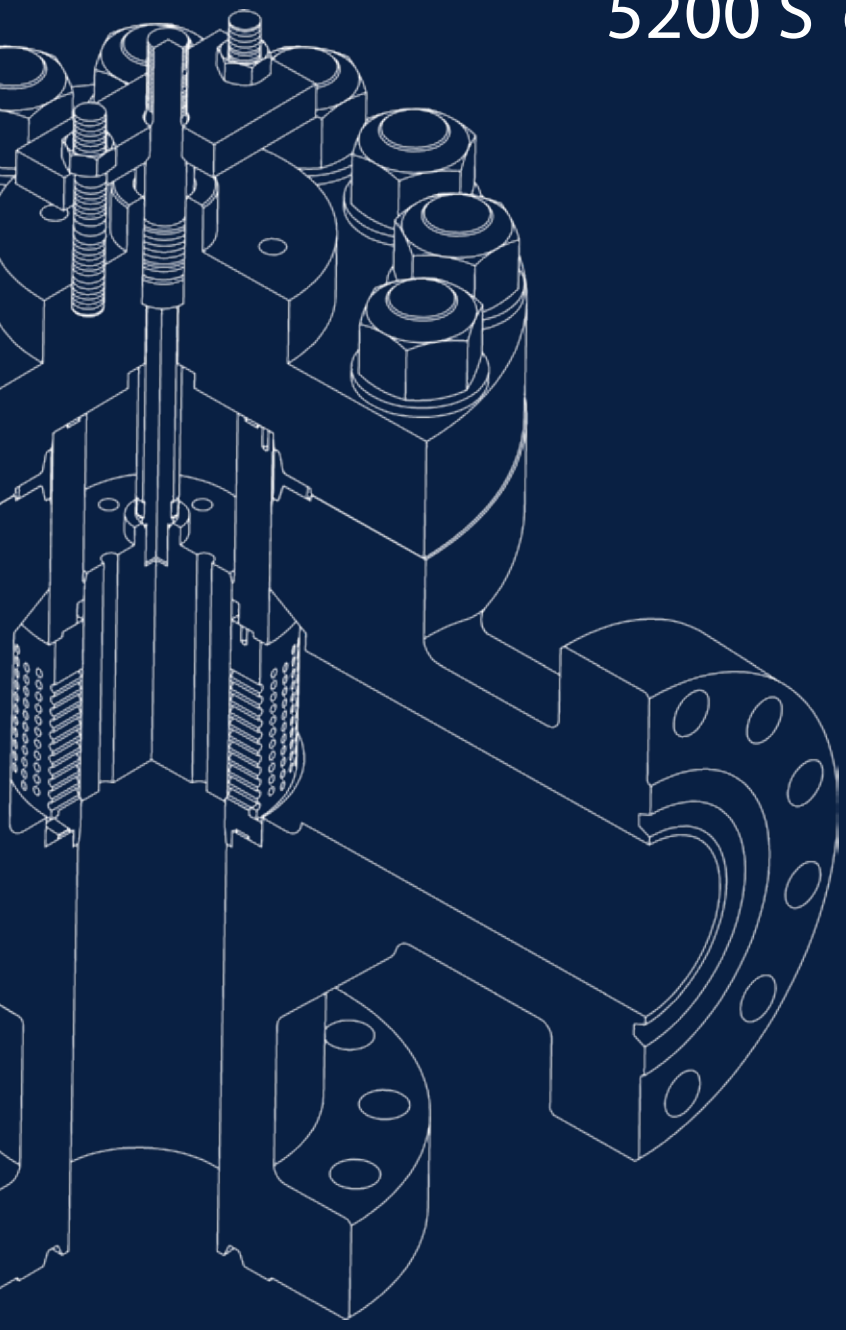
SEVERN
Superior Valve Engineering

5200 Series Choke Valves

Pressure Class 5000 to 15000psi



It all flows from expertise.

60 YEARS
Engineering Excellence

Contents

5200 Series: Introduction 1

Engineering Data 2

Valve Components 3

Body Bonnet Seal 4

Valve sizes, Rating, Trim sizes and End connection 5

CV Table & Trim Details 6

Trim Types 7

Trim Level options 8

Packings & Seals 10

Materials of Construction 11

PSL Requirements 12

Performance Requirement Tests 14

End to End Dimensions 15

Ordering Information 19

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

Engine ering Dat a

Model : 5200 Series Chok e Valv es

Type : Adjustable Chok es

Sizes : Refer table 1& 2.

Body Style : Angle (Standar d) & Globe (Special)

Design Standar d :
- API 6A
- ASME Sec VIII Div II 2004, API 6X

Fac e to Fac e : SG Standar d / ASME B16.10

Pressure Clas s :
- 5000p si, 10000p si and 15000p si

End C onnect ion

Standar d - API de signed Chok es

Forged body with API 6B/6B X studded end connections
C as t body with API 6B/6B X integr al flange .

Op tional
Forged Body with API 6B/6B X integr al flange for API chok e. Forged and C as t Body with API 16B/16BX hub end c onnections .
Special end connections ar e av ailable on reque st.

