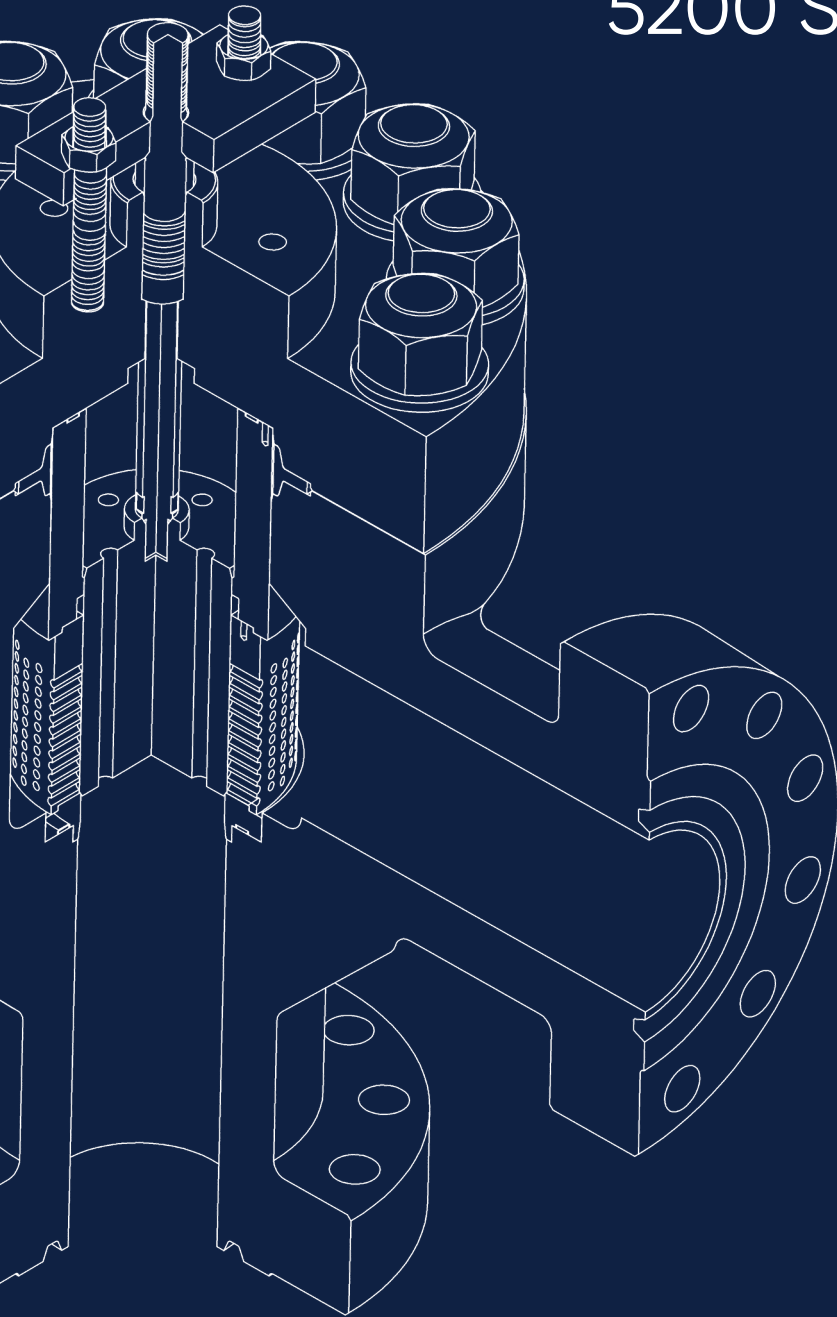


5200 Series Choke Valves

Pressure Class 5000 to 15000psi



It all flows from expertise.

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5200 Series

Severn Glocon is recognized by major oil and gas operators as a global specialist in the design, manufacture and supply of severe service control and choke valves. The Series 5200 Chokes has been designed to offer a robust and viable solution to customer's need. This series includes both API and ASME designs.

Salient features

- Rigid construction of body ensures structural integrity.
- Top opening design for easy trim removal / servicing.
- Design allows interchangeability of trim parts and trim upgrade.
- Large metal seal ring design allows safe and reliable disassembly/assembly of valve for maintenance.
- Balanced or unbalanced designs.
- Safety features like pressure relief mechanism & anti blow-out design.
- Customized yoke option allows reduced valve heights.
- High integrity low fugitive emission gland packing available.

Applications

5200 series chokes and Control valves has been supplied for various applications like

- Oil Production platforms
- Gas Production platforms
- Surface well heads
- Onshore oil wells

Engineering Data

Model: 5200 Series Choke Valves

Type: Adjustable Chokes

Sizes: Refer table 1 & 2.

Body Style: Angle (Standard) & Globe (Special)

Design Standard:

- API 6A
- ASME Sec VIII Div II 2004, API 6X

Face to Face: SG Standard / ASME B16.10

Pressure Class:

- 5000psi, 10000psi and 15000psi

End Connection

Standard – API designed Chokes

Forged body with API 6B/6BX studed end connections
Cast body with API 6B/6BX integral flange.

Optional

Forged Body with API 6B/6BX integral flange for API choke. Forged and Cast Body with API 16B/16BX hub end connections.

Special end connections are available on request.

Bonnet: Standard bolted bonnet

Sealing Arrangement

- T-seal
- Metal Seal
- Spiral wound gaskets with graphite filler

Gland Packing

- PTFE Chevrons
- Graphite
- Low Emission Packing

Balancing Options: Unbalanced & Balanced.

Balance seal options

Spring energized PTFE lip seal (-46°C to 200°C)

Shut Off Class

- ANSI-FCI 70.2 Class IV
- Optional Class V

Guiding: Cage / Top guided.

Trim Options

The trims are designed for easy assembly and maintenance. The Series offers the following trim styles,

- Concentric cages 1CC, 2CC, 3CC and 4CC
- CCD / Multi labyrinth disc (MLT) stack
- LRP trims
- DPMST / LMST / Microspline with SEPD

Flow Direction : Flow Over

As per API 6A section 14.15.2.6, "Chokes shall be designed to direct flow away from bonnet of adjustable chokes".

Inherent Trim Characteristics

- Linear
- Bi-linear
- Customized special

Materials: Refer Page 11

NACE MR0175 Compliance

The 5200 Series product design, characteristic and manufacturing process assures easy compliance of body, bonnet, trim and bolting material with the requirement of NACE MR0175 / ISO 15156.

