

Series 21 Triple Offset Butterfly Valves

Pressure class up to 600#, Sizes up to 36" and beyond

Bespoke & Severe Service Solutions

FCC

Proactive | Collaborative | Result oriented

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Model Number 19



Meet the Series 21

Series 21 Triple Offset Butterfly Valves are the ultimate solution for control applications, delivering exceptional performance even in the most demanding process conditions. Designed with advanced triple offset geometry, these valves ensure frictionless operation, Tight Shutoff, and long-term sealing integrity across a wide range of pressures and temperatures.

Crafted to exceed customer expectations, the Series 21 features a compact, lightweight design with tailor-made solutions offered for specialized applications, making it a versatile choice for both isolation and throttling duties.

High Flow, Precise Control & Low Ownership Cost

Precision and performance for the industrial automation

In a triple-offset butterfly valve, sealing happens through torque seating. This means the disc doesn't rub against the seat while moving—it only makes contact at the very end of the closing stroke. When the actuator applies the final torque, the disc is pressed tightly into the conical seat, creating a secure metal-to-metal seal. The laminated metal–graphite seal helps the valve achieve a tight shutoff with very little wear, giving it long life and excellent fire-safe performance.

Triple offset butterfly valve uses a laminated metal–graphite sandwich seal, which combines multiple layers of metal laminations with flexible graphite. This design provides excellent resilience, high-temperature capability, and tight sealing performance. During normal operation, the metal laminations ensure precise seating, while the graphite layers ensures the sealing. In the event of a fire, the graphite functions as a secondary sealing element, maintaining isolation even if soft components degrade.

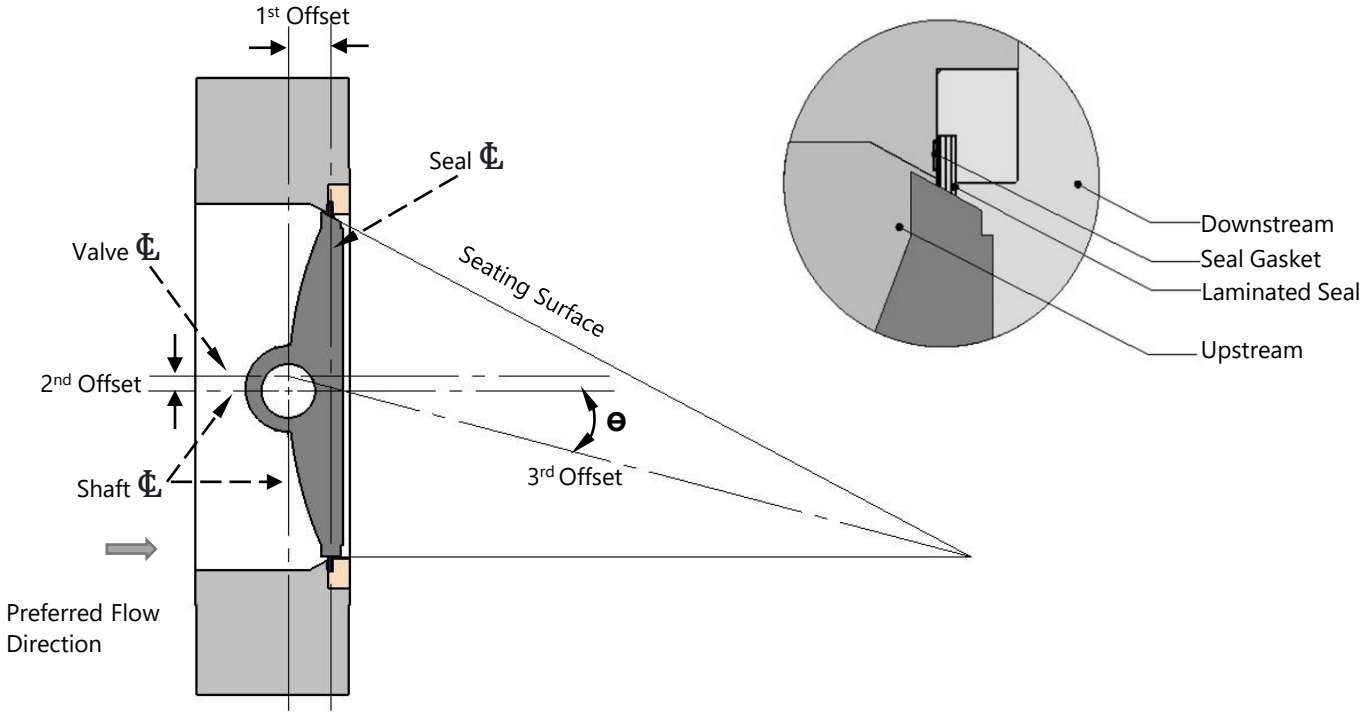
Series 21 valves are fire-safe certified as per API 607, confirming that the valve withstands fire exposure, maintains structural integrity, and controls leakage both during and after the fire test.

Engineering Data

Triple Offset Butterfly Valve designed as per ASME B16.34 & API 609

Sizes, Pressure rating	3” to 36”, ASME Class 150-600
Body Style	Lugged, Double Flange Short Pattern(DFSP)
Flow Characteristics	Modified Equal Percentage (Inherent)
Seal Type & Seat Leakage	Laminated Metal Seal : ANSI / FCI 70-2 Class IV – Class VI Solid Metal Seal : ANSI / FCI 70-2 Class IV
Flow Direction	Standard Flow To Close Optional Bi-Directional on request
End Connections	Size – 3” to 24” Standard: Flanged RF as per ASME B16.5 Optional: Flanged FF as per ASME B16.5 Size – 26” to 36” Standard: Flanged RF as per ASME B16.47 Series A. Optional: Flanged FF as per ASME B16.47 Series A,
Face To Face	Lug – 3” to 24” - API 609 Cat B Lug – 24” to 36” – FCC Standard Double Flange Short Pattern – 3” to 36” – API 609 Cat B
Bonnet Design	Standard (-29° to 232°C), Extension (-46° to 427°C), Cryogenic (-46°C to -196°C)
NACE Conformance	NACE conformance shall be offered for Body, Disc, Shaft & Bolting material when requested
Mode Of Actuation	Pneumatic, Manual, Electrical, Hydraulic & Electro-Hydraulic.