Bonne t : Standar d bolt ed bonne t

Sealing Arrangement
- T-s eal
- Metal Seal
- Spiral wound gas kets with graphit e filler

Gland Packing
- PTFE Che vrons
- Gr aphit e
- Low Emission Packing

Balancing Op tions : Unbalanced & Balanced.

Balanc e seal options
Spring ener gized PTFE lip seal (-4 6°C to 200° C)

Shut Off Clas s
- ANSI-FCI 70.2 Clas s IV
- Op tional Clas s V

Guiding : C age / Top guided.

Trim Op tions
The trims ar e de signed f or eas y as sembly and maint enance . The S erie s offers the f ollowing trim s tyles,

- C onc entric cage s 1CC , 2CC , 3CC and 4CC
- CCD / Multi lab yrinth dis c (MLT) s tack
- LRP trims
- DPMST / LM ST / Micr ospline with S EPD

Flow Dir ect ion : Flow Ov er
As per API 6A s ection 14.15.2.6, “Chok es s hall be de signed t o dir ect flo w aw ay fr om bonne t of ad justable chok es”.

Inher ent T rim Char act eris tics
- Linear
- Bi-linear
- Cus tomized special

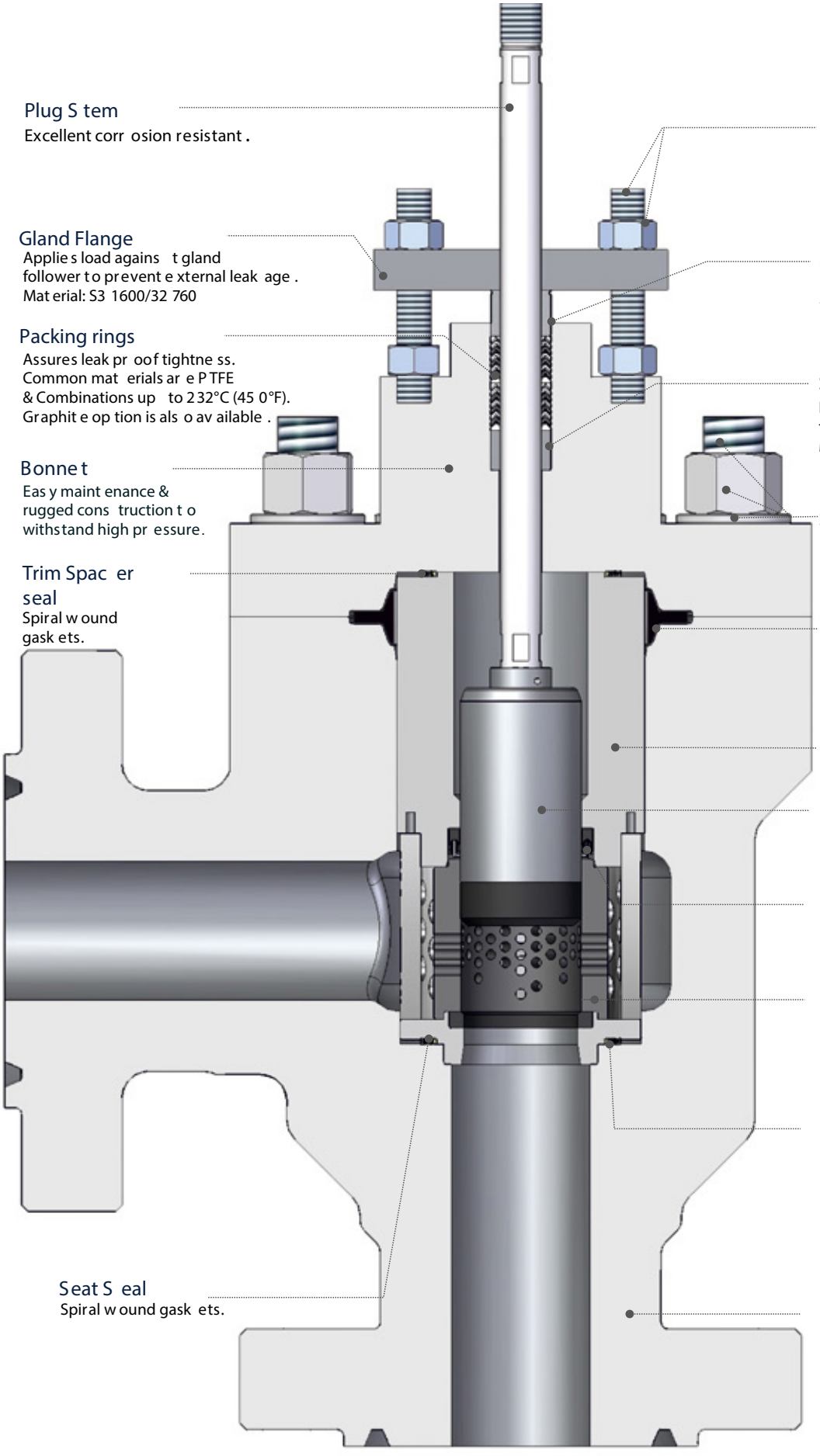
Mat erials : Refer Page 11

NAC E MR0175 C omplianc e
The 5 200 S erie s pr oduct de sign, char act eristic and manuf acturing pr oce ss as sures eas y compliance of body , bonne t, trim and bolting mat erial with the r equirement o f NAC E MR017 5 / I SO 15156.