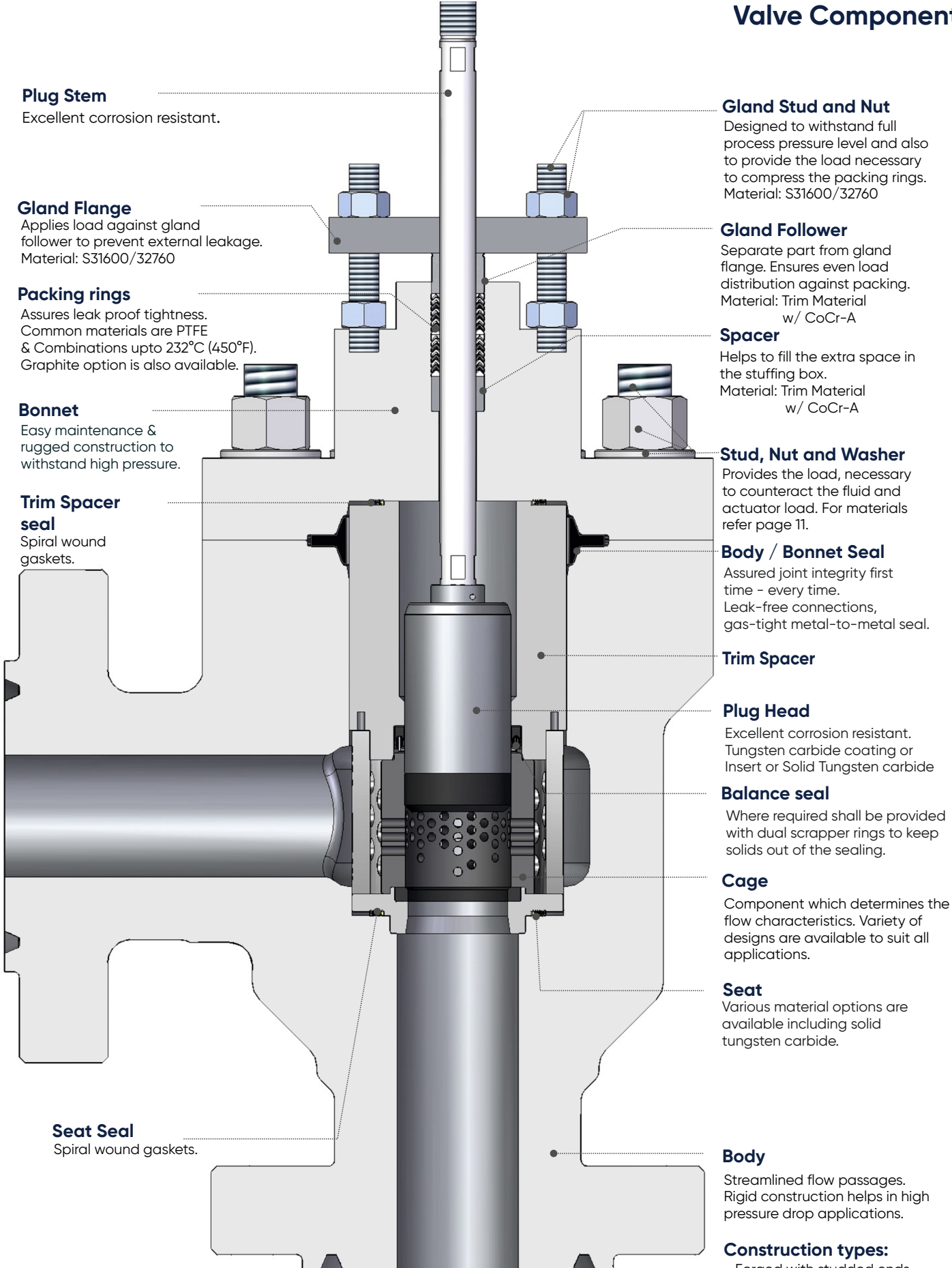
Actuation

- Pneumatic piston actuator
- Hydraulic / Electric actuators
- Geared manual hand wheel

Accessories

A wide range of control instruments are available, including: Positioner , Air-filter Regulator , Relief Valve Volume Booster, Solenoid Valve, Positioner Transmitter and Lock-up Valve.

Valve Components



Plug Stem
Excellent corrosion resistant.

Gland Flange
Applies load against gland follower to prevent external leakage.
Material: S31600/32760

Packing rings
Assures leak proof tightness.
Common materials are PTFE & Combinations upto 232°C (450°F).
Graphite option is also available.

Bonnet
Easy maintenance & rugged construction to withstand high pressure.

Trim Spacer seal
Spiral wound gaskets.

Seat Seal
Spiral wound gaskets.

Gland Stud and Nut
Designed to withstand full process pressure level and also to provide the load necessary to compress the packing rings.
Material: S31600/32760

Gland Follower
Separate part from gland flange. Ensures even load distribution against packing.
Material: Trim Material w/ CoCr-A

Spacer
Helps to fill the extra space in the stuffing box.
Material: Trim Material w/ CoCr-A

Stud, Nut and Washer
Provides the load, necessary to counteract the fluid and actuator load. For materials refer page 11.

Body / Bonnet Seal
Assured joint integrity first time - every time.
Leak-free connections, gas-tight metal-to-metal seal.

Trim Spacer

Plug Head
Excellent corrosion resistant.
Tungsten carbide coating or Insert or Solid Tungsten carbide

Balance seal
Where required shall be provided with dual scrapper rings to keep solids out of the sealing.

Cage
Component which determines the flow characteristics. Variety of designs are available to suit all applications.

Seat
Various material options are available including solid tungsten carbide.

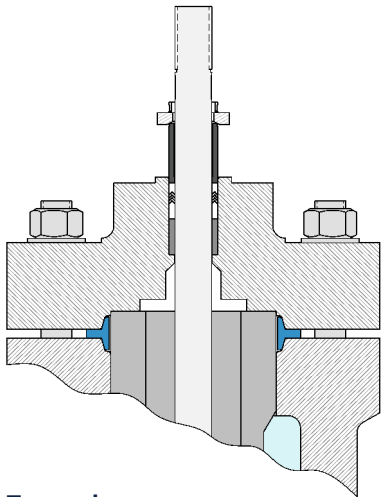
Body
Streamlined flow passages. Rigid construction helps in high pressure drop applications.

Construction types:

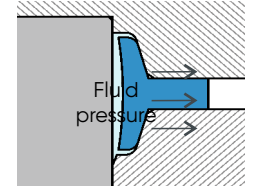
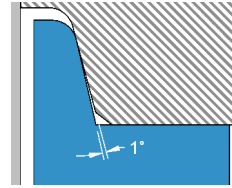
- Forged with studded ends
- Forged with Flange ends
- Forged with hub ends
- Cast with Flanged ends
- Cast with hub ends

Typical representation of 5200 choke

Body Bonnet Seal

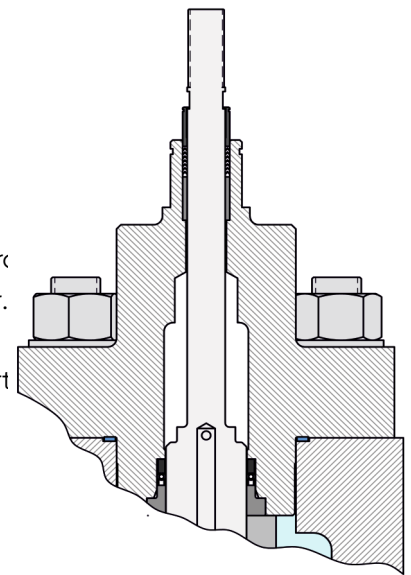


T - seal arrangement

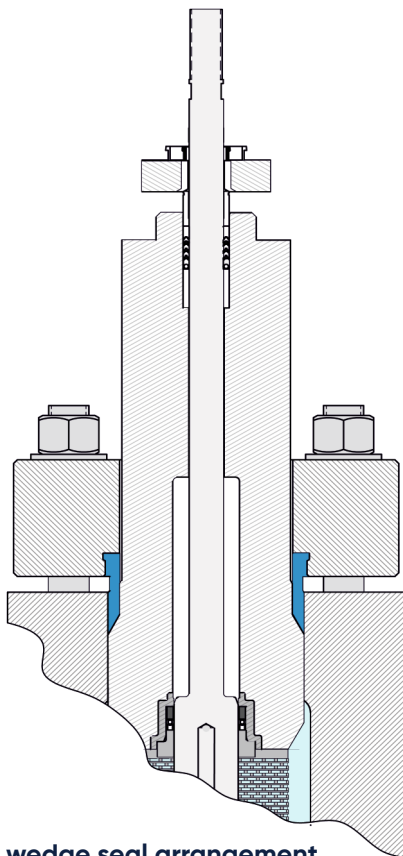


T - Seal: T - seal is a metal-to-metal seal. The flanges or lips of the "T" shaped seal ring are tapered and the angle of the taper differs slightly, approximately 1° from the corresponding taper or angle of the body in which the seal is used. Initial sealing is accomplished at the assembly stage by the bolting torque and while in service self-sealing effect resulting from fluid pressure improves sealing efficiency.