Triple Offset



First Offset:

The rotation axis of the disc is positioned behind the seating surfaces, creating a continuous sealing surface. This ensures a tight seal and simplifies maintenance by allowing easy replacement of the seat or seal when needed

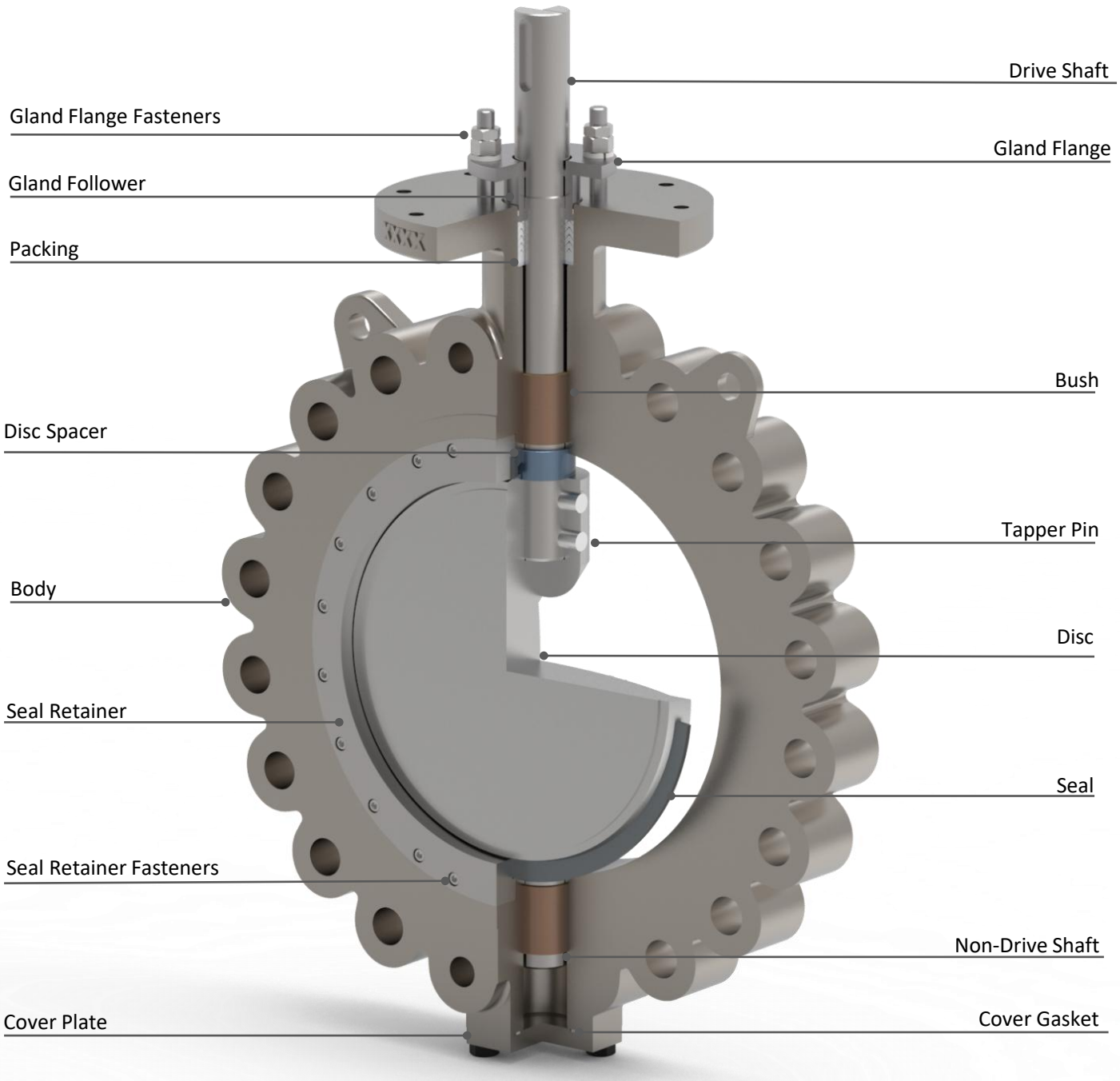
Second Offset:

The valve shaft is offset from the centerline of the valve body. This geometry moves the disc away from the seat rapidly during opening, significantly reducing friction and wear, which extends the valve's operational life.

Third Offset:

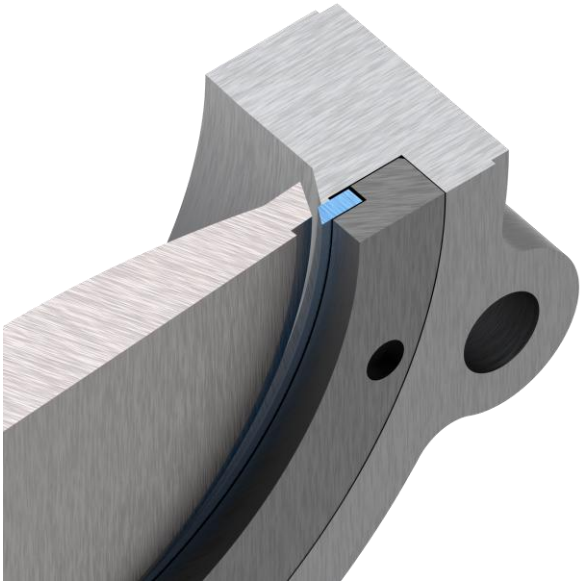
The seat cone axis is offset from the shaft centerline, eliminating rubbing between the disc and seat during operation. This ensures uniform compressive sealing around the entire circumference of the seat, providing zero-leakage performance and long-term reliability.

Valve Components



Sealing Solutions





Laminated Metal Seal:

Triple Offset Laminated seal is developed as a combination of compressible & resilient materials such as Graphite, sandwiched between layers of thin metal sheets. While the metal sheets offer the strength and rigidity, Graphite/PTFE provide good sealing. Each individual layer performs an independent sealing and is unaffected by the damages to other layers. The seal is suitable for a wide-ranging temperature from cryogenic to very high temperatures (-196° C to 427° C).

