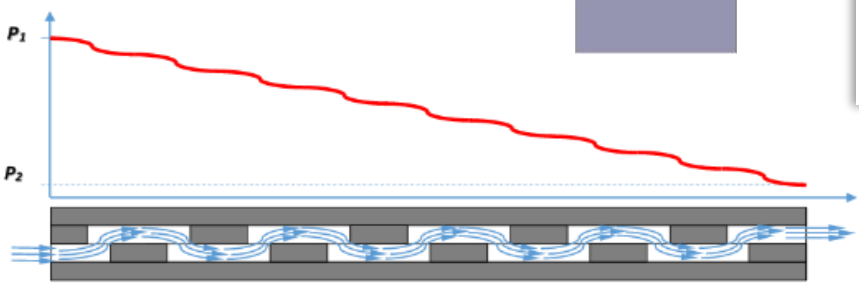
4.5.3. CV-8455 - Velocity Controlled Labyrinth Trim

For severe service applications where multi cage trims are not enough to avoid cavitation or erosion on liquid service or micro drilled cages cannot reduce generated noise to acceptable levels, **labyrinth trims** must be selected.
AST proposes tailor made designed **VeCo-LT** trims (***Velocity Controlled Labyrinth Trim***) that can be fitted inside standard globe bodies or into a special body designed for specific applications.
CV-8455 straightway body and **CV-8755** angle-body valves, equipped with **VeCo-LT** trim, allow to resolve any problem of cavitation, erosion, noise or vibration thanks to the **perfect control of the fluid velocity and of the pressure distribution**.
Customized trim design, valve body selection and sizing, and proper selection of components material, are the key factors to resolve any critical application.
VeCo-LT trim is also **available** for service on **mixed phase fluids**, warranting long and reliable operation.





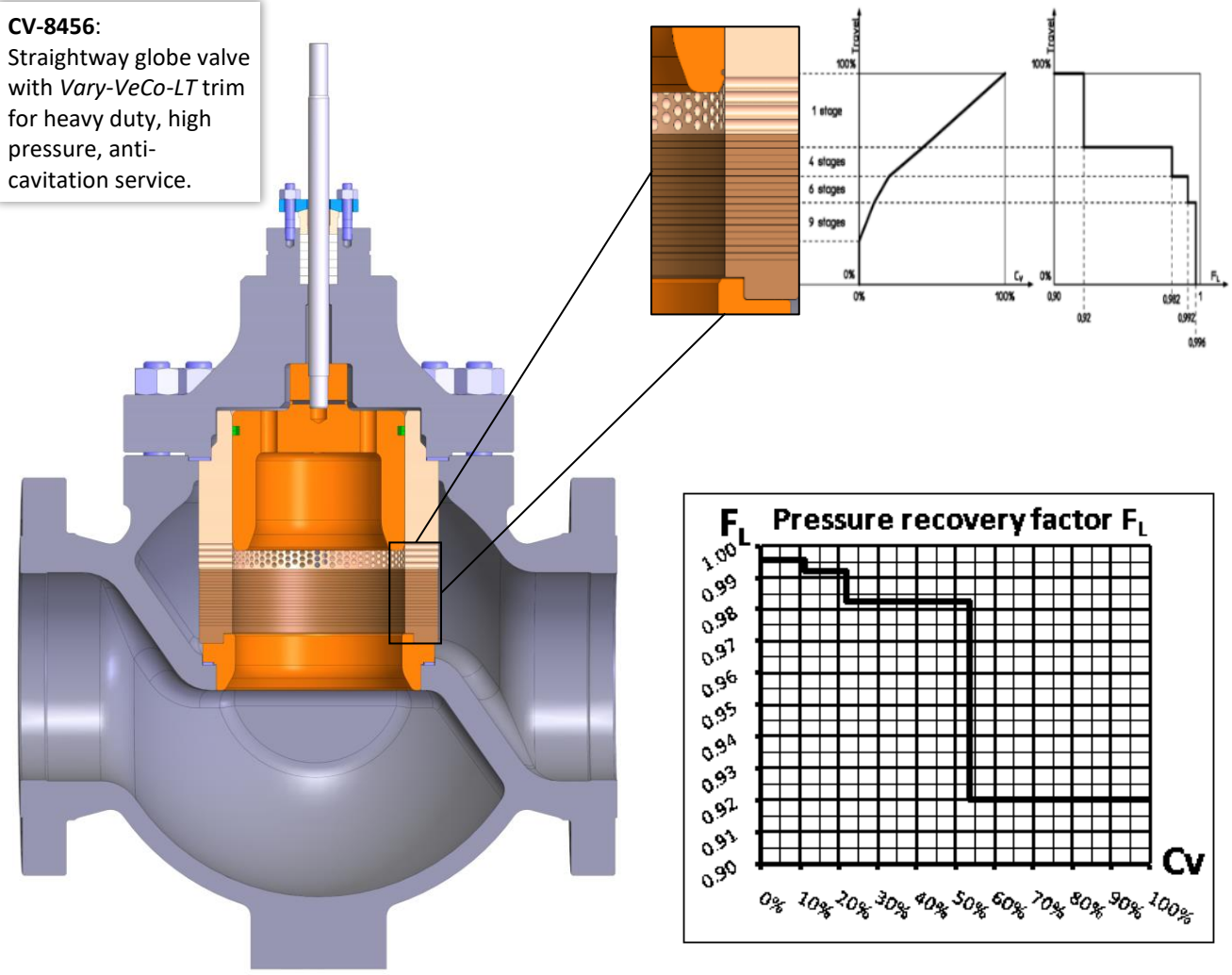
CV-8455:
Straightway globe valve with *Vary-VeCo-LT* trim for heavy duty, high pressure, anti-cavitation service.