Spiral wound gasket: This gasket has a metal wound outwards in a circular spir with the filler material (generally a flexible graphite) wound in the same manner. This results in alternating layers of filler and metal. The filler material in these gaskets acts as the sealing element, with the metal providing structural support. These gasket have proven to be reliable in most applications, and allow lower clamping forces than solid gaskets.



Gasket arrangement



wedge seal arrangement

Wedge seal: The Wedge seal may be used for applications which requires MLT (Multi Labyrinth Trim). When the body bonnet bolting is fully torqued, there maybe a moderate compression of the MLT stack. The metal seal construction offers the requisite cushion for compression. In case of large size high pressure valves the compression load is excessive for the spiral wound gaskets withstand, where metal seal offer a suitable alternative.

Valve Size, Ratings, Trim sizes and End Connections

Table 1 : Chokes with API Sizes and End connection (API Monogrammed)

These valves are designed based on API 60K / 75K material

Pressure rating	API 5000	API 10000	API 15000	API 5000	API 10000	API 15000
End connection	Flanged end	Flanged end	Flanged end	Hub ends	Hub ends	Hub ends
Material designation	60K	60K	75K	60K	60K	75K
1 13/16	-	T1R, T1	T1R, T1	-	T1R, T1	T1R, T1
2 1/16	T1, T2	T1, T2	T1, T2	T1, T2	T1, T2	T1, T2
2 9/16	T2, T3	T2, T3	T2, T3	T2, T3	T2, T3	T2, T3
3 1/16	-	T3, T4	T3, T4	-	T3, T4	T3, T4
3 1/8	T3, T4	-	-	T3, T4	-	-
4 1/16	T4, T5	T4, T5	T4, T5	T4, T5	T4, T5	T4, T5
5 1/8	T5, T6	T5, T6		T5, T6	T5, T6	
7 1/16	T6, T7	T6, T7		T6, T7	T6, T7	
9	T7, T8	T7, T8		T7, T8	T7, T8	
11	T8, T9	T8, T9		T8, T9	T8, T9	
13 5/8	T9, T10	T9, T10		T9, T10	T9, T10	

Flanges (6B & 6BX) and Hub ends (16B & 16BX) as per API 6A.
 Clamps for the Hub ends shall be as per ASME Sec VIII Div 1 Appendix 24.
 Consult factory for other sizes, 36K/45K with Hub ends, un-equal inlet / outlet connections.
 Chokes with Pressure rating / End connection API-2000 and API-3000 is available on request.

CV Table & Trim Details

Table 2 : Trim size, Cv values, Travel and Seat diameter (for API 5000,10000 & 15000psi)

Standard Linear Characteristics

For Multi CC (2CC, 3CC & 4CC) with Bi-linear Characteristics, Consider 80% of rated CV.

Flow Direction :

Liquids - Flow Over

Gases - Flow Over is standard

- Flow Under may be offered based on mutual agreement with customer.

Center Module	Trim Size	Trim Data	Trim Type						
			1CC - Lin	1CC - Bi-	1CC - Lin	1CC - Bi-	2CC - Lin	3CC - Lin	4CC - Lin
CM 1-R	T1-R	Rated Cv	19.3	16.6	3.5	3.4			
		Travel	0.75	1.5	0.75	1.5			
		Seat Bore	1	1	0.5	0.5			
CM 1	T1	Rated Cv	31	38.7	11.5	15.8	7.6	3.7	0.8
		Travel	0.75	1.5	0.75	1.5	0.75	0.75	0.75
		Seat Bore	1.5	1.5	1	1	1	0.625	0.375
CM 2	T2	Rated Cv	65	57.2	29.4	25.4	17.7	14.1	3.5
		Travel	1.5	1.5	1.5	1.5	1.5	1.5	1.5
		Seat Bore	2	2	1.25	1.25	1.25	1.25	0.75
CM 3	T3	Rated Cv	98.6	87.8	48.5	42	29.3	19.6	5.4
		Travel	1.5	1.5	1.5	1.5	1.5	1.5	1.5
		Seat Bore	2.5	2.5	1.75	1.75	1.75	1.5	0.875
CM 4	T4	Rated Cv	146	149.7	80.7	81.9	68	34.7	10.5
		Travel	2.5	2.5	2.5	2.5	2.5	2.5	2.5
		Seat Bore	3	3	2.25	2.25	2.25	1.75	1
CM 5	T5	Rated Cv	262	220.5	147.1	116.5	106.2	81.5	48.7
		Travel	2.5	2.5	2.5	2.5	2.5	2.5	2.5
		Seat Bore	4	4	3	3	3	2.75	2.25
CM 6	T6	Rated Cv	400	404	244.4	237.5	200	109	95.2
		Travel	4	4	4	4	4	4	4
		Seat Bore	5	5	4	4	4	3.25	3.25
CM 7	T7	Rated Cv	744	653	570	430	352	257.7	191.1
		Travel	4	4	4	4	4	4	4
		Seat Bore	7	7	6	6	6	5.375	4.625
CM 8	T8	Rated Cv	1260	1213	1024	932	671	503	401.2
		Travel	6	6	6	6	6	6	6
		Seat Bore	9	9	8	8	8	7.25	6.75
CM 9	T9	Rated Cv	1862	1802	1507	1486	1025	853	646
		Travel	8	8	8	8	8	8	8
		Seat Bore	11	11	10	10	10	9.5	8.75
CM 10	T10	Rated Cv	2607	2613	2340	2121	1549	1126	914
		Travel	9	9	9	9	9	9	9
		Seat Bore	13.5	13.5	12.5	12.5	12.5	12	11.5

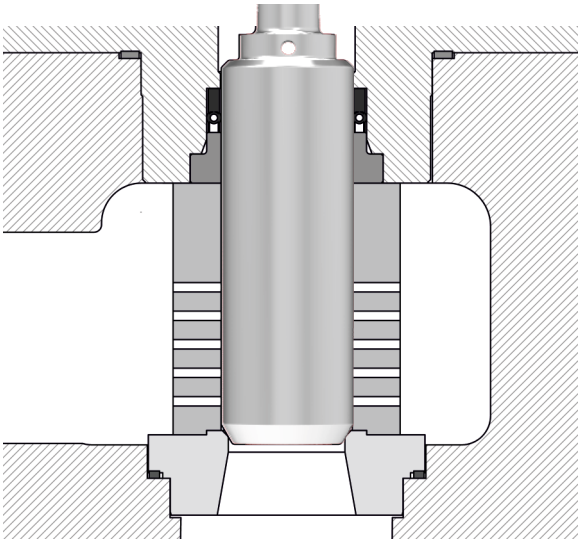
Note-1: Where WC cages are used trim guard shall be provided for process carry solid materials to withstand the impact load.

