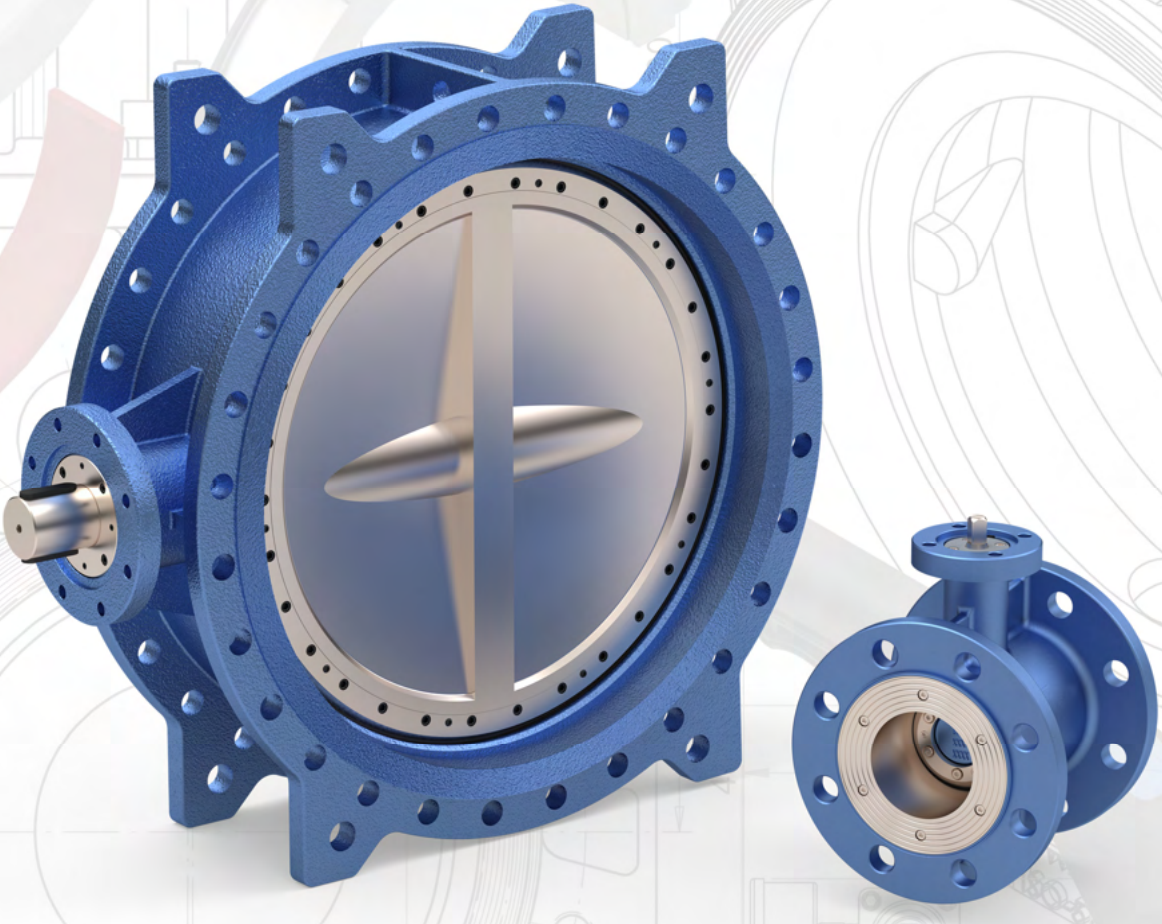
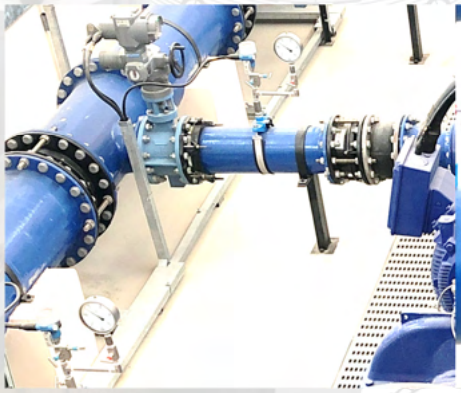
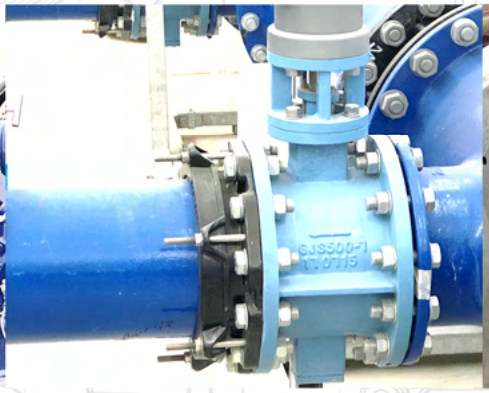
Valves & Technology