Actuat ion
- Pneumatic piston actuat or
- Hydraulic / Electric actuat ors
- Gear ed manual hand wheel

Accessorie s
A wide r ange o f contr ol instrument s ar e av ailable , including: P ositioner , Air -filt er R egulat or , R elief Valv e Volume Boo ster, S olenoid V alv e, P ositioner T ransmit ter and L ock-up V alv e.

Valve Components



Plug Stem
Excellent corrosion resistant.

Gland Flange
Applies load against gland follower to prevent external leakage.
Material: S3 1600/32 760

Packing rings
Assures leak proof tightness.
Common materials are PTFE & Combinations up to 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: S3 1600/32 760

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.

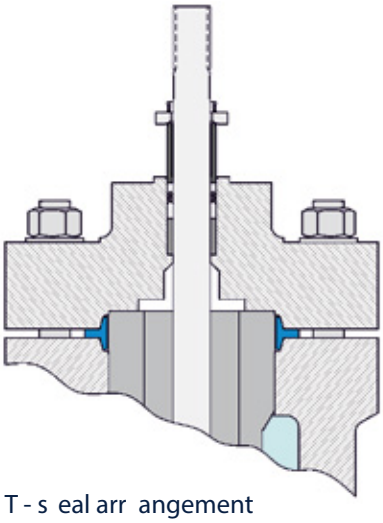
Seat
Various material options are available including solid tungsten carbide.

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

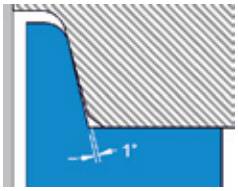
Construction types:
- Forged with studded ends
- Forged with Flange ends
- Forged with hub ends
- Cast with Flanged ends
- Cast with hub ends

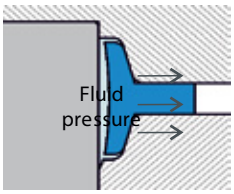
Typical representation of 5200 choke

Body Bonnet Seal



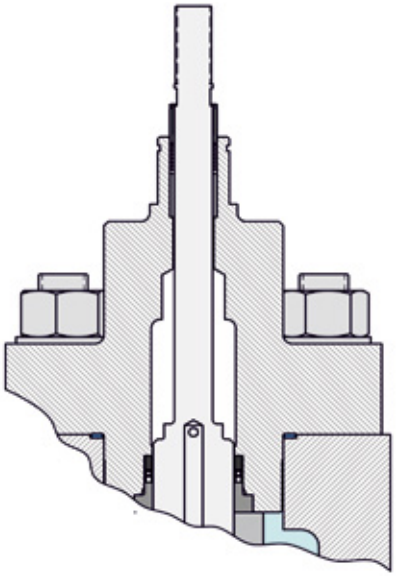
T-S eal arr angement



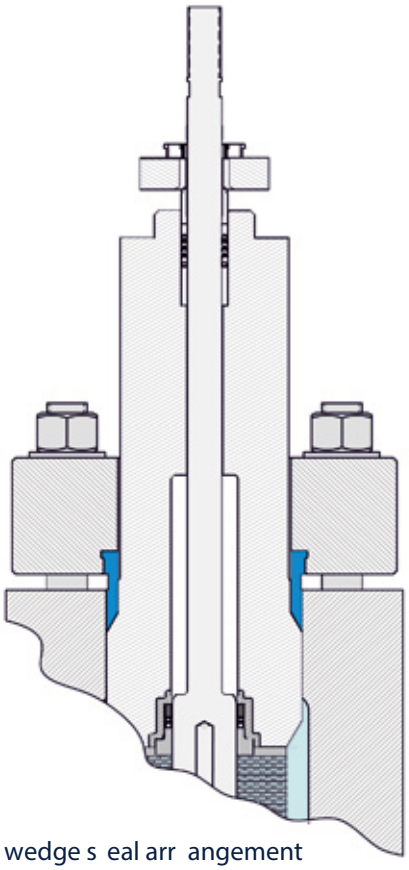


T-S eal : T-s eal is a me tal- to-me tal s eal. The flange s or lip s of the "T" s haped seal ring ar e t aper ed and the angle o f the t aper dif fers s lightly, appr oximat ely 1° from the corr esponding t aper or angle o f the body in which the s eal is us ed. Initial sealing is accomplis hed at the as sembly s tage b y the bolting t orque and while in s ervic e s elf-s ealing e ffect r esulting fr om fluid pr essure impr oves s ealing efficiency .