4.5.4. CV-8456 – Variable Step Number Labyrinth Trim

CV-8456 series with **Vary-VeCo-LT**, multi-path, variable stage number labyrinth trim, has been specialty designed for **boiler feed water applications** where anti-cavitation, anti-erosion trim is required during **plant startup** while high-capacity trim with reduced pressure drop is more suitable to reduce valve size and operating head of loss. This valve can be installed alone avoiding the installation of 30% startup boiler feedwater valve and 100% main boiler feed-water valve. **Vary-VeCo-LT** trim can be convenient for all application requiring anti-cavitation or anti-erosion trim at low plant load and high specific flow coefficient at maximum load.
Specific design can be provided for compressible fluid service, when required.

CV-8456:
Straightway globe valve with *Vary-VeCo-LT* trim for heavy duty, high pressure, anti-cavitation service.

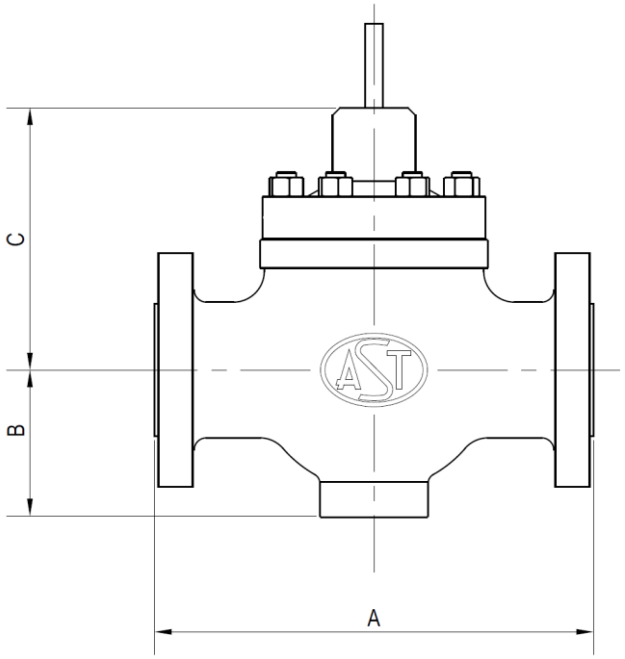


5. Special Materials and Cladding

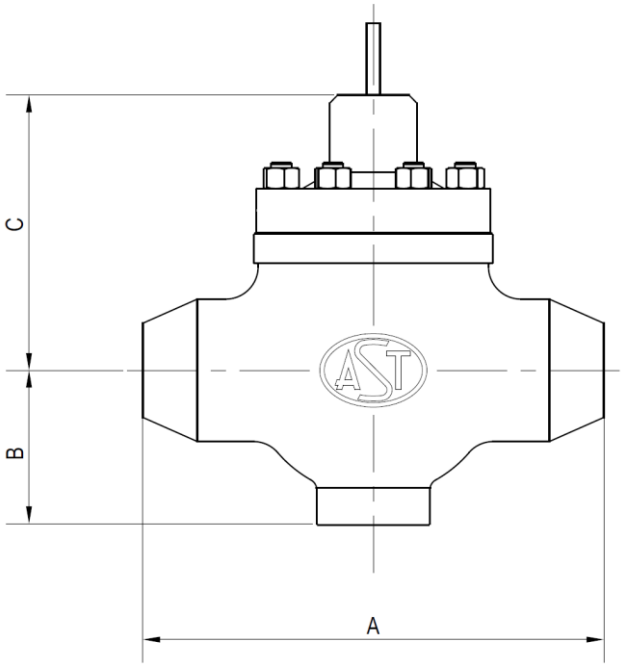
Special valve body materials or inside cladding, like as inside **valve body cladding by Inconel or CoCr-A**, are available on request.
Special trim execution with TC cladding, full *TC inserts* or special solid *TC labyrinth trims* are available for erosive fluid service also in combination with extreme pressure drops.