Metal Seal

For applications demanding Class IV shut-off in the closed position, especially in scenarios where elevated temperatures or arduous service conditions make the use of a laminar seal impractical, Metal seal is recommended.

The choice of a Metal seal is driven by its ability to withstand harsh conditions and maintain a reliable shut-off, providing a robust solution where laminar seal may not be suitable.

Table 1: Seal Types Vs Temperature

Seal type	Material	Temperature Range (°C)
Laminar Seal	SS316 + Graphite Inconel 625 + Graphite	-46 to 427
Metal Seal	SS316 / Inconel 625	-196 to 427

Notes
1. Triple offset valves are inherently firesafe valves.

Material Specifications

Table 2: Material Combinations

Description	Carbon Steel	Stainless Steel	Duplex/ Super Duplex	Al. Bronze	Monel	Inconel
Body	WCB/WCC/LCB/LCC	CF8M/CF3M	4A & 6A	Al.Bronze	Monel 400	Inconel 625
Disc	CF8M/CF3M		4A & 6A	Monel 400	Monel 400	Inconel 625
Shaft & Pins	17-4 PH/Inconel 718		32760/Inconel 718	Monel K500/Inconel 718		Inconel 718
Laminar Seat	SS316 + Graphite		4A + Graphite	Monel K400 + Graphite / Inc 625 + Graphite		
Metal Seat	SS316		Duplex	Inconel 625		
Seat Gasket	Graphite Laminated with 316L		Graphite laminated with 4A	Graphite laminated with K400/ Inc 625		
Seat Retainer	SS316		4A	Monel K500 / Inc 625		
Retainer screw	A4-70/ A193 B8M		4A	Inconel 625		
Disc Spacer	XM-19		4A	Inconel 625		
Packing	PTFE (Temp < 232 ° C) or Graphite (Temp > 232 ° C)					
Gland follower	SS316		4A	Inconel 625		
Gland Bolts	A4-70/ A193 B8M					
Cover Plate	SS316		4A	Inconel 625		
Cover Plate	SS316		4A	Inconel 625		
Cover Bolts	A4-70/ A193 B8M					
Cover Gasket	316L Spiral Wound		S32760 spiral wound	Inconel 625 Spiral Wound		
Bush	DU Bush (Temp < 232 ° C) or Stellite Bush (Temp > 232 °C)					

Notes
1.Stelliting, hard chrome plating and nitriding on Sealing area (i.e, Disc).
2.Stelliting on disc will be preferred on metal seal configuration
3.Alloy 718, XM-19 shaft based on valve torque.
4.Material configuration for temperature above > 427° Contact factory.
5.For other material combination Contact factory.

Flow Coefficient Cv

Table 3 : ASME Class 150

Valve Size in	Degree of Opening				
	10°	30°	50°	70°	90°
3	8	50	88	111	107
4	16	81	177	287	305
6	39	178	357	580	638
8	76	350	772	1340	1543
10	123	606	1327	2192	2528
12	229	925	1932	3317	3941
14	261	1051	2194	4086	5698
16	307	1382	3058	5720	7148
18	441	1768	3746	6721	8636
20	567	2271	4811	9471	12930
24	688	2978	6851	13872	20195
30	2269	3823	9639	21536	31538
36	3127	5269	13288	29688	43476

Table 4 : ASME Class 300

Valve Size in	Degree of Opening				
	10°	30°	50°	70°	90°
3	8	50	88	111	107
4	16	81	177	287	305
6	32	162	357	499	516
8	76	350	772	1340	1543
10	103	509	1077	1974	2449
12	166	766	1694	3260	3525
14	216	979	2148	3885	4775
16	283	1225	2846	5302	6486
18	327	1525	3373	6486	8455
20	538	2238	4747	8426	10049
24	644	2967	6829	13256	17092
30	2020	3624	9237	19261	28134
36	2768	4966	12658	26394	38553

Table 5 : ASME Class 600

Valve Size in	Degree of Opening				
	10°	30°	50°	70°	90°
3	8	50	88	111	107
4	16	81	177	287	305
6	32	162	357	499	516
8	87	317	735	1183	1302
10	102	504	1068	1670	2180
12	149	669	1636	2801	3255
14	174	924	2067	3721	4489
16	279	1090	2565	4367	4993
18	291	1312	3140	5238	6681
20	334	1786	4102	8079	9871
24	504	2697	6455	11213	13565
30	1818	3261	8314	17335	25321
36	2625	4709	12004	25029	36559

Valve Torque

Dynamic Torque

The Triple Offset Geometry results in Torque that tends to rotate the disc towards the seat and assists valve closure, as the fluid flows in the preferred direction (Flow to Close)

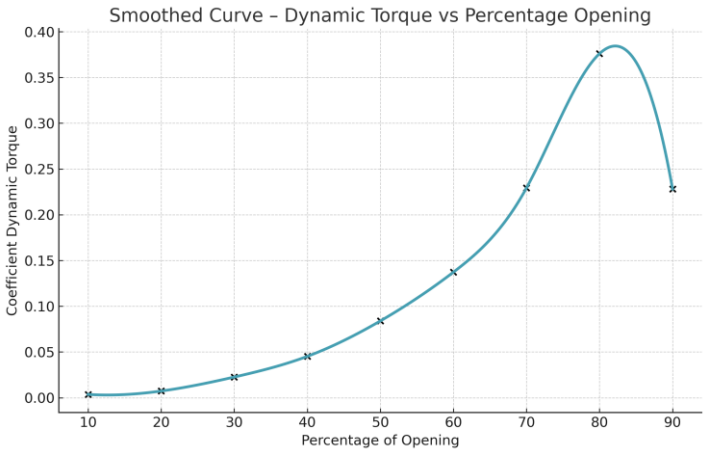
Combined effect of Geometry and the Hydro dynamic fluid pressure around the disc, results in a torque that increases steadily with increase in opening and reaches its peak at around 70-80 degree and thereafter falls rapidly.