Spir al w ound gas ket: This gas ket has a me tal w ound outw ar ds in a cir cular spir a with the filler mat erial (gener ally a fle xible gr aphit e) w ound in the s ame manner. This results in alt ernating lay ers of filler and me tal. The filler mat erial in the se gas kets act s as the s ealing element, with the me tal pr oviding s tructur al s uppor t These gas ket hav e pr oven t o be r eliable in mo st applications , and allo w lower clamping f orc es than s olid gas kets.



Gas ket arr angement



wedge s eal arr angement

Wedge s eal: The W edge s eal may be us ed f or applications which r equir es MLT (Multi Lab yrinth Trim). W hen the body bonne t bolting is fully t orqued, there maybe a moder at e compr ession of the ML T stack. The me tal s eal construction o ffers the r equis ite cus hion for c ompr ession. In cas e o f lar ge s ize high pr essure v alv es the compr ession load is e xce ssive f or the spir al w ound gas kets withs tand, wher e me tal s eal o ffer a s uitable alt ernativ e.

Table 1 : Chok es wit h API Siz es and End c onnect ion (API Monogr amed)

These v alv es ar e de signed bas ed on API 60K / 7 5K mat erial

Pressure rat ing	API 5000	API 10000	API 15000	API 5000	API 10000	API 15000
End c onnect ion	Flanged end	Flanged end	Flanged end	Hub ends	Hub ends	Hub ends
Material de signat ion	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	

Flange s (6B & 6B X) and Hub ends (16B & 16B X) as per API 6A.
Clamp s for the Hub ends shall be as per A SME S ec VIII Div 1 Appendix 2 4.
Consult f act ory for o ther siz es, 36K/45K with Hub ends , un-equal inle t / outle t connections .
Chok es with P ressure rating / End connection API-2 000 and API-3000 is av ailable on r eque st.

CV Table & Trim Details

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

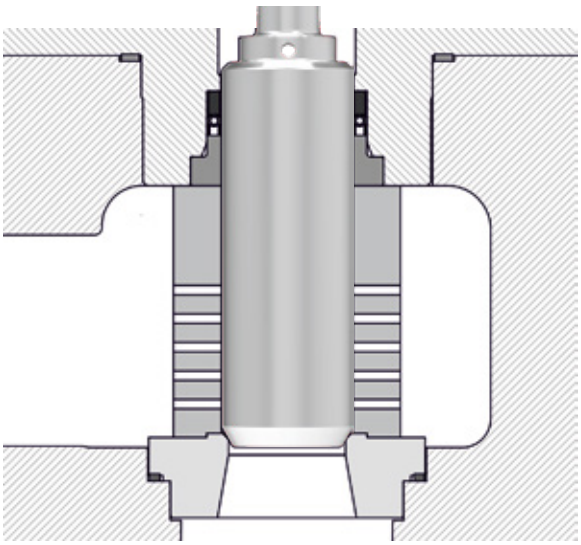
Standard Linear Characteristics
For Multi CC (2CC, 3CC & 4CC) with Bi-linear Characteristics, Consider 80% of rated CV.
Flow Direction :
Liquids - Flow Over
Gases - Flow Over is standard
- Flow Under may be offered based on mutual agreement with customer.

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	193	166	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	1136	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.

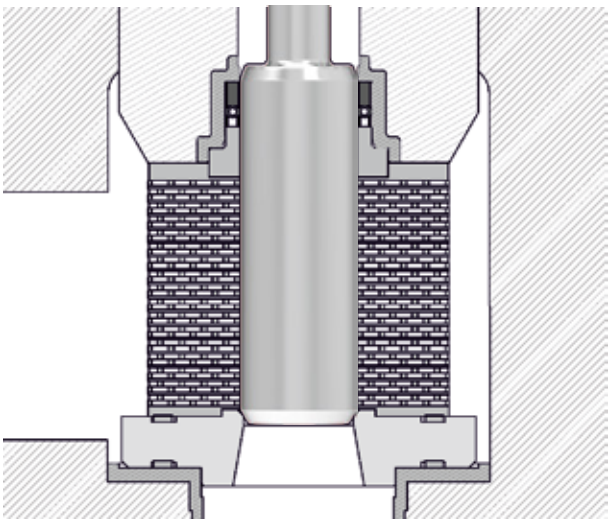
Table 3 : Trim size, CV values, Travel and Seat diameter for Microspline trim