HYDOR

DOUBLE FLANGED DOUBLE ECCENTRIC BUTTERFLY VALVE







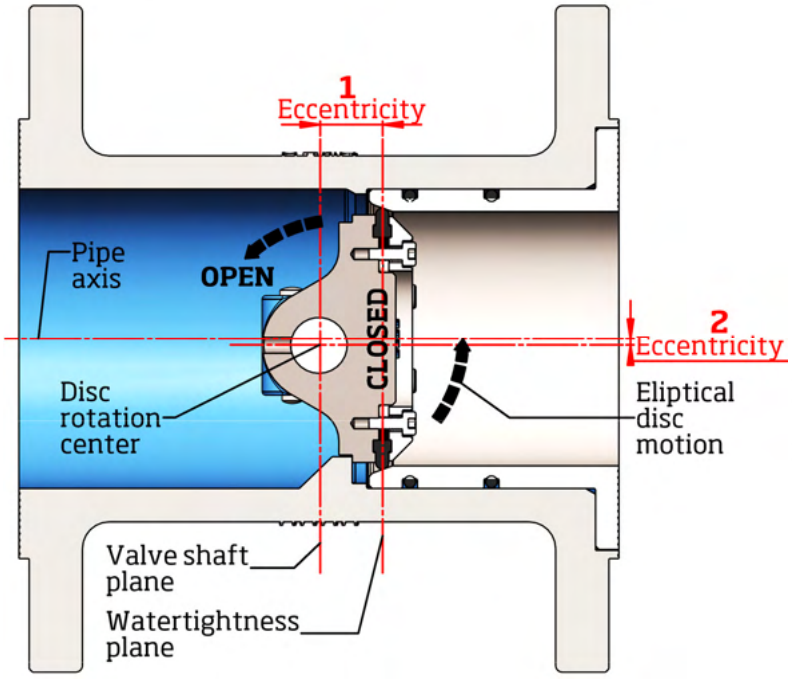
INDEX

1. SPECIFICATIONS

Due to the double offcentering of the valve shaft, the rotational movement of the disc is eccentric with respect to the seat.

The first eccentricity (1) moves the axis of rotation away from the sealing shaft, thus achieving a full circular sealing between the body seat and the disc seat.

The second eccentricity (2) moves the disc rotation axis away from the shaft, so that the disc seat is in contact with the body seat only a few degrees before the valve is fully open. This eccentricity, in turn, allows rapid relief of sealing compression in the seat area closer to the shaft reducing abrasive wear and scoring of the disc sealing ring .



The fully open valve has no stresses, so it does not retain any permanent compression even if the valve remains open for years, despite it's always recommended a mínimum number of yearly Operations "open/closed" for maintenance purposes.