6. Overall Dimensions and Masses

Straightway Body – Flanged Connections

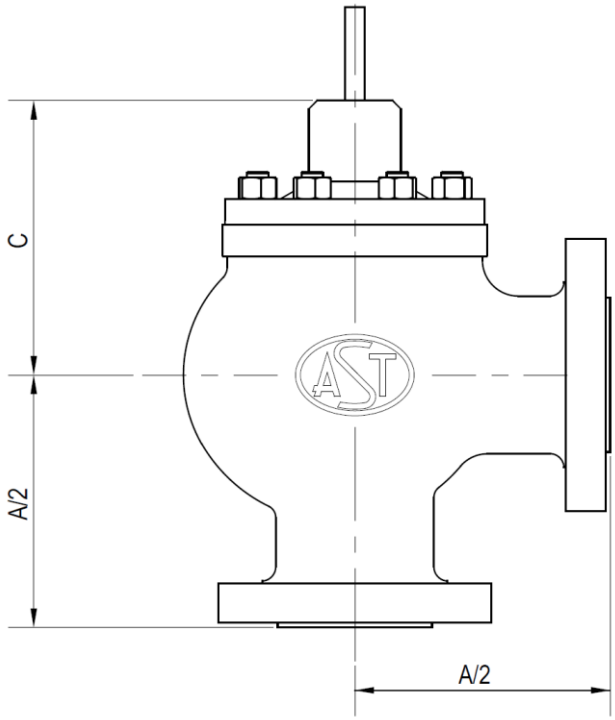


Straightway Body – Butt Weld Connections

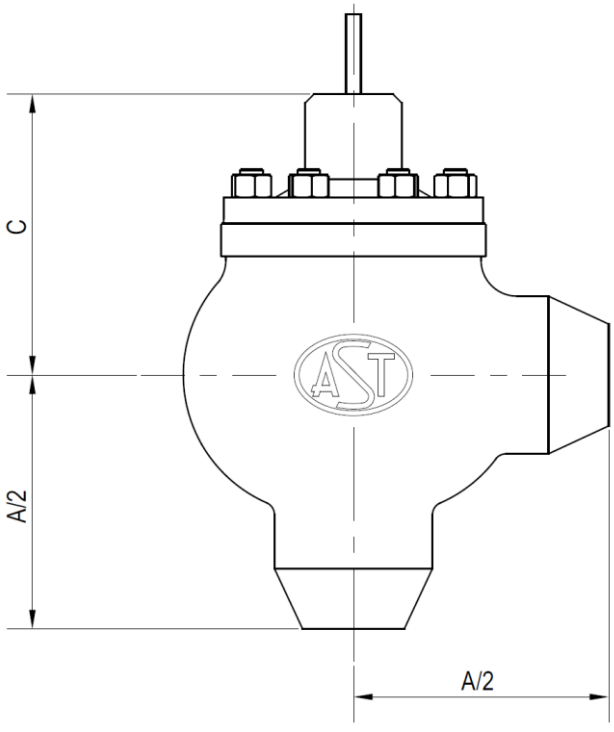


±1.5 DN 1/2"-10"
±3 DN ≥12"