Neglect the dynamic torque values if used for ON/OFF applications.

Table 6: Co-efficient of dynamic torque, Ct

% of Opening	Coefficient dynamic Torque
10	0.0036
20	0.0073
30	0.0226
40	0.0452
50	0.0839
60	0.1372
70	0.2292
80	0.376
90	0.228

Hydrodynamic torque characteristics is represented in **chart – 1** below



Hydrodynamic torque can be calculated using the formula

$T_d = (C_t \times D^3) \times \Delta P$

where, Td – Dynamic Torque in lbs inch
C_t – Torque Coefficient Factor
D – Disc Diameter in inch
ΔP – Pressure Drop in psi(g)

Valve Torque

Table 7: ASME Class 150

Valve Size in	Shaft Dia in	Differential Pressure (bar)				MAST lbf.in
		5	10	15	20	
3	5/8”	712	784	855	927	2903
4	3/4”	878	1010	1141	1273	5016
6	3/4”	1368	1685	2002	2320	5016
8	1”	2487	3152	3817	4481	11889
10	1”	3629	4629	5629	6629	11889
12	1-1/4”	5540	7227	8914	10600	23221
14	1-1/2”	7578	10080	12583	15086	40126
16	1-1/’2”	9957	13282	16608	19933	40126
18	1-3/4”	13118	17812	22505	27199	63718
20	2”	16410	22642	28874	35106	95113
24	2-1/4”	24653	34568	44483	54398	135425
30	3”	44109	64257	84405	104554	321007
36	3- 1/2”	63148	93975	124803	155630	509748

Valve Torque

Table 8: ASME Class 300

Valve Size in	Shaft Dia in	Differential Pressure (bar)				MAST lbf.in
		20	30	40	50	
3	5/8”	988	1162	1336	1510	2903
4	3/4"	1252	1505	1759	2012	5016
6	1”	2402	3050	3699	4347	11889
8	1-1/4”	4565	5909	7253	8597	23221
10	1-1/4”	6741	8769	10797	12825	23221
12	1-1/2”	10720	14125	17531	20936	40126
14	2”	15528	20698	25869	31040	95113
16	2”	19845	26395	32946	39497	95113
18	2-1/4”	27445	36899	46354	55809	135425
20	2-3/4”	35702	48380	61059	73737	247257
24	3”	55800	76246	96695	117142	321007
30	3-1/2”	106389	147546	188706	229865	509748

Notes:
1. Consult factory for Torque values above 30” valve size

Valve Torque

Table 9: ASME Class 600

Valve Size in	Shaft Dia in	Differential Pressure (bar)				MAST lbf.in
		20	30	40	50	
3	5/8”	988	1162	1336	1510	2903
4	3/4"	1252	1505	1759	2012	5016
6	1”	2402	3050	3699	4347	11889
8	1-1/4”	4565	5909	7253	8597	23221
10	1-3/4”	6741	8769	10797	12825	23221
12	2”	10720	14125	17531	20936	40126
14	2-1/4”	15528	20698	25869	31040	95113
16	2-1/2”	19845	26395	32946	39497	135425
18	2-1/2”	27445	36899	46354	55809	135425
20	2-3/4”	35702	48380	61059	73737	247257
24	3-1/4”	55800	76246	96695	117142	321007
30	3-1/2”	106389	147546	188706	229865	509748

Notes:
1. The MAST (Maximum Allowable Shaft Torque) values correspond to 17-4PH.
2. Valve torque includes FOS of 1.5
3. To convert Lbf.in to Nm which is multiply by 0.1129
4. Consult factory for Torque values above 30” valve size

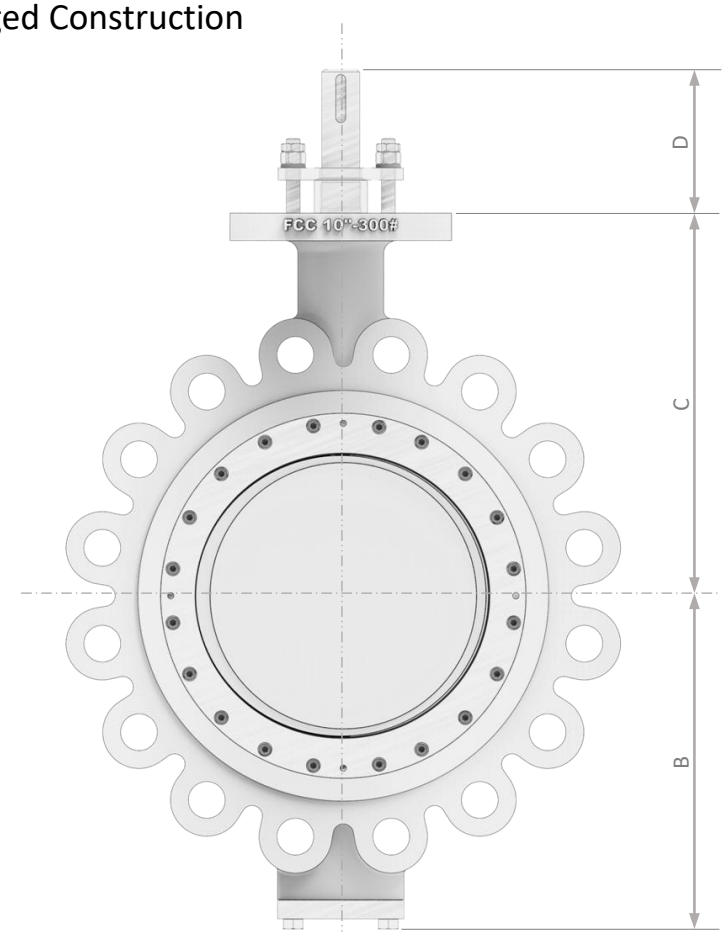
For other materials multiply the value with the factors below

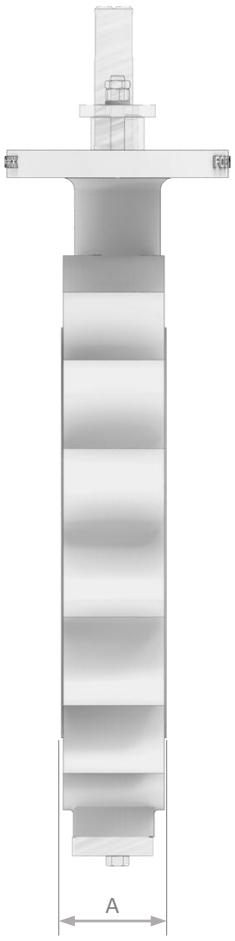
Materials	SS316	Nitronic 50	S32760	Monel K500	Inconel 718
Factor	0.51	0.74	0.80	0.95	1.43

Under certain conditions, hydrodynamic torque can meet or exceed the Break Torques.
When designing valve systems, hydrodynamic torque must be considered to ensure correct selection of actuator.