Note-2: Rated Cv specified in the above table for 2CC, 3CC, 4CC are based on Liquid service.

For Gas applications, consider 65% of provided Multi CC (2CC, 3CC & 4CC) Cv.

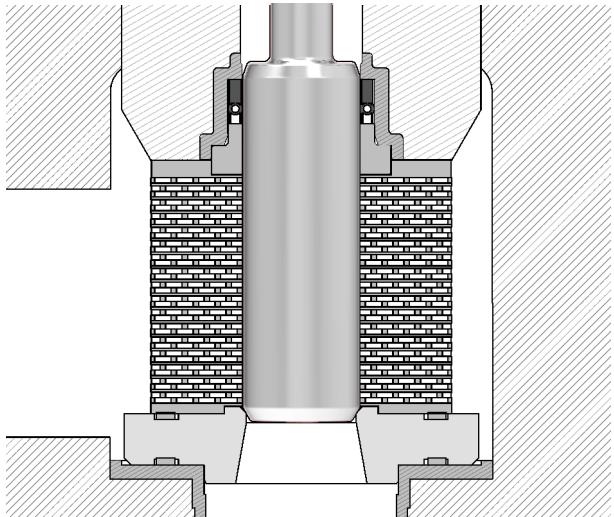
Table 3 : Trim size, CV values, Travel and Seat diameter for Microspline trim

Center Module	Trim Type	Travel	0.75							
		Seat Bore	0.381						0.625	
CM 1-R	Microspline	Rated Cv	0.01	0.05	0.1	0.15	0.25	0.5	0.95	1.45



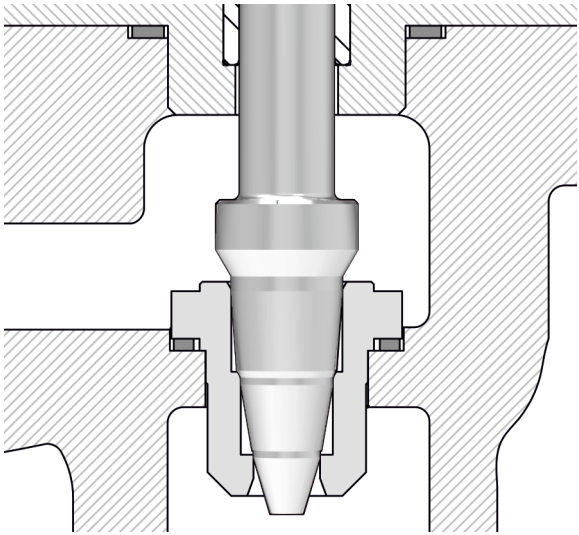
Concentric Cage (CC) Range

Single and multiple heavy section 'drilled hole' cage (1CC to 4CC) design options. Developed to provide 'low pressure recovery' within the flowing stream to reduce the potential for excessive erosion, cavitation, noise and vibration. The CC trim range has been designed to operate on all fluid combinations with clean service. The CC range of trims is normally the first choice for medium to relatively high pressure differential applications.



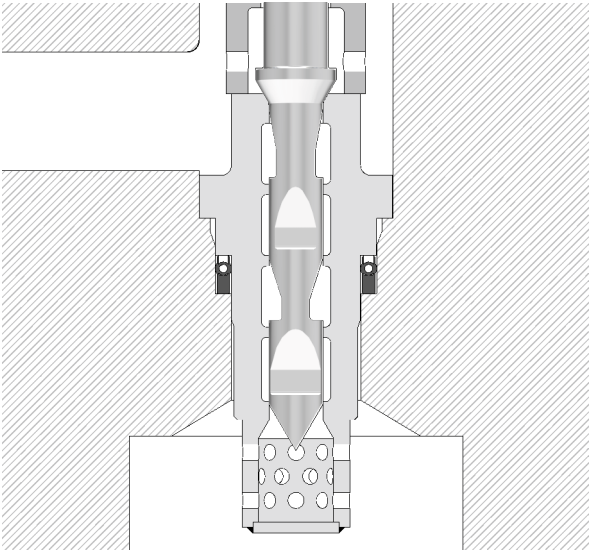
Concentric Carbide Discs (CCD) / MLT Range

Concentric Carbide disc design is developed to provide a high number of pressure letdown stages to maintain fluid velocities at a level needed to minimize and to provide 'ultra low pressure recovery' within the flowing stream to minimize erosion, cavitation, noise and vibration. The CCD trim range has been designed to operate as an alternative options for CC with higher number of cages. The CCD is normally the first choice for extremely high pressure differential and dirty flow applications.



Low Recovery Profile Trim (LRP Trim)

LRP Trim is manufactured from wide ranging material options, available in double and triple stage let down. The LRP trim provides constant ratio let down without direct impingement of the fluid onto seating faces or pressure envelope boundaries, thus erosion rate are controlled throughout the trim. The LRP trimset includes a protective shroud which separates the flow and the pressure boundary walls directly downstream of the trim.



Dense Phase Multi Spline Trim (DPMST)

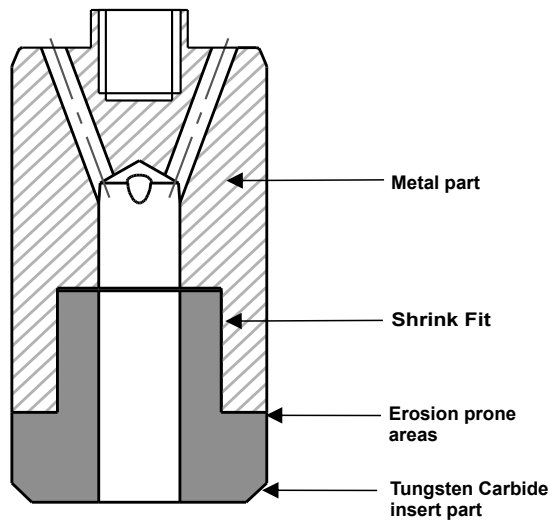
DPMST is required where there are high pressure drops on gas applications and with a low Cv requirement. In these cases if a step trim is used there is significant risk of chatter. The DPMST trim is a multiple (serial) microspline designed for flow over control and by spline design, the forces are balanced along the length of the plug rather than expanding at each step. The number of serial splines is dependant on the application conditions.

Trim Level Options

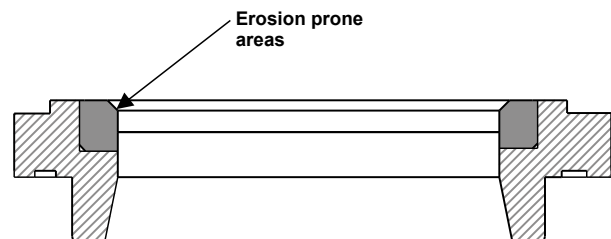
Table 4 : Trim Level options:

Trim Parts	Level 0	Level 1	Level 2	Level 3	Level 4
Plug	Metal	TC Insert	TC Insert	Full TC	Full TC
Seat	Metal	TC Insert	TC Insert	TC insert	TC Insert
Cage (Inner)	Metal	Full TC	Full TC	Full TC	Full TC
Cage (Intermediate,Outer)	Metal	Metal	Metal	Metal	Metal
Trim Guard	NA	NA	Metal	NA	Metal

Note 1: For selection of trim levels, consult factory as it is completely application based involving parameters like flow medium, solid particle load in process fluid & erosional velocity.