Angle Body – Flanged Connections



Angle Body – Butt Weld Connections



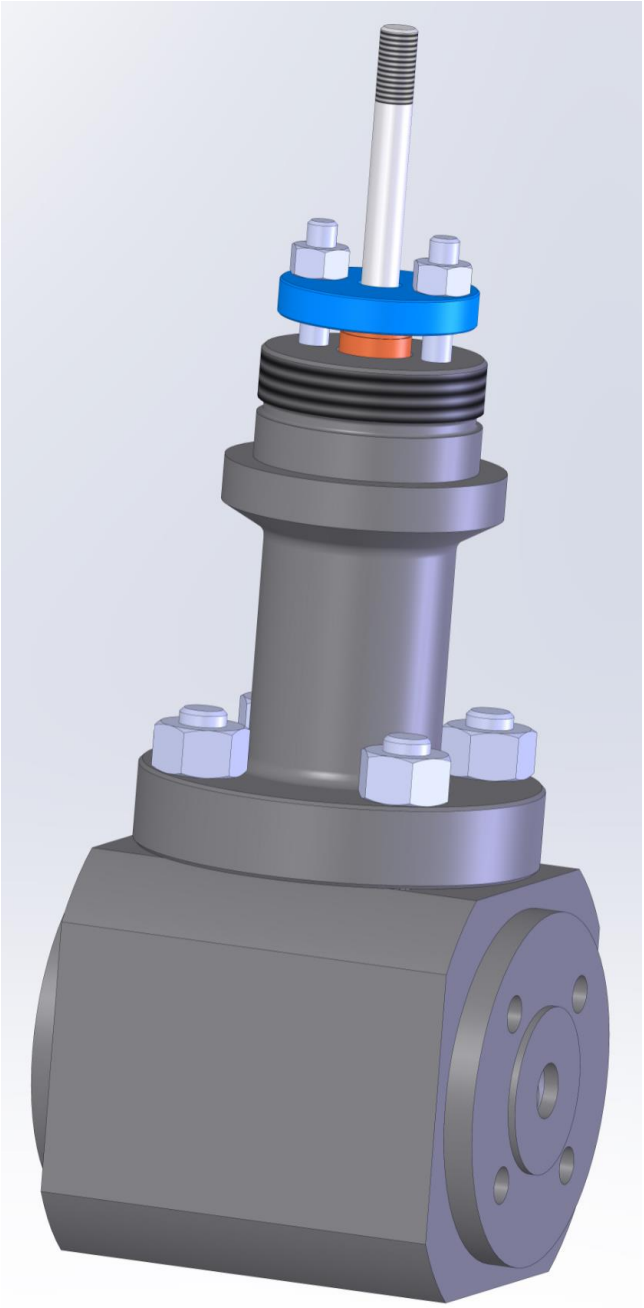
6.1. CV-8407 / CV-8707

DIMENSIONS - mm

DN	Class 150						Class 300						Class 600					
	A				B	C	A				B	C	A				B	C
	RF	RJ	BW	SW			RF	RJ	BW	SW			RF	RJ	BW	SW		
1/2"	184	-	203	206	59	160	190	201	203	206	60	160	203	203	203	206	60	160
3/4"	184	-	206	210	60	160	194	207	206	210	59	160	206	206	206	210	60	160
1"	184	197	210	210	59	160	197	210	210	210	59	160	210	210	210	210	59	160
1 1/2"	222	235	251	251	87	198	235	248	251	251	83	198	251	251	251	251	87	198
2"	254	267	286	286	104	248	267	283	286	286	104	248	286	289	286	286	104	248
3"	298	311	337	-	132	283	317	333	337	-	115	283	337	340	337	-	115	283
4"	352	365	394	-	153	286	368	384	394	-	153	286	394	397	394	-	153	286
6"	451	464	508	-	185	320	473	489	508	-	185	320	508	511	508	-	207	320
8"	543	556	610	-	277	400	568	584	610	-	250	400	610	613	610	-	250	400
10"	673	686	752	-	280	560	708	724	752	-	280	560	752	755	752	-	280	560

STRAIGHTWAY BODY MASSES - kg

DN	Flanged			BW		
	ANSI 150	ANSI 300	ANSI 600	ANSI 150	ANSI 300	ANSI 600
1/2"	10	10	11	9	8	9
3/4"	10	11	14	9	8	11
1"	12	12	17	10	9	14
1 1/2"	23	24	30	20	18	24
2"	29	30	43	24	23	27
3"	50	60	70	42	47	56
4"	75	95	110	63	75	80
6"	120	130	150	104	97	91
8"	250	350	450	225	299	361
10"	450	550	750	416	477	605



CV-8400:
Lug Connection, Straightway globe valve with integral body machined from forged bar.

6.2. CV-8450 / CV-8750

DIMENSIONS - mm

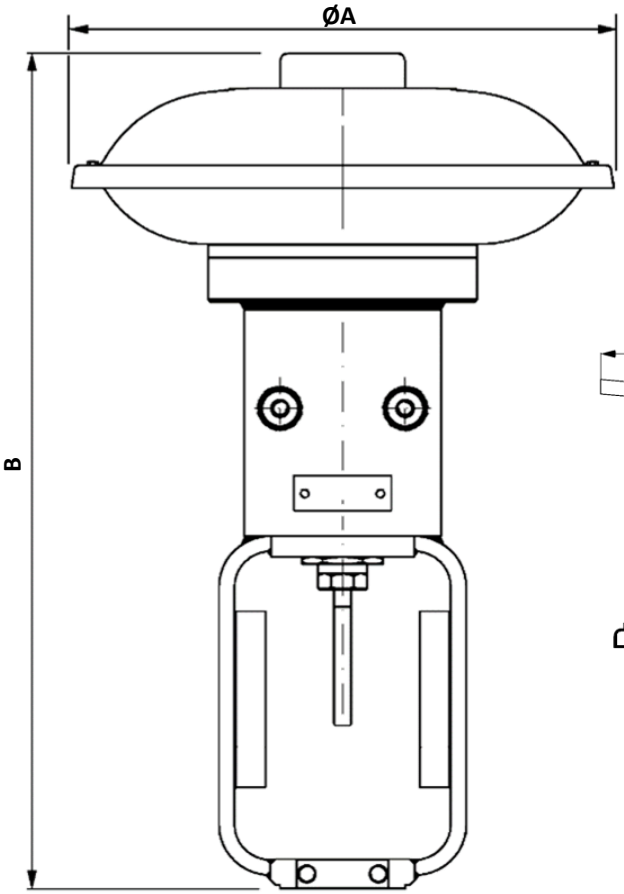
DN	Class 150						Class 300						Class 600					
	A				B	C	A				B	C	A				B	C
	RF	RJ	BW	SW or thr.			RF	RJ	BW	SW or thr.			RF	RJ	BW	SW or thr.		
3/4"	184	-	206	210	70	188	194	207	206	210	70	188	206	206	206	210	70	188
1"	184	197	210	210	70	188	197	210	210	210	70	188	210	210	210	210	70	188
1.1/2"	222	235	251	251	100	250	235	248	251	251	100	250	251	251	251	251	100	250
2"	254	267	286	286	122	290	267	283	286	286	122	290	286	289	286	286	122	290
3"	298	311	337		150	330	317	333	337		150	330	337	340	337		150	330
4"	352	365	394		160	380	368	384	394		160	380	394	397	394		160	380
6"	451	464	508		200	430	473	489	508		200	430	508	511	508		205	430
8"	543	556	610		200	480	568	584	610		200	480	610	613	610		220	480
10"	673	686	752		258	620	708	724	752		258	620	752	755	752		265	620
12"	737	750	819		290	710	775	791	819		290	710	819	822	819		300	710
14"	889	902	1029		320	820	927	943	1029		325	820	972	975	1029		340	820
16"	1016	1029	1108		380	950	1057	1073	1108		380	950	1108	1111	1108		360	950
20"	1278	1291	1420		490	1080	1320	1333	1420		490	1080	1400	1413	1460		500	1080
24"	1680	1693	1680		520	1260	1724	1746	1724		520	1260	1800	1809	1800		580	1260