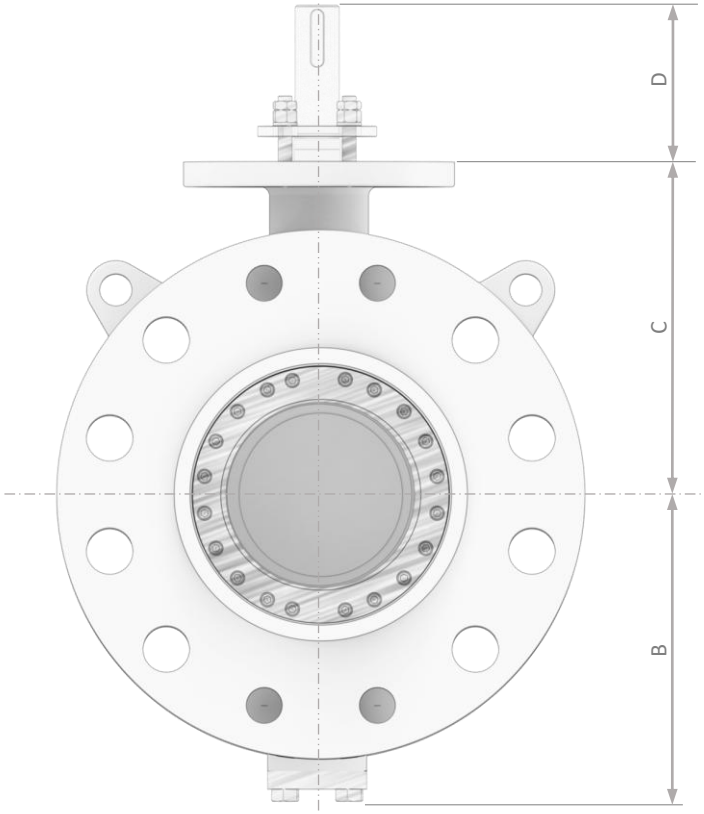
Dimensions, Weights & Bolting

Lugged Construction





Double Flanged Construction





150# Dimensions, Weights & Bolting

Table 10: Dimensions & Weights

Valve Size (in)	Dimensions (mm)								Actuator Mounting	Weight (kg)	
	A		B	C	D	Ø PCD	Ø OD	Ø S	Flange Type ISO 5211	LW	DF
	LW	DF									
3	48	114	120	130	75	152.4	212	5/8”	F05	8	27
4	54	127	140	170	90	190.5	230	3/4”	F07	16	31
6	57	140	170	200	90	241.3	280	3/4”	F07	20	39
8	64	152	205	235	110	298.4	344	1”	F10	34	64
10	71	165	245	280	110	362.0	408	1”	F12	55	89
12	81	178	275	310	120	431.8	483	1-1/4”	F14	80	129
14	92	190	310	360	145	476.2	535	1-1/2”	F14	105	163
16	102	216	340	400	145	539.8	598	1-1/’2”	F16	142	210
18	114	222	365	425	165	577.8	637	1-3/4”	F16	180	240
20	127	229	405	465	165	635.0	700	2”	F25	235	285
24	154	267	460	520	180	749.3	817	2-1/4”	F25	349	450
30	165	318	605	680	210	914.4	988	3”	F30	583	725
36	203	330	650	735	240	1085.5	1168	3- 1/2”	F35	856	1154

Table 11: End Connection and Bolting (Lugged)

Valve Size (in)	Drilled Holes					Tapped Holes				
	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts
3	5/8- 11 UNC	6	4	5/8- 11 UNC	8	-	-	-	-	-
4	5/8- 11 UNC	6.25	8	5/8- 11 UNC	16	-	-	-	-	-
6	3/4- 10 UNC	6.75	8	3/4- 10 UNC	16	-	-	-	-	-
8	3/4- 10 UNC	7.25	8	3/4- 10 UNC	16	-	-	-	-	-
10	7/8- 9 UNC	8	12	7/8- 9 UNC	24	-	-	-	-	-
12	7/8- 9 UNC	8.5	12	7/8- 9 UNC	24	-	-	-	-	-
14	1-8 UN	9.5	12	1-8 UN	24	-	-	-	-	-
16	1-8 UN	10	16	1-8 UN	32	-	-	-	-	-
18	1-1/8- 8 UN	11	16	1-1/8- 8 UN	32	-	-	-	-	-
20	1-1/8- 8 UN	11.75	16	1-1/8- 8 UN	32	1-1/8- 8 UN	4.5	8	1-1/8- 8 UN	8
24	1-1/4- 8 UN	13.5	16	1-1/4- 8 UN	32	1-1/4- 8 UN	5	8	1-1/4- 8 UN	8
30	1-1/4- 8 UN	16.25	24	1-1/4- 8 UN	48	1-1/4- 8 UN	6.25	8	1-1/4- 8 UN	8
36	1-1/2- 8 UN	19.50	28	1-1/2- 8UN	56	1-1/2- 8 UN	7.50	8	1-1/2- 8 UN	8

150# Dimensions, Weights & Bolting

Table 12: End Connection and Bolting (Double Flanged)