1.1. Double Eccentric Design Characteristics

- Longer service life, minimum friction between disc sealing ring and body seat.
- In the closed valve position, the force of the disc sealing ring on the body seat ensures complete tightness regardless of pressure.
- 360° uninterrupted sealing mechanism ensures tight sealing and low torque.
- Offset shaft design allows easy seat replacement without disassembling shaft or other internal components, with quick on-site maintenance.
- Disc seat can be easily replaced without the need for special tools.
- Hydor double eccentric TTV butterfly valves offer a better performance than gate and ball valves, at a lower cost and lighter weight, apart than easier and more competitive maintenance impact.

1.2. General Characteristics

- Design available as per EN593 (S13 and S14) and AWWA C504 (short and long) on demand.
- Dry shaft desing.
- Bidirectional sealing on request.
- WRAS approved parts in contact with fluid.
- Body and Disc in ductil iron, carbon steel, stainless steel and duplex.
- Valve construction with sealing in EPDM, NITRILE, VITON and other materials on request, suitable for vacuum.
- Stainless steel and duplex shaft.

- Easy replacement of the disc sealing ring .
- In diameters larger than DN350, stainless steel seat is integrated in the body to avoid corrosion and erosion resistance on the disc sealing ring .
- Design and construction:
  API 609
  ASME B16.34
  EN 593
  BS 5155
  AWWA C504
- Inspection and testing: ISO 5208, API 598, EN 12266.
- Working pressure: Up to PN.40
- Flange connection:
  ISO 7005-1/2
  DIN 2501 PN10/16/25/40
  ASME B16.5 (150-300Lbs)
  ASME B16.47 Series A/B (150-300Lbs)
  ASME B16.1 class 125/250 Lbs
  AWWA C207
- Face to Face:
  ISO 5752
  EN593
  ANSI/ASME B16.1 (only DN50 - DN65)
  DIN 3202
- Valve top works: ISO 5211

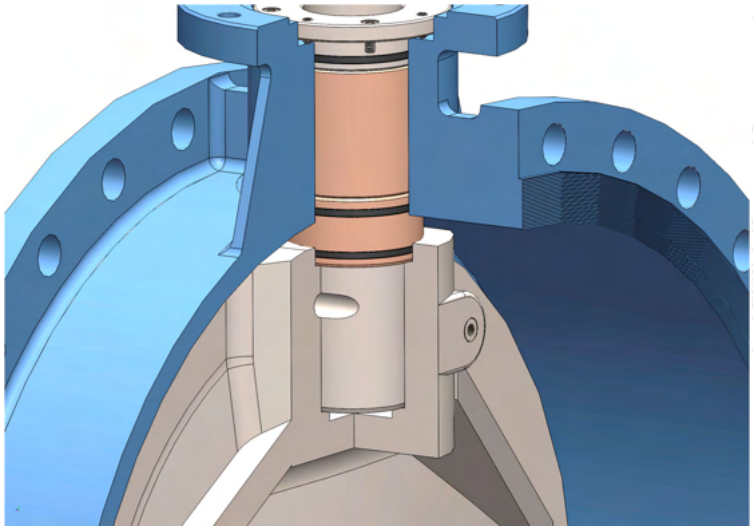
Other standards are available on request.

1.3. Design Specification

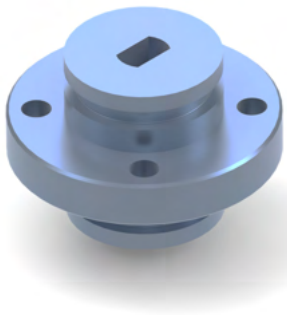
Hydor double excentric valve is based on a standard design extended with upgrade and safety options.

- Dry shaft:
  DN80-3000

Dry shaft design is achieved through the use of O-rings located in the shaft sleeve between the body and the disc . With this design, optimum sealing is achieved, preventing the fluid from contacting the shaft and not leaking through the same, guaranteeing a maintenance-free seal during the entire service life.