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



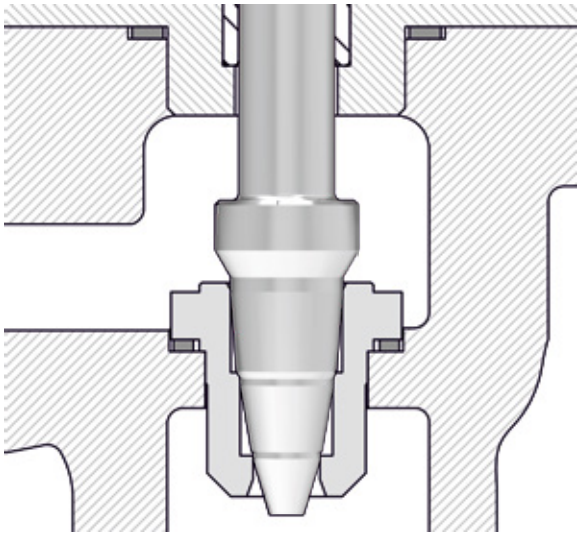
Concentric Cage (CC) Range

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



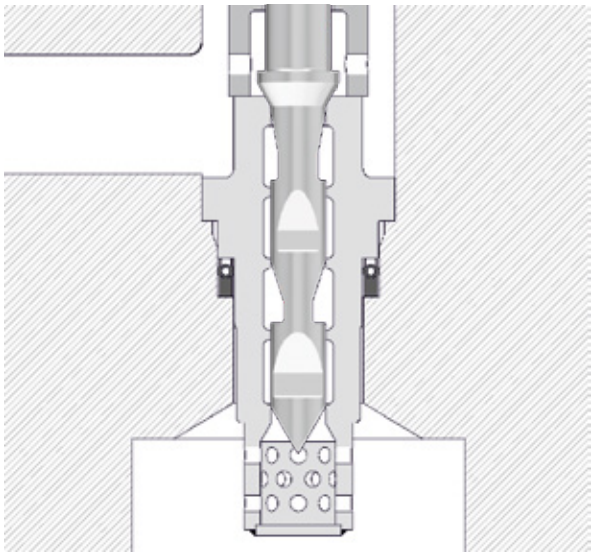
Concentric Carbide Discs (CCD) / MLT Range

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



Low Recovery Profile Trim (LRP Trim)

LRP Trim is manufactured from wide ranging material options, available in double and triple stage letdown. The LRP trim provides constant ratio letdown 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)

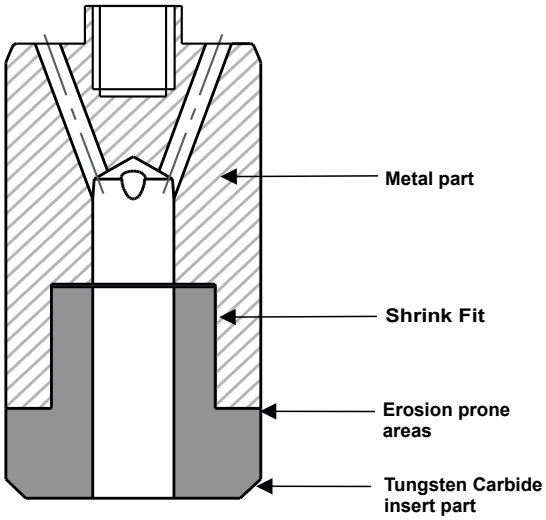
DPMST is required where there are high pressure drops on gas applications and with a low Cv requirement. In these cases if a step trim is used there is significant risk of chatter. The DPMST trim is a multiple (serial) microspline designed for flow over control and by spline design, the forces are balanced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

Trim Level Options

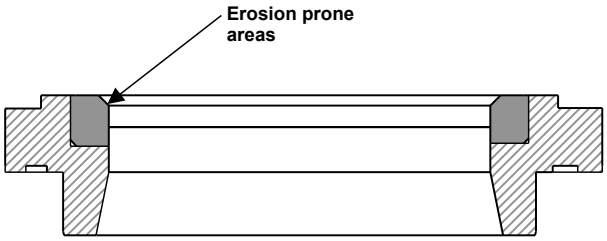
Table 4 : Trim Level options :

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

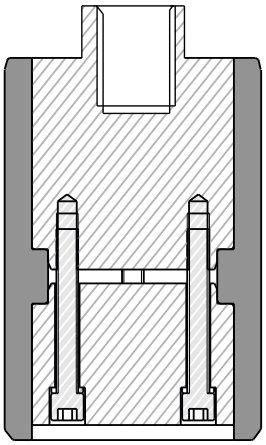


Seat with Tungsten carbide insert

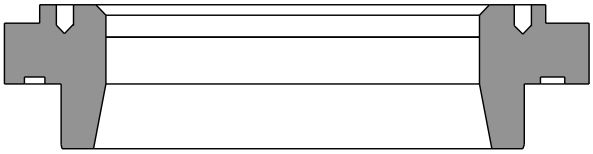
Insert type:

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

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



Tungsten carbide Plug

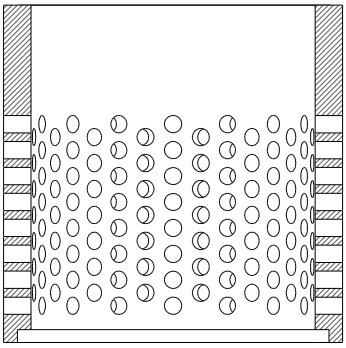


Tungsten carbide Seat

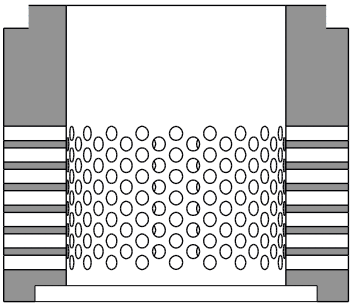
Full WC type:

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 range s 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

A320 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)
A320 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 : ISO 148 / 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 Longtitudinal	
Hardness Test	Test procedure : ASTM E10 (Brinell - Bench type) Test procedure : ASTM E18 (Rock well - Bench type) Test procedure : ASTM E110 (Brinell/Rock well - 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 A751, 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 surface s 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 castings from that heat lot.	Castings/Forgings : As far as practical, the entire volume of each part shall be examined.
	Forgings : As far as practical, the entire volume of each part shall be examined.	