Valve Size (in)	Drilled Holes					Tapped Holes				
	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts
3	5/8- 11 UNC	4	8	5/8- 11 UNC	16	-	-	-	-	-
4	5/8- 11 UNC	4	8	5/8- 11 UNC	16	5/8-11 UNC	2.75	8	5/8- 11 UNC	8
6	3/4- 10 UNC	4.25	8	3/4- 10 UNC	16	3/4-10 UNC	3	8	3/4- 10 UNC	8
8	3/4- 10 UNC	4.5	8	3/4- 10 UNC	16	3/4-10 UNC	3.25	8	3/4- 10 UNC	8
10	7/8- 9 UNC	5	16	7/8- 9 UNC	32	7/8- 9 UNC	3.5	8	7/8- 9 UNC	8
12	7/8- 9 UNC	5	16	7/8- 9 UNC	32	7/8-9 UNC	3.5	8	7/8- 9 UNC	8
14	1-8 UN	5.75	16	1-8 UN	32	1-8 UN	4	8	1-8 UN	8
16	1-8 UN	5.75	24	1-8 UN	48	1-8 UN	4	8	1-8 UN	8
18	1-1/8- 8 UN	6.25	24	1-1/8- 8 UN	48	1-1/8-8 UN	4.5	8	1-1/8- 8 UN	8
20	1-1/8- 8 UN	6.25	32	1-1/8- 8 UN	64	1-1/8- 8 UN	4.5	8	1-1/8- 8 UN	8
24	1-1/4- 8 UN	7.25	32	1-1/4- 8 UN	64	1-1/4- 8 UN	5	8	1-1/4- 8 UN	8
30	1-1/4- 8 UN	9.75	48	1-1/4- 8 UN	96	1-1/4- 8 UN	6.25	8	1-1/4- 8 UN	8
36	1 1/2 -8 UN	11.25	56	1 1/2 -8 UN	112	1 1/2 -8 UN	7.5	8	1 1/2 -8 UN	8

300# Dimensions, Weights & Bolting

Table 13: Dimensions & Weights

Valve Size (in)	Dimensions (mm)								Actuator Mounting	Weight (kg)	
	A		B	C	D	Ø PCD	Ø OD	Ø S	Flange Type ISO 5211	LW	DF
	LW	DF									
3	48	114	120	130	75	168.1	212	5/8”	F07	14	26
4	54	127	155	185	90	200.2	254	3/4"	F07	20	39
6	59	140	190	220	110	269.7	319	1”	F10	34	63
8	73	152	260	270	120	330.2	384	1-1/4”	F12	57	98
10	83	165	270	310	120	387.4	445	1-1/4”	F14	85	130
12	92	178	310	350	145	450.8	524	1-1/2”	F16	123	180
14	117	190	340	390	165	514.4	584	2”	F16	207	256
16	133	216	370	420	165	571.5	650	2”	F25	269	329
18	149	222	405	480	180	628.6	712	2-1/4”	F25	357	400
20	159	229	440	515	210	685.8	777	2-3/4”	F30	416	505
24	181	267	515	600	210	812.8	918	3”	F30	635	753
30	241	318	615	700	210	997.0	1096	3-1/2”	F35	1103	1125
36	241	330	700	800	235	1168.4	1270	3-1/2”	F40	1663	2070

Table 14: End Connection and Bolting (Lugged)

Valve Size (in)	Drilled Holes					Tapped Holes				
	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts
3	3/4- 10 UNC	6.5	8	3/4- 10 UNC	16	-	-	-	-	-
4	3/4- 10 UNC	7	8	3/4- 10 UNC	16	-	-	-	-	-
6	3/4- 10 UNC	7.75	12	3/4-10 UNC	24	-	-	-	-	-
8	7/8- 9 UNC	9	12	7/8- 9 UNC	24	-	-	-	-	-
10	1-8 UN	10	12	1-8 UN	24	1-8 UN	4.5	8	1-8 UN	8
12	1-1/8- 8 UN	11	16	1-1/8- 8 UN	32	1-1/8-8 UN	4.75	8	1-1/8- 8 UN	8
14	1-1/8- 8 UN	12.25	16	1-1/8- 8 UN	32	1-1/8-8 UN	5	8	1-1/8- 8 UN	8
16	1-1/4- 8 UN	13.25	16	1-1/4- 8 UN	32	1-1/4- 8 UN	5.25	8	1-1/4- 8 UN	8
18	1-1/4- 8 UN	14.25	20	1-1/4- 8 UN	40	1-1/4- 8 UN	5.5	8	1-1/4- 8 UN	8
20	1-1/4- 8 UN	15	20	1-1/4- 8 UN	40	1-1/4- 8 UN	5.75	8	1-1/4- 8 UN	8
24	1-1/2- 8 UN	16.75	20	1-1/2- 8 UN	40	1-1/2- 8 UN	6.5	8	1-1/2- 8 UN	8
30	1-3/4- 8 UN	21.75	24	1-3/4- 8 UN	48	1-3/4- 8 UN	8	8	1-3/4- 8 UN	8
36	2 – 8 UN	23.25	28	2 – 8 UN	56	2 – 8 UN	9.0	8	2 – 8 UN	8

300# Dimensions, Weights & Bolting

Table 15: End Connection and Bolting (Double Flanged)