Plug with Tungsten carbide insert



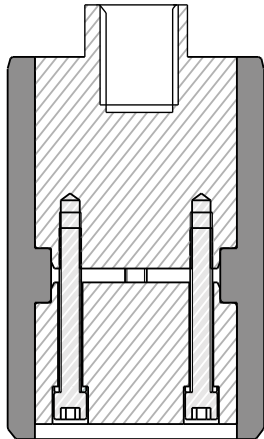
Seat with Tungsten carbide insert

Insert type:

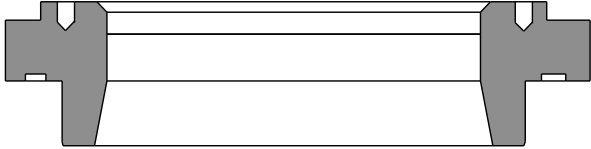
In Plug, seating face and controlling edge of the plug are provided with tungsten carbide, whereas they forms to be the high erosive zone.

Similarly in Seat, the seating face prone to erosion has been made of solid and robust tungsten carbide.

Trim Level Options



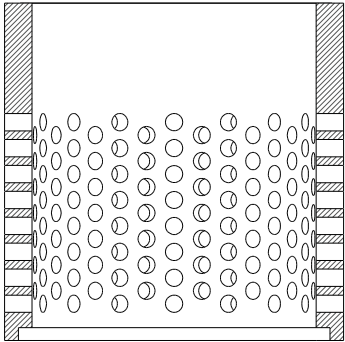
Tungsten carbide Plug



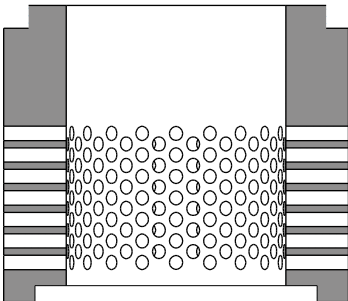
Tungsten carbide Seat

Full WC type:

In Plug, the entire outer surface is provided with tungsten carbide for applications with severe erosion. Entire seat and cage is made up of tungsten carbide.



Trim guard



Tungsten carbide cage

Trim Guard:

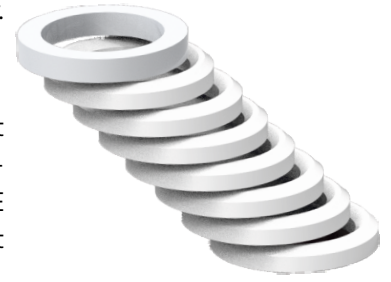
The Trim guard protects tungsten carbide cage from impact of solid particles present in high erosive applications. Material of construction is similar to that of trims (metal).

This design protects the tungsten carbide trims from catastrophic failure due to impact.

Packings & Seals

Variety of packings are available to suit wide ranging requirements of the industry. Most commonly offered packing types include

PTFE Chevrons: Usually offered as a set of PTFE V-rings, with anti extrusion rings at the ends. May be offered in two sets when used for vacuum service, with inverted V-ring on the top and upright V-ring at the bottom facing the process medium. PTFE Chevrons are preferred for their excellent sealing capability, low friction and cost effectiveness. The operating temperature ranges from -196°C to 232°C .



Graphite packing: These are self lubricating and does not require external lubrication. Relatively they offer higher friction and are suitable for a wide range of temperatures from -196°C to 450°C .

Suitable for fugitive emission class B as per ISO 15848.

High integrity packing: The packing set consist of two sets of sealing rings and adaptors in cup and cone configuration with varying densities (Carbon filled PTFE / High density PTFE). This arrangement allows selective component compression and radial flow resulting in effective sealing through out wide ranging temperatures and pressures. The packing is also equipped with a spring energized lip seal at the bottom facing the process medium and an anti extrusion ring on the top. It achieves fugitive emission class B as per ISO 15848.



Spiral Wound Gasket: Metal wound gaskets with graphite filler are designed to be the most reliable sealing element for use in difficult, critical and arduous duties. Gaskets without centre rings are used as seat and Trim spacer seal for sealing leak.

PTFE Lipseal: Effective sealing is achieved between trim parts used in balanced design using PTFE Lip seal.



Table 5 : Body-Bonnet materials

Material Class	Temperature Class	Material	Design Module	Material Form	Material Designation	Temperature (°C)	
						Min	Max
AA, BB, EE	L, N, P, S, T, U, V	A487 Gr. 4C	API 6A	Cast	60K	-46	482
		A694 Gr. F60	API 6A	Forged	60K	-46	343
		AISI 4130	API 6A	Forged	75K	-46	316
CC, FF	L, N, P, S, T, U, V	A995 Gr. 4A	API 6A	Cast	60K	-46	315
		A995 Gr. 6A	API 6A	Cast	60K	-46	316
		A182 Gr. F51	API 6A	Forged	60K	-46	316
		A182 Gr. F55	API 6A	Forged	75K	-46	316
HH	K, L, N, P, S, T, U, V	B564 UNS N06625	API 6A	Forged	60K	-60	538
	L, N, P, S, T, U, V	A487 Gr. 4C w/Inconel	API 6A	Cast	60K	-46	482
		AISI 4130 w/Inconel cladding	API 6A	Forged	75K	-46	316

For PSL 3 : Phosphorous / Sulphur concentration not to exceed 0.025% mass fraction, for carbon, low alloy, martensitic SS.

For PSL 4 : Phosphorous / Sulphur concentration not to exceed 0.015%/0.010% mass fraction, for carbon, low alloy, martensitic SS.

For PSL 4 only wrought products can be used / welding is not allowed, except weld overlay.

For forgings, required yield strength shall be tested in two directions (Longitudinal and transverse or tangential).

Materials other than stated above shall be provided on request (if conditions are applicable).

Trim materials

Plug head	Duplex / Inconel 625 Tungsten carbide coating, Tungsten carbide insert, Solid tungsten carbide
Cage / Seat	Duplex / Inconel 625 Tungsten carbide coating, Tungsten carbide insert, Solid Tungsten carbide
MLT / CCD Trim	316, Inconel 600, Solid Tungsten Carbide, Inconel 625
Stem material	Super Duplex / Inconel 718

Bolting Materials

A 320 Gr L7 studs and A194 Gr 7L nuts	Standard (for Carbon Steel and Low alloy Body)
A453 Gr 660D	Standard (for Stainless steel & Duplex Body)
A 320 Gr L7M studs and A194 Gr 7ML nuts	NACE Compliant (Weaker than standard material)

Caution Exercise caution for 316 annealed bolting which has low yield strength.