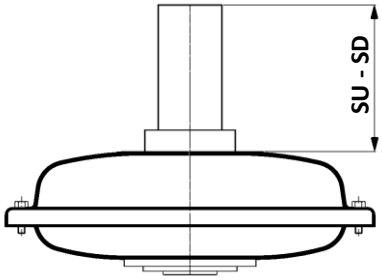
DN	Class 900			B	C	Class 1500			B	C	Class 2500			B	C
	A					A					A				
	RF	RJ	BW			RF	RJ	BW			RF	RJ	BW		
3/4"	273	273	279	70	218	273	273	279	70	218	318	318	318	75	242
1"	273	273	279	80	218	273	273	279	80	218	318	318	318	85	242
1.1/2"	333	333	330	110	280	333	333	330	110	280	381	384	359	125	320
2"	375	378	375	135	310	375	378	375	135	310	413	416	400	150	360
3"	441	444	460	170	340	460	463	460	170	370	660	666	498	165	400
4"	511	514	530	200	400	530	533	530	200	410	737	747	575	190	450
6"	714	717	768	210	460	768	774	768	220	460	864	877	819	250	530
8"	781	784	832	250	520	838	848	832	260	530					
10"	864	867	991	300	670	991	1001	991	335	670					
12"	1016	1019	1130	330	760	1130	1146	1130	370	760					

STRAIGHTWAY BODY MASS – kg

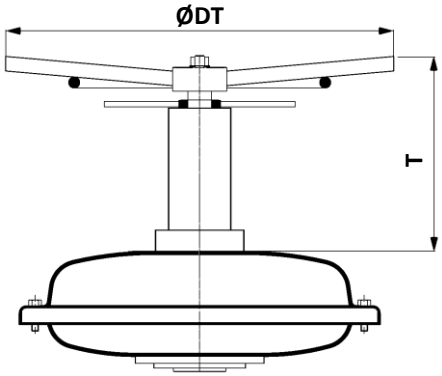
DN	Flanged						BW				
	ANSI 150	ANSI 300	ANSI 600	ANSI 900	ANSI 1500	ANSI 2500	ANSI 300	ANSI 600	ANSI 900	ANSI 1500	ANSI 2500
3/4"	15	19	19	38	38	45	15	19	38	38	45
1"	17	21	21	43	43	50	17	21	43	43	46
1.1/2"	39	41	44	57	57	70	39	41	52	52	67
2"	46	57	60	97	97	135	46	57	88	88	125
3"	71	89	95	170	170	325	71	89	160	155	300
4"	105	115	130	250	250	475	105	115	230	225	435
6"	200	240	285	400	530	900	200	240	360	495	600
8"	280	330	410	650	930		280	330	590	860	
10"	455	550	750	1 140	1 620		455	550	1 060	1 480	
12"	660	765	1 050	1 500	2 140		660	765	1 400	1 920	
14"	990	1 180	1 570				990	1 180			
16"	1 380	1 620	2 000				1 380	1 620			
20"	2 750	3 150	3 700				2 750	3 150			
24"	3 200	3 900	4 750				3 200	3 900			