Valve Size (in)	Drilled Holes					Tapped Holes				
	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts
3	3/4- 10 UNC	4.5	8	3/4- 10 UNC	16	3/4-10 UNC	3.25	8	3/4- 10 UNC	8
4	3/4- 10 UNC	4.75	8	3/4- 10 UNC	16	3/4-10 UNC	3.25	8	3/4- 10 UNC	8
6	3/4- 10 UNC	5.25	16	3/4-10 UNC	32	3/4-10 UNC	3.5	8	3/4- 10 UNC	8
8	7/8- 9 UNC	5.75	16	7/8- 9 UNC	32	7/8- 9 UNC	4	8	7/8- 9 UNC	8
10	1-8 UN	6.75	24	1-8 UN	48	1-8 UN	4.5	8	1-8 UN	8
12	1-1/8- 8 UN	7.25	24	1-1/8- 8 UN	48	1-1/8-8 UN	4.75	8	1-1/8- 8 UN	8
14	1-1/8- 8 UN	7.5	32	1-1/8- 8 UN	64	1-1/8-8 UN	5	8	1-1/8- 8 UN	8
16	1-1/4- 8 UN	8	32	1-1/4- 8 UN	64	1-1/4- 8 UN	5.25	8	1-1/4- 8 UN	8
18	1-1/4- 8 UN	8.25	40	1-1/4- 8 UN	80	1-1/4- 8 UN	5.5	8	1-1/4- 8 UN	8
20	1-1/4- 8 UN	8.5	40	1-1/4- 8 UN	80	1-1/4- 8 UN	5.75	8	1-1/4- 8 UN	8
24	1-1/2- 8 UN	9.5	40	1-1/2- 8 UN	80	1-1/2- 8 UN	6.5	8	1-1/2- 8 UN	8
30	1-3/4- 8 UN	12.25	48	1-3/4- 8 UN	96	1-3/4- 8 UN	8	8	1-3/4- 8 UN	8
36	2 – 8 UN	13.25	56	2 – 8 UN	112	2 – 8 UN	9.0	8	2 – 8 UN	8

600# Dimensions, Weights & Bolting

Table 16: Dimensions & Weights

Valve Size (in)	Dimensions (mm)								Actuator Mounting	Weight (kg)	
	A		B	C	D	Ø PCD	Ø OD	Ø S	Flange Type ISO 5211	LW	DF
	LW	DF									
3	54	180	130	165	75	66	210	5/8”	F10	15	30
4	64	190	165	210	90	91	275	3/4"	F10	28	52
6	78	210	215	250	110	135	355	1”	F12	58	101
8	102	230	255	290	120	188	422	1-1/4”	F14	99	173
10	117	250	305	350	165	236	510	1-3/4”	F16	178	270
12	140	270	335	380	165	284	560	2”	F25	223	310
14	155	290	355	410	180	328	605	2-1/4”	F25	280	370
16	178	310	420	500	200	366	688	2-1/2”	F30	425	550
18	200	330	440	520	200	414	745	2-1/2”	F30	515	660
20	216	350	470	550	210	465	815	2-3/4”	F35	652	780
24	232	390	535	620	210	561	942	3-1/4”	F35	880	1080
30	318	450	625	710	210	711	1132	3-1/2”	F40	1540	1750
36	330	510	750	820	270	1193.8	1314	4”	F48	1960	2710

Table 17: End Connection and Bolting (Lugged)

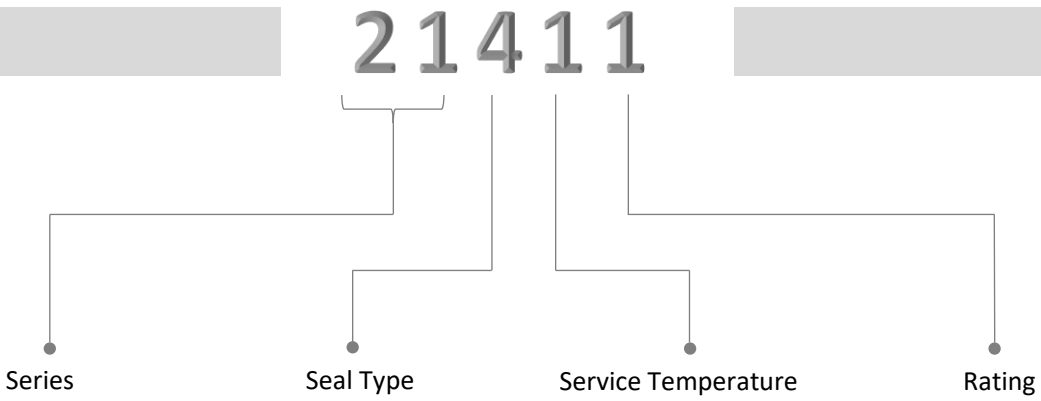
Valve Size (in)	Drilled Holes					Tapped Holes				
	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts
3	3/4- 10 UNC	7.25	8	3/4- 10 UNC	16	-	-	-	-	-
4	7/8- 9 UNC	8.5	8	7/8- 9 UNC	16	-	-	-	-	-
6	1-8 UN	10	12	1-8 UN	24	-	-	-	-	-
8	1-1/8- 8 UN	11.75	12	1-1/8- 8UN	24	-	-	-	-	-
10	1-1/4- 8 UN	13.25	12	1-1/4- 8 UN	24	1-1/4-8 UN	5.75	8	1-1/4- 8 UN	8
12	1-1/4-8 UN	14.5	16	1-1/4- 8 UN	32	1-1/4-8 UN	5.75	8	1-1/4- 8 UN	8
14	1-3/8- 8 UN	15.5	16	1-3/8- 8 UN	32	1-3/8-8 UN	6.25	8	1-3/8- 8 UN	8
16	1-1/2- 8 UN	17.25	16	1-1/2- 8 UN	32	1-1/2- 8 UN	6.75	8	1-1/2- 8 UN	8
18	1-5/8- 8 UN	18.75	16	1-5/8- 8 UN	32	1-5/8- 8 UN	7.25	8	1-5/8- 8 UN	8
20	1-5/8- 8 UN	20	20	1-5/8- 8 UN	40	1-5/8- 8 UN	7.5	8	1-5/8- 8 UN	8
24	1-7/8- 8 UN	22.25	20	1-7/8- 8 UN	40	1-7/8- 8 UN	8.5	8	1-7/8- 8 UN	8
30	2- 8 UN	27.25	24	2- 8 UN	48	2- 8 UN	9.5	8	2- 8 UN	8
36	2-1/2 – 8UN	26.50	28	2-1/2 – 8UN	56	2-1/2- 8UN	10.5	8	2-1/2- 8UN	8