Sealing Materials

Body Bonnet Seals	
Spiral wound Gasket (API-2000/3000)	Inconel 625 w/Graphite filler or Duplex w/Graphite filler
T-seals (API-5000/10000/15000)	AISI 4130/4140, Inconel 625 or A182 Gr F55
Wedge Seals (for MLT trim)	AISI 4130/4140 or Inconel 625
Pressure balance Seals	PTFE LIP Seals
Body-to-seat and other static seals	
API-5000/10000	Spiral wound Gasket
API-15000	PTFE Lip Seals

PSL-Material Qualification Requirements

Table 6 : PSL Material qualification requirements (Product specification level)

Material Qualification requirements adopted at Severn Glocon for Body-Bonnets
 Severn Glocon standard product meets PSL 2 requirements as minimum

Parameter	PSL 2	PSL 3 / 4
Material type	Casting(CSL-3) / Forgings	PSL 3 : Castings(CSL-3) / Forgings PSL 4 :Forgings only
Qualified Test coupon (QTC)	Castings : Castings : As per API 6A (Thickness equal or greater than the dimensions of the qualified part) Forgings : As per API 6A (Not req. to exceed 63mm ER)	Castings : As per API 6A (Thickness equal or greater than the dimensions of the qualified part) Forgings : As per API 6A (Not req. to be > 125mm ER)
Tensile Testing	Test procedure : ASTM A370, Test twice, if the first fails	
Impact Testing	Test procedure : ISO148 / ASTM A370-Charpy V-notch Technique Set of 3 Specimens / Heat / Heat treatment batch Min average value > 20J, Each value > 2/3 Min average value, 2 specimens should exceed Min average value Repeat the test with another set of 3 specimens if the first fails in which case all 3 values to exceed Min average value Forgings : 20 J transverse / 27J Longitudinal	
Hardness Test	Test procedure : ASTM E10 (Brinell - Bench type) Test procedure : ASTM E18 (Rockwell - Bench type) Test procedure : ASTM E110 (Brinell/Rockwell - Portable) All Body - Bonnets shall be hardness tested Min of one test on each part, plus additional test on end connection face (at locations other than sealing area)	
Dimension Inspection	Critical dimensions verified for all items.	
Traceability	Parts shall be traceable to a specific heat and heat-treat lot.	
Chemical analysis	Spectro analysis as per ASTM A 751, E76, E354, E350, E1473 based on material alloy group	
Surface NDE (After machining)	Test procedure : ASTM E709 for MT and ASTM E165 for PT. Acceptance criteria as per API 6A. MT / PT performed for all accessible surfaces including wetted surfaces and sealing surfaces of each finished parts after final heat treatment. MT or PT shall be performed on all surfaces prepared for "weld metal overlay" Employ wet fluorescent method for MT (Prods not permitted)	
Volumetric NDE	Test procedure : ASME BPVC Sec. V Art. 2 for RT and ASTM A388/388M and ASTM E428 for UT. Acceptance criteria for RT and UT as per API 6A. NDE shall be performed after heat treatment operations.	
	Castings: As far as practical, the entire volume of one casting from each heat lot shall be examined. If sample casting fails to meet acceptance criteria (API 6A), RT/UT shall be performed on all the casting from that heat lot. Forgings: As far as practical, the entire volume of each part shall be examined.	Castings/Forgings: As far as practical, the entire volume of each part shall be examined.

PSL- Welding & Testing requirements

Table 7 : PSL requirements for welding

Severn Glocon standard product meets PSL 2 requirements as minimum

Note 1 : For PSL4 only overlay welding is permitted. Fabrication weld or repair welding not allowed.

Parameter	For all Product Specification Levels ^(Note 1)
Welding General requirements	<p>Fabrication : Visual, MT/PT, Hardness test and RT/UT</p> <p>Repair : Visual, MT/PT, Hardness test RT/UT if weld thickness > 1inch or >25% of wall thickness, whichever is lesser or cavity exceeds 65 cm²</p> <p>Overlay : Visual, MT/PT, Hardness test, overlay thickness, bond integrity and volumetric examination (UT)</p> <p>Notes :-</p> <ol style="list-style-type: none"> 1. MT/PT shall be performed both before and after welding 2. Where PWHT is applicable all weld NDEs (Visual, MT/PT, RT/UT) shall be performed after PWHT 3. The essential welding variables and equipment shall be monitored; welding activities shall be audited 4. Hardness test shall be conducted in both the weld and adjacent un-affected base metal after all heat treatment and machining. Hardness recorded in the PQR shall be the basis for acceptance if the weld is not assesible
Repair Weld NDE (surface)	Follow same methods and acceptance criteria as used for base metal with additional requirements specified in API-6A (weld NDE)
Weld NDE (volumetric)	<p>Test Procedure as per ASTM E94 for RT or ASTM A388 for UT (repair and overlay welding)</p> <p>ASME Section V Article 4 for UT/ Article 2 for RT for Fabrication welding</p> <p>Acceptance criteria : API-6A (weld NDE)</p>
Serialization	Each individual part and/or piece of equipment shall be assigned and marked with a unique code to maintain traceability

Table 8 : PSL testing requirements for chokes and control valves

Severn Glocon standard product meets PSL 2 requirements as minimum

Parameter	For all Product Specification Levels
Serialization & Traceability	<p>Every Choke shall be assigned and marked with a unique code to maintain traceability.</p> <p>Body, Bonnet, Plug, Seat, Cage shall be traceble to the assembly.</p>
Hydrostatic body test	<p>For PSL 2:</p> <p>Hydrostatic test Pressure as per API-6A Table 33.</p> <p>Primary pressure holding (3 mins) - reduction to Zero</p> <p>Secondary pressure holding (3 mins)</p>
Hydrostatic test (extended)	<p>For PSL 3 / 4:</p> <p>Primary pressure holding (3 mins) - reduction to Zero</p> <p>"Secondary pressure holding period : 15 mins" is additional with PSL 2 requirements</p> <p>Chart recorder shall be used for extended hydro static tests.</p>
Gas body test	<p>For PSL 3 / 4:</p> <p>Test medium - Nitrogen</p> <p>Equipment fully submerged in a water bath</p> <p>Single pressure holding period of 15 mins</p> <p>Test pressure = Rated working pressure</p> <p>Pressure drop of 300 psi is acceptable</p>
Seat Leak Test	<p>Optional</p> <p>Class IV / Class V as per ANSI / FCI 70-2</p>

Performance Requirements Tests

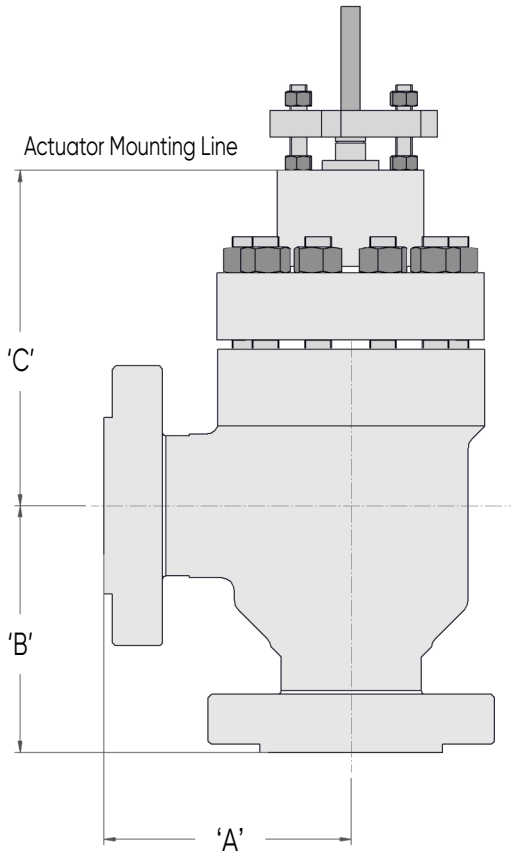
Table 9 : Performance requirement tests PR1 & PR2