Table 7 : P SL requir ement s for w elding

Severn Glocon s tandar d product mee ts P SL 2 r equirement s as minimum
Note 1 : For P SL4 only o verlay w elding is permit ted. Fabrication w eld or r epair w elding no t allo wed.

Parameter	For all Product Specification Levels[Note 1]
W elding Gener al requirement s	Fabrication : V isual, MT/P T, Har dne ss t est and R T/UT Repair : V isual, MT/P T, Har dne ss t est R T/UT if w eld thickne ss > 1inch or >25% of wall thickne ss, whiche ver is le sser or cavit y e xceeds 6 5 cm^2 Ov erlay : V isual, MT/P T, Har dne ss t est, o verlay thickne ss, bond int egrit y and v olume tric e xamination (UT) Notes :- 1. MT/P T shall be perf ormed bo th be fore and af ter w elding 2. W here P WHT is applicable all w eld NDEs (V isual, MT/P T, R T/UT) shall be perf ormed af ter P WHT 3. The e ssential w elding v ariable s and equipment shall be monit ored; w elding activitie s shall be audit ed 4. Har dne ss t est shall be conduct ed in bo th the w eld and ad jacent un-affect ed bas e me tal af ter all heat treatment and machining. Har dne ss recor ded in the PQR shall be the basis f or accep tance if the w eld is no t as sesible
Repair W eld NDE (surface)	Follow s ame me thods and accep tance crit eria as us ed f or bas e me tal with additional r equirement s specified in API-6A (w eld NDE)
W eld NDE (volume tric)	Test P rocedur e as per A STM E9 4 f or R T or A STM A388 f or UT (r epair and o verlay w elding) ASME S ection V Ar ticle 4 f or UT/ Ar ticle 2 f or R T for Fabrication w elding Accep tance crit eria : API-6A (w eld NDE)
Serializ ation	Each individual par t and/or piece o f equipment shall be as signed and mark ed with a unique code t o maint ain tr aceabilit y

Table 8 : P SL testing r equir ement s for chok es and c ontr ol valv es

Severn Glocon s tandar d product mee ts P SL 2 r equirement s as minimum

Par ame ter	For all P roduct Specific at ion L evels
S erializ ation & Traceabilit y	Every Chok e shall be as signed and mark ed with a unique code t o maint ain tr aceabilit y. Body , Bonne t, Plug, S eat, Cage shall be tr aceble t o the as sembly.
Hydrostatic body t est	For P SL 2: Hydrostatic t est P ressure as per API-6A T able 3 3. Primar y pressure holding (3 mins) - r eduction t o Zero S econdar y pressure holding (3 mins)
Hydrostatic t est (extended)	For P SL 3 / 4: Primar y pressure holding (3 mins) - r eduction t o Zero "Secondar y pressure holding period : 15 mins " is additional with P SL 2 r equirement s Char t recor der shall be us ed f or e xtended h ydro s tatic t ests.
Gas body t est	For P SL 3 / 4: Test medium - Nitr ogen Equipment fully submer ged in a w at er bath Single pr essure holding period o f 15 mins Test pr essure = R at ed w orking pr essure Pressure dr op o f 300 p si is accep table
S eat L eak T est	Op tional Clas s IV / Clas s V as per AN SI / FCI 7 0-2

Performanc e R equir ement s Tests

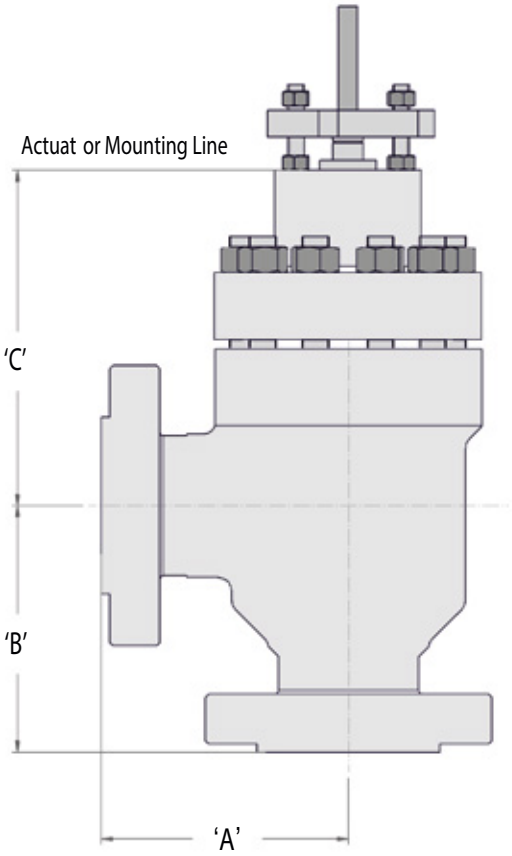
Table 9 : P erformanc e r equir ement t ests PR 1 & PR2