600# Dimensions, Weights & Bolting

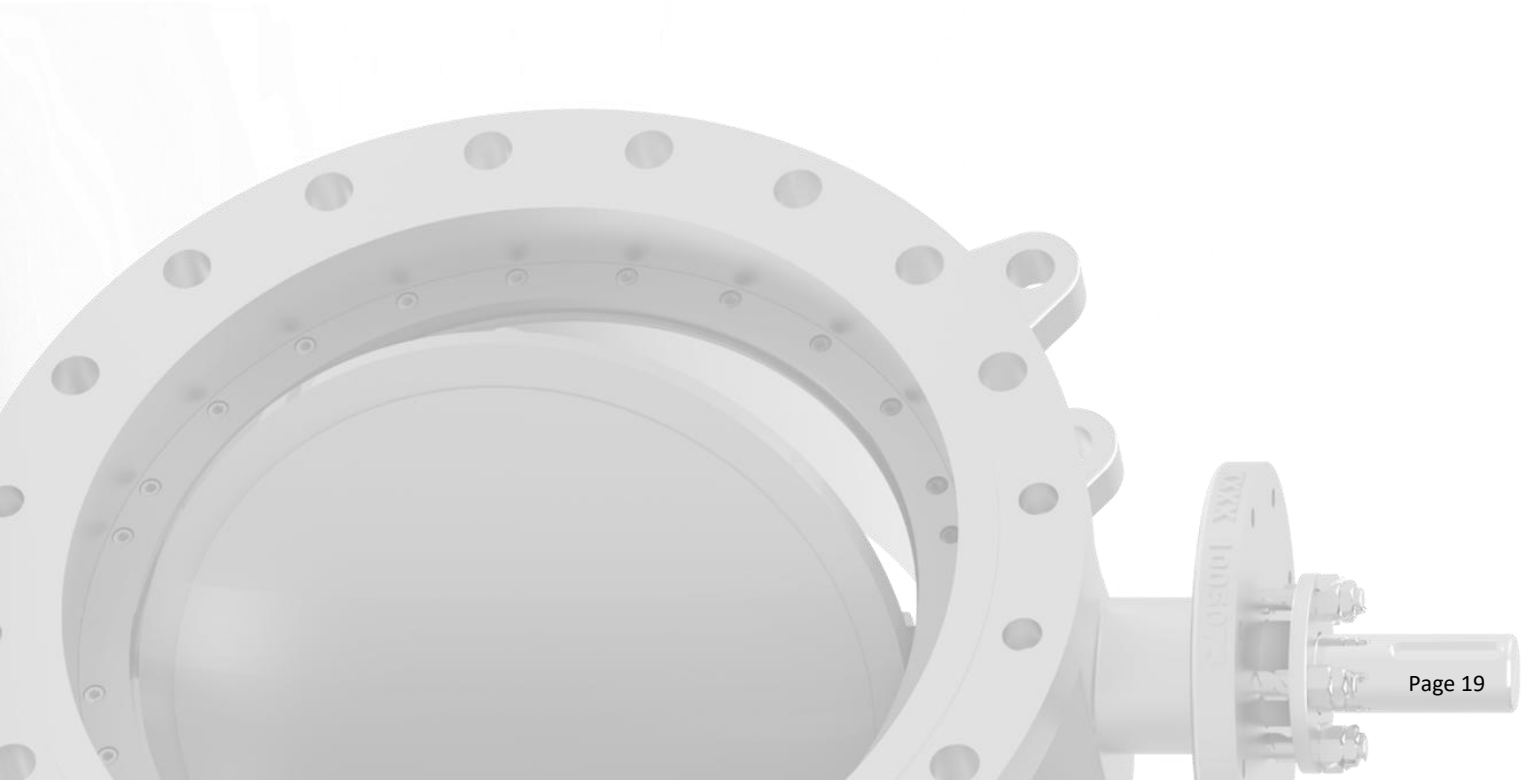
Table 18: End Connection and Bolting (Double Flanged)

Valve Size (in)	Drilled Holes					Tapped Holes				
	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts	Stud Size	Length (in)	No of Studs	Nut Size	No of Nuts
3	3/4- 10 UNC	5	8	3/4- 10 UNC	16	3/4-10 UNC	3.25	8	3/4- 10 UNC	8
4	7/8- 9 UNC	5.75	8	7/8- 9 UNC	16	7/8- 9 UNC	4	8	7/8- 9 UNC	8
6	1-8 UN	6.75	16	1-8 UN	32	1-8 UN	4.5	8	1-8 UN	8
8	1-1/8- 8 UN	7.75	16	1-1/8- 8UN	32	1-1/8-8 UN	5	8	1-1/4- 8 UN	8
10	1-1/4- 8 UN	8.5	24	1-1/4- 8 UN	48	1-1/4-8 UN	5.75	8	1-1/4- 8 UN	8
12	1-1/4-8 UN	8.75	32	1-1/4- 8 UN	64	1-1/4-8 UN	5.75	8	1-1/4- 8 UN	8
14	1-3/8- 8 UN	9.25	32	1-3/8- 8 UN	64	1-3/8-8 UN	6.25	8	1-3/8- 8 UN	8
16	1-1/2- 8 UN	10	32	1-1/2- 8 UN	64	1-1/2- 8 UN	6.75	8	1-1/2- 8 UN	8
18	1-5/8- 8 UN	10.75	32	1-5/8- 8 UN	64	1-5/8- 8 UN	7.25	8	1-5/8- 8 UN	8
20	1-5/8- 8 UN	11.5	40	1-5/8- 8 UN	80	1-5/8- 8 UN	7.5	8	1-5/8- 8 UN	8
24	1-7/8- 8 UN	13	40	1-7/8- 8 UN	80	1-7/8- 8 UN	8.5	8	1-7/8- 8 UN	8
30	2- 8 UN	14.5	48	2- 8 UN	96	2- 8 UN	9.5	8	2- 8 UN	8
36	2-1/2 – 8UN	26.50	56	2-1/2 – 8UN	112	2-1/2- 8UN	10.5	8	2-1/2- 8UN	8

Model Number



Series	Seal Type	Service Temperature	Rating
21	3 - Triple Offset, Laminar Seal	1 - Warm Service	1 - 150
	4 - Triple Offset, Metal Seal	2 - High Temperature	2 - 300
		3 – Cryogenic	3 - 600







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