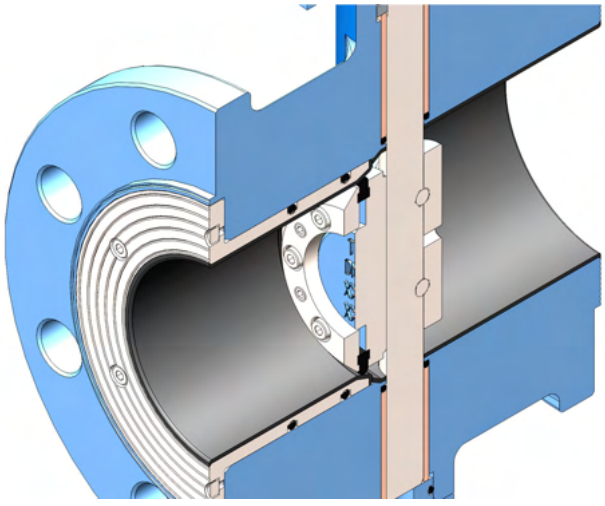
- Locking device at the non-drive shaft :
  DN80-3000



Locking device on the shaft of the end opposite the transmission, which facilitates possible maintenance on higher worksites, if necessary. This cover is optional and interchangeable with the standard.

- Vulcanized body :
  DN80-3000

Vulcanized body and encapsulated disc with EPDM, NITRILE or EBONITE (hard rubber), according to the fluid , protecting them from possible corrosion and in the meantime , achieving a better sealing.



- The sealing system:

Despite TTV's standard sealing system is by a welded metallic ring on the body against an elastic ring retained on the disc, under certain working conditions (heavy abrasion, for example) and in order to improve the performance of the valve and facilitate its maintenance, TTV offers an alternative sealing design based on the use of a replaceable retainer extended to the sealing area as per above sketch.

1.4. Raw Materials

1.4.1. Standard materials used in the construction of our valves :

- Body: EN 1563 GJS500-7, GJS400-12/15; A216 Grade WCB; ASTM A316 CF8M; ASTM B148 C95500; ASTM A890 4A/5A/6A.
- Disc: EN 1563 GJS500-7, GJS400-12/15; A216 Grade WCB; ASTM A316 CF8M; ASTM B148 C95500; ASTM A890 4A/5A/6A.
- Shaft: Stainless Steel AISI 420, AISI316, 17-4PH; and Duplex, Super-Duplex Stainless Steel to F51/F53/F55.

1.4.2. Seat materials:

- Disc sealing rings : EPDM, NITRILE, VITON (Please consult other materials).

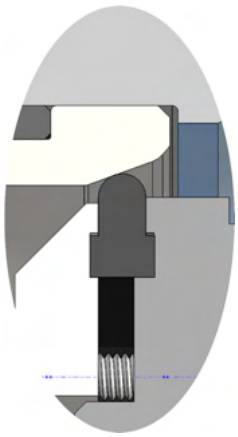
Temperature:

- EPDM -20°C to +110°C.
  Suitable for: Fresh water, sea water, hot water, air, cooling, ozone, nitrogen derivatives, weak acid circuits, aldehydes, amines, ketones, esters, dairy products, food products, alcohols, wines, beers, fruit juices, food service, etc.
- NITRILE -10 °C to +90°C.
  Suitable for: Hydrocarbons, vegetable and mineral fats, oils, compressed air, water, fuel oil, food services, city gas, propane, butane, etc.
- VITON -5°C to +180°C.
  Suitable for: Concentrated and hot acids, solvents, high temperature gases, oxygenated (unleaded) gasoline, etc.

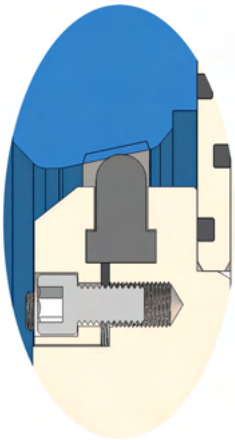
Tightness Class VI, Leakage "0", PN10/16/25/40, 50-300Lbs.

- Replaceable Seat: SS316, Duplex, Super-Duplex.
- Welded Seat: SS316, Duplex, Super-Duplex.