Perf ormanc e r equir ement	Oper at ing cy cles	S eat - to-body s ealing
PR1	3 cy cle s	1 cycle
PR2	200 cy cle s	3 cy cle s

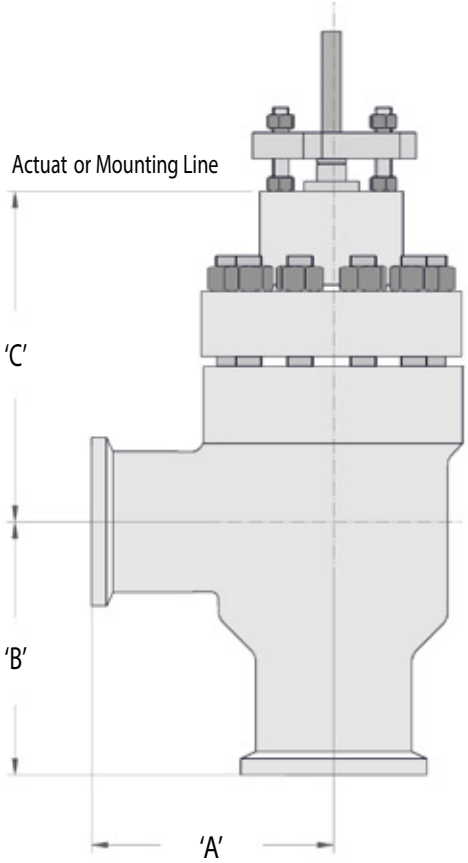
Note 1 : PR1 is perf ormed f or one Chok e / V alv e per de sign as SGI s tandar d.

Table 10 : De sign v alidat ion - PR2 (PR2F le vel) (Applied when specified b y cus tomer)

Perf ormanc e r equir ement	PR2 (PR2F LEVEL)
Oper ating f orce measur ement	Pressure unbalance f orce b y calculation S eat load : Empirical dat a Packing / Bal s eal Friction b y open /clo se t ests
Body s tatic pr essure t est	Not applicable
S eat t o body-s eal t est at r oom temper atur e	Hydro t est to ensur e int egrit y of seal (S eat t o Body-s eal) Hydro - P SL 2 & P SL 3 [wat er at r at ed pr . and r oom t emp] Gas t est - P SL 3 & P SL 4 [N_2 at r at ed pr . and r oom t emp] Pressure holding period : 1 Hour
Dynamic open/clo se cy cling pressure t est at r oom t emp	160 cy cle s (Open-Clo se-Open) [W at er / N_2 at r at ed pr essure and r oom t emp] Adjustment the int ernal pr essure t o compens at e f or the e xpansion and contr action o f the fluid chamber .
Dynamic open/clo se cy cling pressure t est at max r at ed t emp	20 cy cle s (Open-Clo se-Open) [N_2 at r at ed pr essure and maximum r at ed t emp]
Gas body t est at max r at ed temper atur e	Holding time =1hr (P ar tially open) [N_2 at r at ed pr essure and maximum r at ed t emp]
Dynamic open/clo se cy cling pressure t est at min r at ed t emp	20 cy cle s (Open-Clo se-Open) [N_2 at r at ed pr essure and minimum r at ed t emp]
Gas body t est at min r at ed temper atur e	Holding time =1hr (P ar tially open) [N_2 at r at ed pr essure and minimum r at ed t emp]
Body P ressure/T emper atur e Cy cling	e) R ais e the t emper atur e t o room t emper atur e (f) Apply t est pre ssure and r ais e the t emp t o maximum (g) 1 hr holding period (h) Reduce the t emper atur e t o minimum (i) 1 hr holding period (j) Rais e the t emper atur e t o room t emper atur e (k) Releas e the pre ssure and r ais e the t emper atur e t o Max (l) Apply t est pr.(Max T emp), hold f or 1 hr, releas e the pre ssure. (m) Reduce the t emper atur e t o minimum (n) Apply t est pre ssure (Min Temp), hold f or 1 hr, releas e the pre ssure. (o) Rais e the t emper atur e t o room t emper atur e
Body pr essure holding t est at room t emper atur e	(p) Apply t est pr essure (R oom T emp) with s eat open , but do no t releas e the pr essure , hold for 1 hour, releas e the pr essure
Body lo w-pr essure holding t est	q) Apply 5 % to 10% test pr. (Room T emp) with s eat open, hold f or 1 hour, R eleas e the pre ssure.
Second s eat t o body t est at room t emper atur e (may be omitted f or ad justabe chok es	Hydro t est to ensur e int egrit y of seal (S eat - to-Body s eal) Hydro t est - P SL 2 & P SL 3 [w at er at r at ed pr . and r oom t emp] Gas t est - P SL 3 & P SL 4 [N_2 at r at ed pr . and r oom t emp] Pressure holding period : 1 Hour
Testing o f Non-me tallic s eals	As specified in F .1.13