6.3. SD - PNEUMATIC ACTUATORS

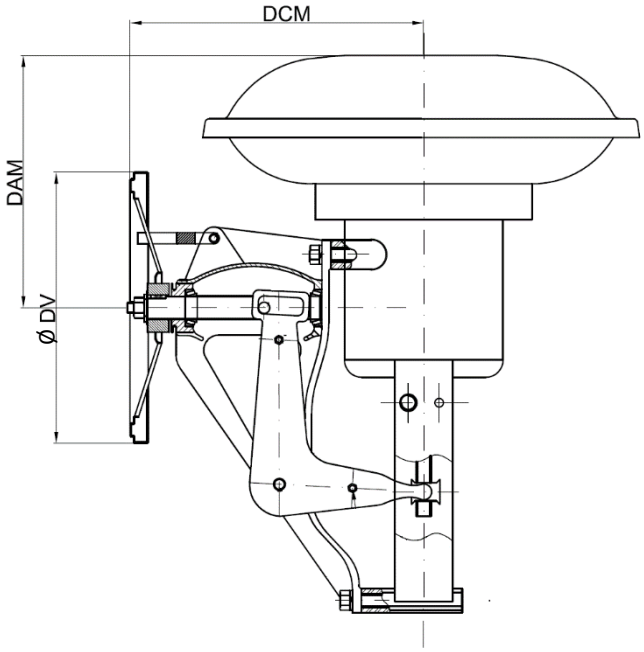




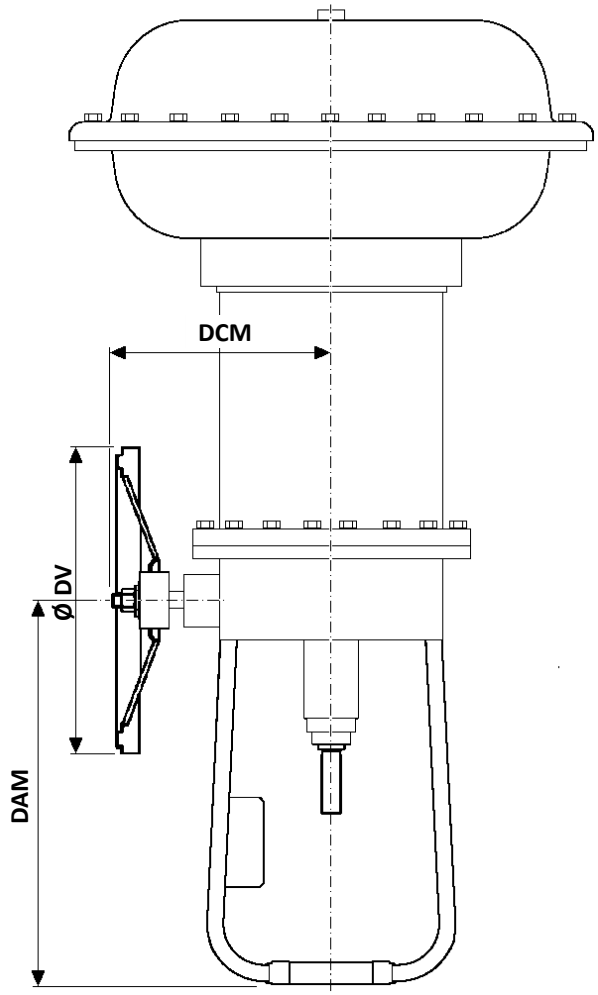
Stroke Limiter



Top-mounted hand wheel



Side-mounted hand wheel sizes:
SD09-SD11-SD13-SD15-SD18-SD18L-SD24

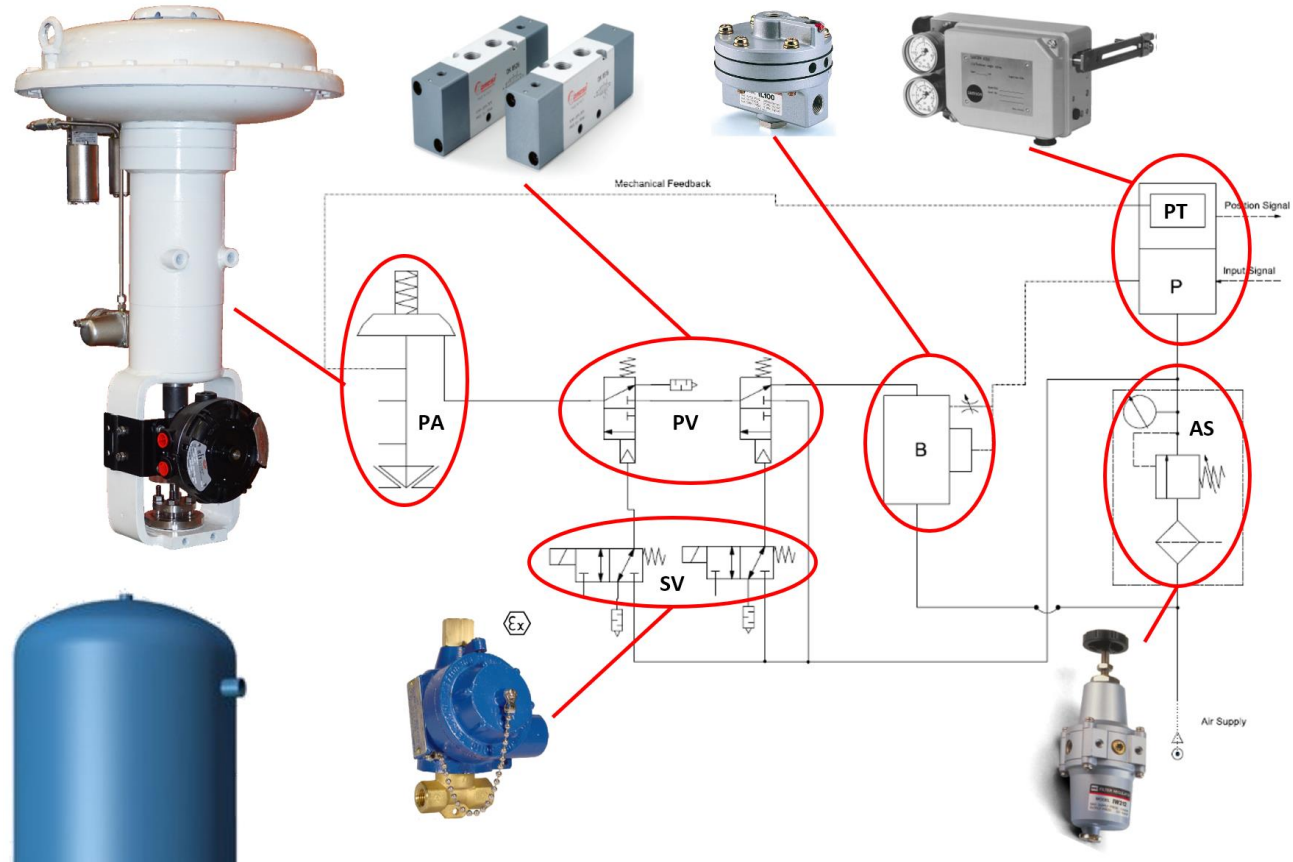


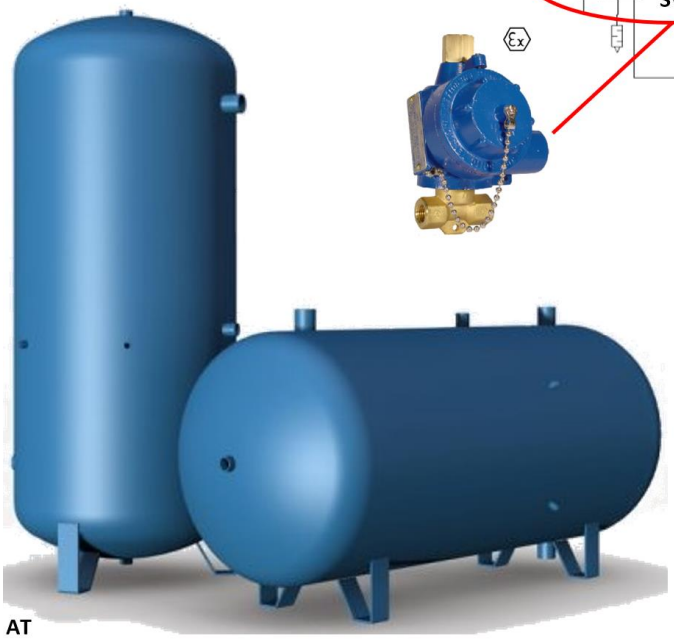
Line-mounted side
hand wheel – SD size 24L

SIZE	ACTION	ACTUATOR			SIDE HAND-WHEEL				TOP HAND-WHEEL			STROKE LIMITER [2]		
		ØA mm	B mm	Mass kg	DAM mm	DCM mm	ØDV mm	Mass kg	T mm	ØDT mm	Mass kg	SU mm	SD mm	Mass kg
SD09	DIRECT	280	410	18	158	287	250	11	230	280	8.5	245	178	7
	REVERSE		470	25	214				208			259		
SD11	DIRECT	330	420	20	180				230			245		
	REVERSE		495	28	234				208			259		
SD13	DIRECT	385	550	35	282	370	400	24	342	570	15.5	245		8
	REVERSE		655	45	362				287			259		
SD15	DIRECT	494	705	70	305	413	572	34	342			312		13
	REVERSE		805	80	430				287			367		
SD18	DIRECT	535	705	75	305				342			312		
	REVERSE		870	83	430				287			367		
SD18L	DIRECT		1 000	100	471	723	910	112	385	910	16	312		14
	REVERSE		1 165	110	660				515			367		
SD24	DIRECT	640	1 040	160	520				385		18	312		
	REVERSE		1 280	180	720				515			367		
SD24L	DIRECT		1 450 1 600[1]	240	536	370	572	60						
	REVERSE		1 580 1 820[1]	280										

[1] With in line-mounted side hand-wheel.

[2] SU - Uphill; SD - Downhill.





AT

AL - Air Lock valve
AS - Air Set filter
AT - Air Tank
B - Air flow Booster
P - Positioner
PA - Pneumatic Actuator
PT - Position Transmitter
PV - Pneumatic Valve
SV - Solenoid Valve



AL

7. CODING SYSTEM

7.1. VALVES

	Body Shape	Construction	Trim Type