Performance requirement	Operating cycles	Seat-to-body sealing
PR1	3 cycles	1 cycle
PR2	200 cycles	3 cycles

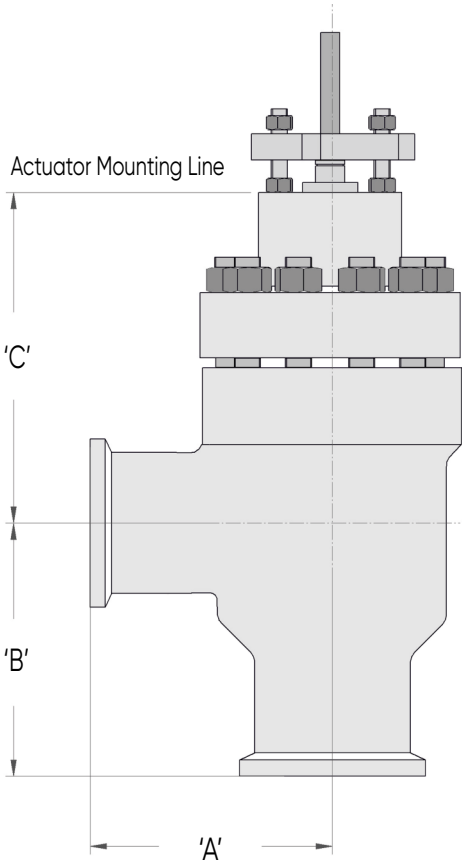
Note 1: PR1 is performed for one Choke / Valve per design as SGI standard.

Table 10 : Design validation - PR2 (PR2F level) (Applied when specified by customer)

Performance requirement	PR2 (PR2F LEVEL)
Operating force measurement	Pressure unbalance force by calculation Seat load : Empirical data Packing / Bal seal Friction by open /close tests
Body static pressure test	Not applicable
Seat to body-seal test at room temperature	Hydro test to ensure integrity of seal (Seat to Body-seal) Hydro - PSL 2 & PSL 3 [water at rated pr. and room temp] Gas test - PSL 3 & PSL 4 [N ₂ at rated pr. and room temp] Pressure holding period : 1 Hour
Dynamic open/close cycling pressure test at room temp	160 cycles (Open-Close-Open) [Water / N ₂ at rated pressure and room temp] Adjustment the internal pressure to compensate for the expansion and contraction of the fluid chamber.
Dynamic open/close cycling pressure test at max rated temp	20 cycles (Open-Close-Open) [N ₂ at rated pressure and maximum rated temp]
Gas body test at max rated temperature	Holding time =1hr (Partially open) [N ₂ at rated pressure and maximum rated temp]
Dynamic open/close cycling pressure test at min rated temp	20 cycles (Open-Close-Open) [N ₂ at rated pressure and minimum rated temp]
Gas body test at min rated temperature	Holding time =1hr (Partially open) [N ₂ at rated pressure and minimum rated temp]
Body Pressure/Temperature Cycling	e) Raise the temperature to room temperature f) Apply test pressure and raise the temp to maximum g) 1 hr holding period h) Reduce the temperature to minimum i) 1 hr holding period j) Raise the temperature to room temperature k) Release the pressure and raise the temperature to Max l) Apply test pr.(Max Temp), hold for 1 hr, release the pressure. m) Reduce the temperature to minimum n) Apply test pressure (Min Temp), hold for 1 hr, release the pressure. o) Raise the temperature to room temperature
Body pressure holding test at room temperature	(p) Apply test pressure (Room Temp) with seat open , but do not release the pressure , hold for 1 hour, release the pressure
Body low-pressure holding test	q) Apply 5% to 10% test pr. (Room Temp) with seat open, hold for 1 hour, Release the pressure.
Second seat to body test at room temperature (may be omitted for adjustable chokes)	Hydro test to ensure integrity of seal (Seat-to-Body seal) Hydro test - PSL 2 & PSL 3 [water at rated pr. and room temp] Gas test - PSL 3 & PSL 4 [N ₂ at rated pr. and room temp] Pressure holding period : 1 Hour
Testing of Non-metallic seals	As specified in F.1.13



Typical representation of choke
Cast Body with Flanged end connections



Typical representation of choke
Cast Body with Hub end connections

End to End Dimensions

Table 11 : Flanged & Hub end connection for API 5000 - Cast Body

End Connections	Standard Centre Module	Reduced Centre Modules	CL to Inlet (A)	CL to Outlet (B)	Height (C)
2 1/16	CM2	CM1, CM1-R	237	237	264
2 9/16	CM3	CM2, CM1	275	275	284
3 1/8	CM4	CM3, CM2	313	313	264
4 1/16	CM5	CM4, CM3	356	356	299
5 1/8	CM6	CM5, CM4	421	421	327
7 1/16	CM7	CM6, CM5	500	500	317
9	CM8	CM7, CM6	639	639	377
11	CM9	CM8, CM7	540	540	482
13 5/8	CM10	CM9, CM8	594	594	508

Table 12 : Flanged & Hub end connection for API 10000 - Cast Body

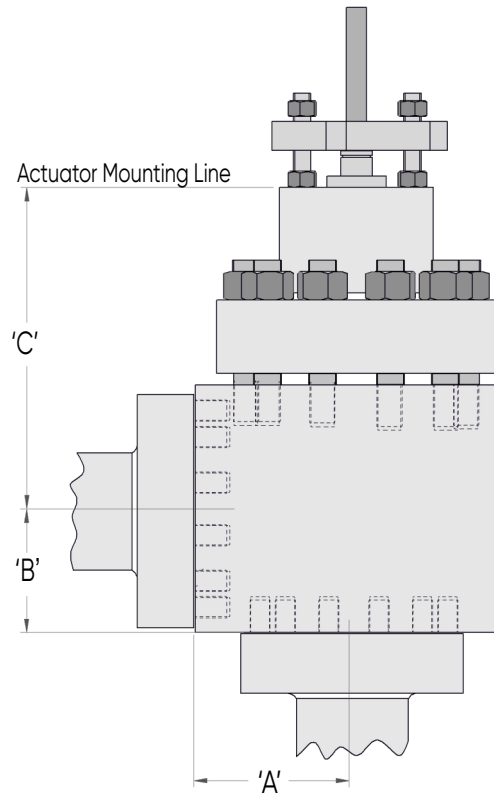
End Connections	Standard Centre Module	Reduced Centre Modules	CL to Inlet (A)	CL to Outlet (B)	Height (C)
1 13/16	CM1	CM1-R	228	228	249
2 1/16	CM2	CM1,CM1-R	291	291	272
2 9/16	CM3	CM2,CM1	339	339	259
3 1/16	CM4	CM3,CM2	397	397	287
4 1/16	CM5	CM4,CM3	460	460	295
5 1/8	CM6	CM5,CM4	516	516	321
7 1/16	CM7	CM6,CM5	640	640	388
9	CM8	CM7,CM6	591	591	454
11	CM9	CM8,CM7	699	699	543
13 5/8	CM10	CM9,CM8	876	876	651

The Centre to face dimensions(Dim A & B) provided for cast body are as per ASME B16.10.