Typic al r epr esent at ion o f chok e
C as t B ody wit h Flanged end c onnect ions



Typic al r epr esent at ion o f chok e
C as t B ody wit h Hub end c onnect ions

End to End Dimensions

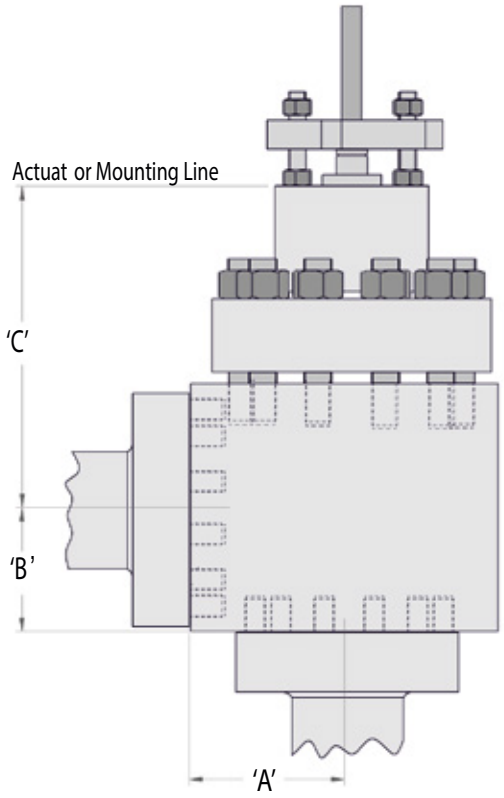
Table 11 : Flanged & Hub end connection for API 5000 - Cast Body

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 B 16.10.
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.



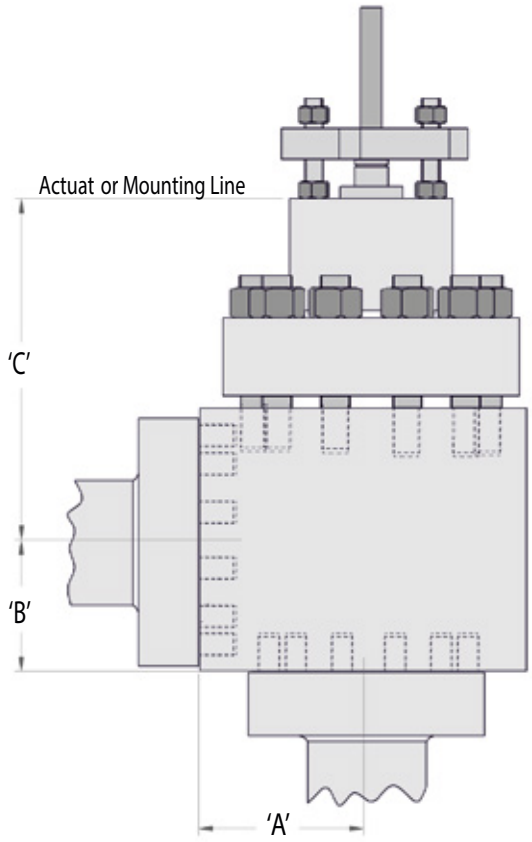
Typical representation of choke
Forged Body with Studded end connections

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									

Consult Factory

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							-	-	-

Consult Factory

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-15 000	Refer Clause 4.3.1.1 in API 6A		
Outlet size / Rating	2 9/16 , API-15 000			
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 ☐	3 ☐	4 ☐	None ☐
Performance Requirement Levels (PR)	1 ☐	2 ☐	None ☐	
Retained fluid corrosivity	Co_2 ☐	H_2S ☐	Chlorides ☐	Others ☐
Fugitive emission requirement	Yes ☐	No ☐		
Will scale , paraffin, corrosion, or other types of inhibitors be used?	Yes ☐	No ☐		
If yes, Inhibitor type:	Inhibitor carrier:	Batch or continuous inhibition:		
Will Erosion be a concern ?	Yes ☐	No ☐		
If yes, cause?				
Sleeve or Coating protection	Yes ☐	No ☐		
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 ☐ Electric ☐ Pneumatic ☐ Gear operated ☐		
Actuator make / Model			Severn Glocon / P1CN		
Power source			Pneumatic / Hydraulic / Electric		
Supply medium			Air ☐ Gas ☐ Hydraulic ☐ None ☐		
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/MR0 175			Yes ☐ No ☐		
Comments:-					

Maroc Sealing
FLUID CONTROL

92, Lot Maurit ania - Z one Industrielle Bernoussi
Casablanca MAROC 20590

www.marocsealing.com
marocsealing@marocsealing.com
(+212) 05 22 35 41 49/50
(+212) 05 22 35 41 52
(+212) 06 62 14 80 39