CV-8	**X**	**Y**	**Z**

1	Single Cage
2	Double Cage
3	Triple Cage
4	Pilot Operated Plug
5	VeCo-LT
6	Vary-VeCo-LT
7	Contoured Plug
8	Contoured - Integral Stem
9	Double Plug
B	Contoured - Balanced
M	Multistage Cascade

0	Screwed Seat
5	Quick Change Trim

4	Globe Straightway Body
5	Offset Body
7	Angle Body



CV-8755 DN 4” Class 2500 RJ
Angle body control valve with VeCo-LT, anti-cavitation, multi-path, labyrinth trim for High pressure service on liquid ammonia.

8. PACKINGS

Complete range of PTFE or graphite-based packings are available to comply with all service conditions and customer requirements.
Certification for fugitive emissions ISO FE BH-CC1-SSA1-t400°C-CL1500-ISO 15848-1 is available for CV-8400 valves.
Bellows seal design is available, on request, for all valve configurations.
For further details about packings types and performances and for particular options (live loading, sand protection etc.) see specific AST Bulletin “Control Valve Packings”.

9. ACTUATORS

Pneumatic actuators are available as standard, **electric** or **electro hydraulic** actuators are available on request.
For further details about AST, spring return, pneumatic diaphragm actuators see specific AST Bulletin “Pneumatic Diaphragm Actuators”.

10. OPTIONS

Devices for valve installation and maintenance are available on request:

- ✓ Devices for lines blowing and washing with on-line installed valves.
- ✓ Devices for lines hydro-testing with on-line installed valves.
- ✓ Special tools for assembling/disassembling valves on field.
- ✓ Startup and commissioning spare parts sets.