Consider the unit as "mm" when the same is not indicated.

The dimensions provided here are indicative. Exact dimensions are available through submitted GA drawings against the order.

End to End Dimensions



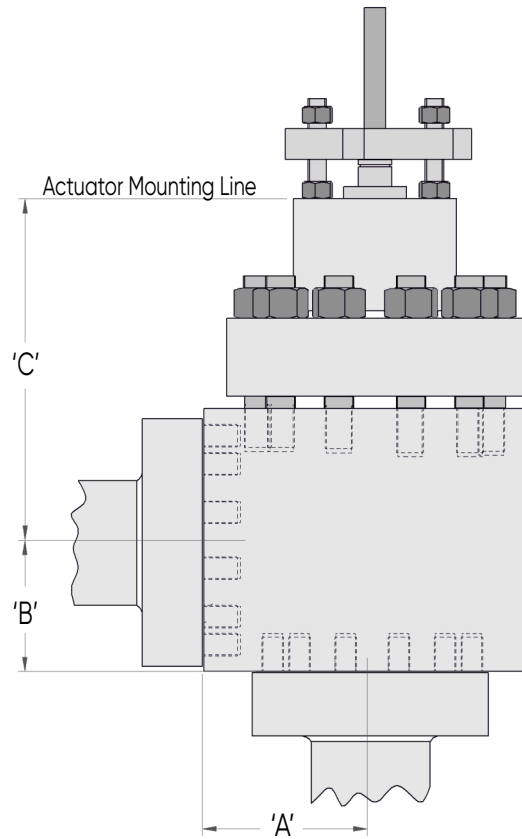
Typical representation of choke
Forged Body with Studded end connections

Table 13 : Studded end connection for API - Forged Body(As per API 6A)

End Connections	Centre Module	API 5000			API 10000			API 15000		
		CL to Inlet (A)	CL to Outlet (B)	Height (C)	CL to Inlet (A)	CL to Outlet (B)	Height (C)	CL to Inlet (A)	CL to Outlet (B)	Height (C)
1 13/16	CM1	-	-	-	127	100	249	148	110	263
	CM1-R	-	-	-	119	100	240	132	110	257
2 1/16	CM2	145	114	264	148	106	272	174	117	257
	CM1	132	114	251	127	106	256	148	117	270
	CM1-R									
2 9/16	CM3	162	129	284	171	122	259	202	133	289
	CM2	152	129	278	152	122	287	178	133	273
	CM1									
3 1/8	CM4	171	140	264	-	-	-	-	-	-
	CM3	164	140	295	-	-	-	-	-	-
	CM2				-	-	-	-	-	-
3 1/16	CM4	-	-	-	178	141	287	212	150	312
	CM3	-	-	-	175	141	278	206	150	306
	CM2	-	-	-						
4 1/16	CM5	200	162	299	226	164	295	275	187	331
	CM4	189	162	286	192	164	310	220	187	349
	CM3									

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End to End Dimensions



Typical representation of choke
Forged Body with Drill tapped end connections

Table 14 : Studded end connection for API - Forged Body(As per API 6A)

End Connections	Centre Module	API 5000			API 10000			API 15000		
		CL to Inlet (A)	CL to Outlet (B)	Height (C)	CL to Inlet (A)	CL to Outlet (B)	Height (C)	CL to Inlet (A)	CL to Outlet (B)	Height (C)
5 1/8	CM6	232	194	327	253	164	321	-	-	-
	CM5	222	194	330	226	185	315	-	-	-
	CM4							-	-	-
7 1/16	CM7	261	203	317	321	246	388	-	-	-
	CM6	233	203	377	281	246	383	-	-	-
	CM5							-	-	-
9	CM8	312	248	377	375	283	454	-	-	-
	CM7	282	248	361	321	283	425	-	-	-
	CM6							-	-	-
11	CM9	374	298	482	476	333	543	-	-	-
	CM8	337	298	428	383	333	504	-	-	-
	CM7							-	-	-
13 5/8	CM10	436	343	508	617	391	651	-	-	-
	CM9	380	343	527	480	391	600	-	-	-
	CM8							-	-	-

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Typical input data / ordering information for Chokes and Valves

Customer					_____
SGI Quote Ref.					_____
Project					_____
Application		Production Choke			_____
Fluid		Hydrocarbon Liquid			_____
Qty		1			_____
Adjustable or positive		Adjustable			_____
Inlet size / Rating		2 9/16, API-15000		Refer Clause 4.3.1.1 in API 6A	
Outlet size / Rating		2 9/16, API-15000			
Body Material class / Grade		75K / AISI 4130 (EE)		Refer Table 3 in API 6A	
Trim Material class		316L SS (EE)		Refer Table 3 in API 6A	
Temperature rating		U (-18 to 121°C)		Refer Table 2 in API 6A	
Product Specification Level (PSL)		2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	None <input type="checkbox"/>
Performance Requirement Levels (PR)		1 <input type="checkbox"/>	2 <input type="checkbox"/>	None <input type="checkbox"/>	
Retained fluid corrosivity		CO ₂ <input type="checkbox"/>	H ₂ S <input type="checkbox"/>	Chlorides <input type="checkbox"/>	Others <input type="checkbox"/>
Fugitive emission requirement		Yes <input type="checkbox"/>		No <input type="checkbox"/>	
Will scale, paraffin, corrosion, or other types of inhibitors be used?		Yes <input type="checkbox"/>		No <input type="checkbox"/>	
If yes, Inhibitor type: _____		Inhibitor carrier: _____		Batch or continuous inhibition: _____	
Will Erosion be a concern?		Yes <input type="checkbox"/>		No <input type="checkbox"/>	
If yes, cause? _____					
Sleeve or Coating protection		Yes <input type="checkbox"/>		No <input type="checkbox"/>	
Delivery requirement					
Special Shipping, packing and storage instruction: _____					

Service conditions at		Units	Max. Flow	Nor. Flow	Min. Flow
Pressure	Inlet	Kg/cm ² .g			
	Outlet	Kg/cm ² .g			
	ΔP	Kg/cm ² .g			
Temperature at inlet		Deg. C			
Oil	Flow rate	Kg/hr			
	S.G	-			
Gas	Flow rate	Kg/hr			
	S.G	-			
Liquid	Flow rate	Kg/hr			
	S.G	-			

Manual / Actuated			
Actuator Type		Hydraulic <input type="checkbox"/> Electric <input type="checkbox"/> Pneumatic <input type="checkbox"/> Gear operated <input type="checkbox"/>	
Actuator make / Model		Severn Glocon / P1CN	
Power source		Pneumatic / Hydraulic / Electric	
Supply medium		Air <input type="checkbox"/> Gas <input type="checkbox"/> Hydraulic <input type="checkbox"/> None <input type="checkbox"/>	
Supply pressure			
Manual override		None	
Position Indication - Local		None	Remote/Posn. Trmtr. 4-20 mA analog output
Positioner		4-20 mA Hart Positioner	
Max. Orifice diameter		0.625	
Type of Flow bean		Cage type	
ISO 15156/MR0175		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Comments:-			



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