11. SPECIAL EXECUTIONS

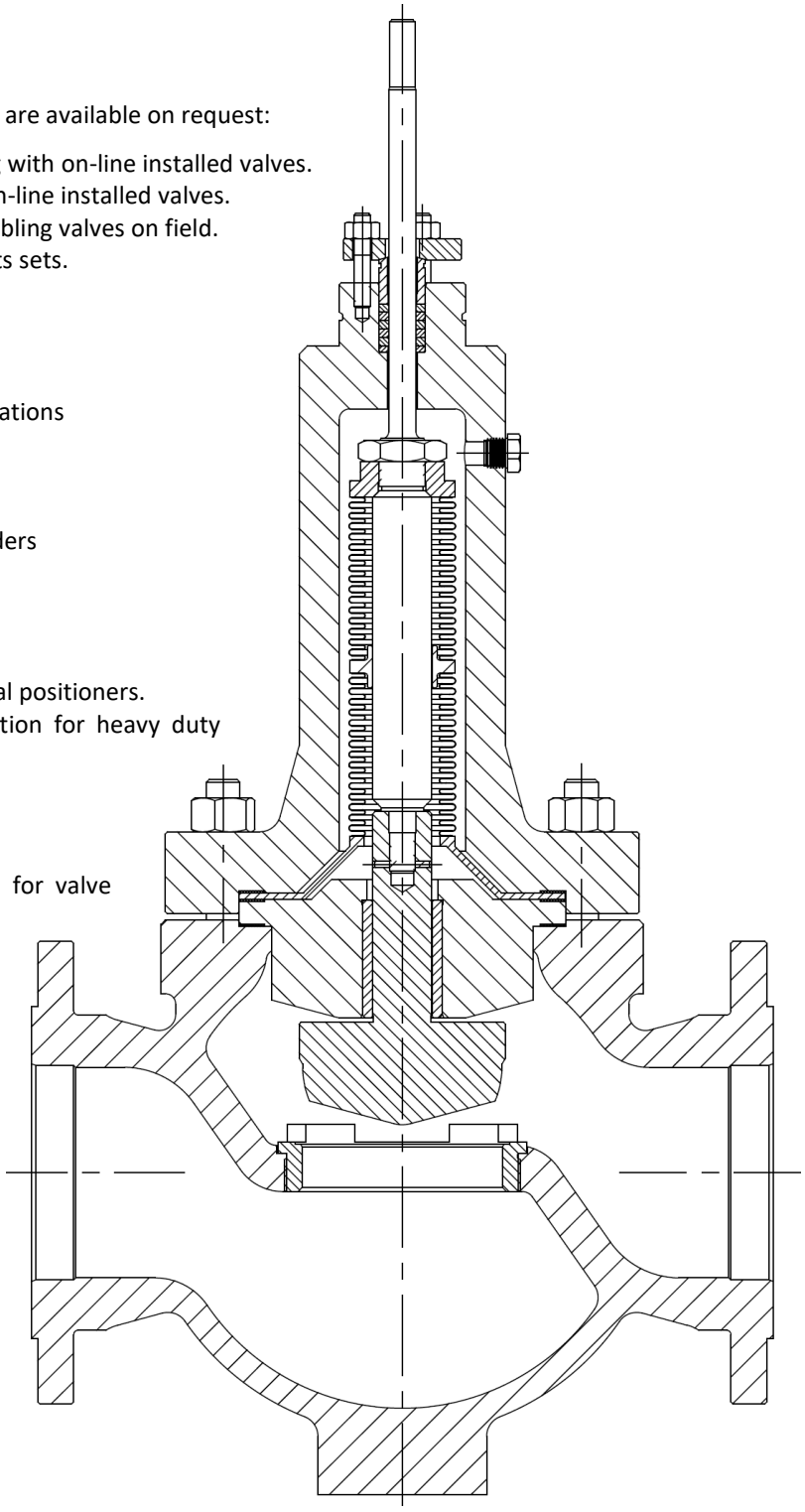
- ✓ Finned, partial extension bonnet
- ✓ Extension bonnet for cryogenic applications
- ✓ Bellows seal
- ✓ Cryogenic execution with cold box
- ✓ Steam jacketing
- ✓ Welded or Flanged Reducers / Expanders
- ✓ Low noise discs and silencers

12. ACCESSORIES

- ✓ Pneumatic, electropneumatic or digital positioners.
- ✓ Remote position feedback configuration for heavy duty services.
- ✓ Air set filters.
- ✓ Flow boosters.
- ✓ Lockup valves.
- ✓ Solenoid valves for fast strokes and for valve action to fail position.
- ✓ Limit switches.
- ✓ Mechanical stroke limiters.
- ✓ Hydraulic manual operator.

13. AVAILABLE CERTIFICATIONS

- ✓ ISO 15848
- ✓ ATEX
- ✓ PED
- ✓ SIL
- ✓ Particular Applications/Appraisals for local Regulations:
  - IBR (Indian Boiler Register)
  - CUTR
  - Other





AST S.p.A.
Via R. Merendi, 40
I-20007 Cornaredo MI
P +39 02 934848.1
F +39 02 9362248
W www.astspa.it

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