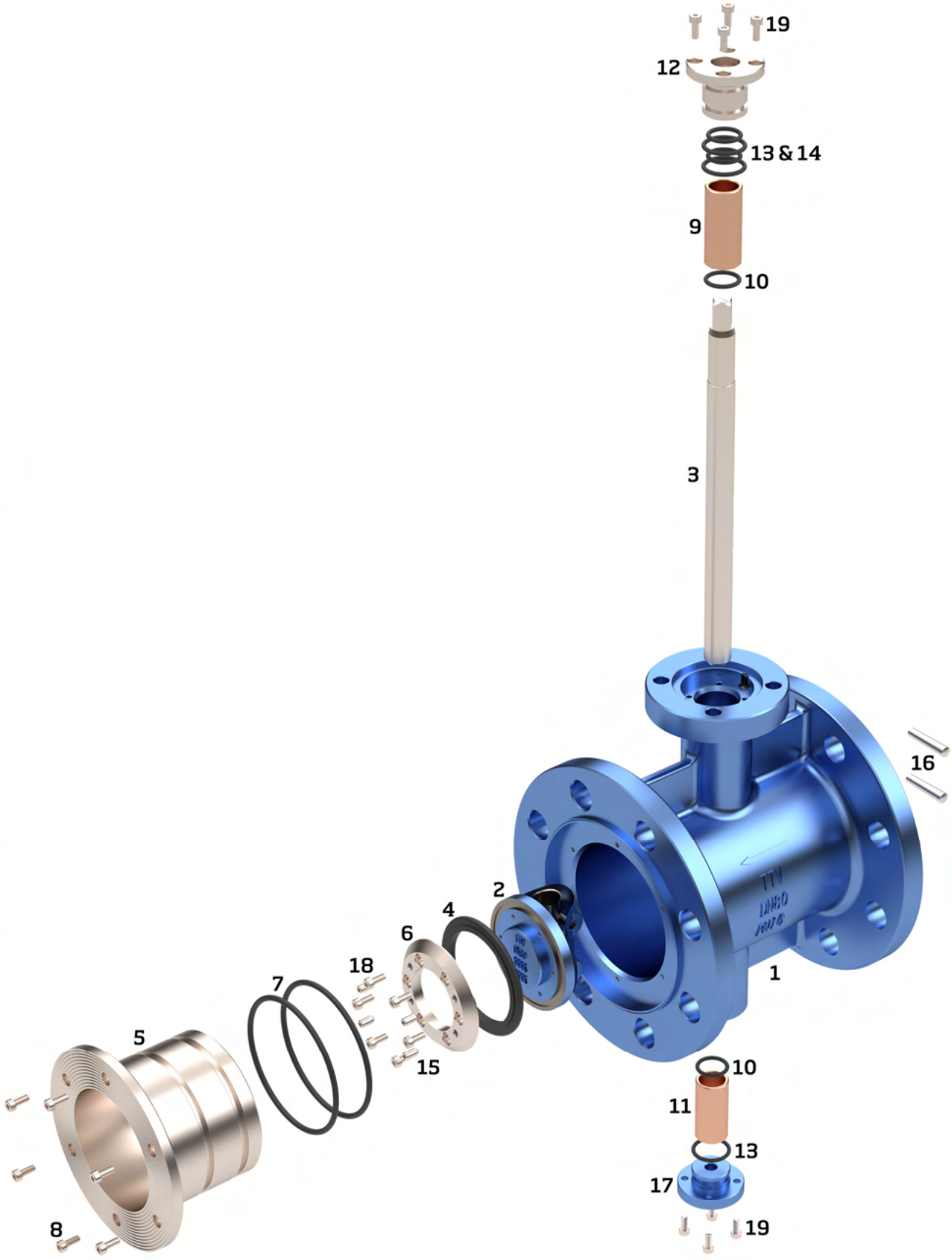
DN80 - DN300



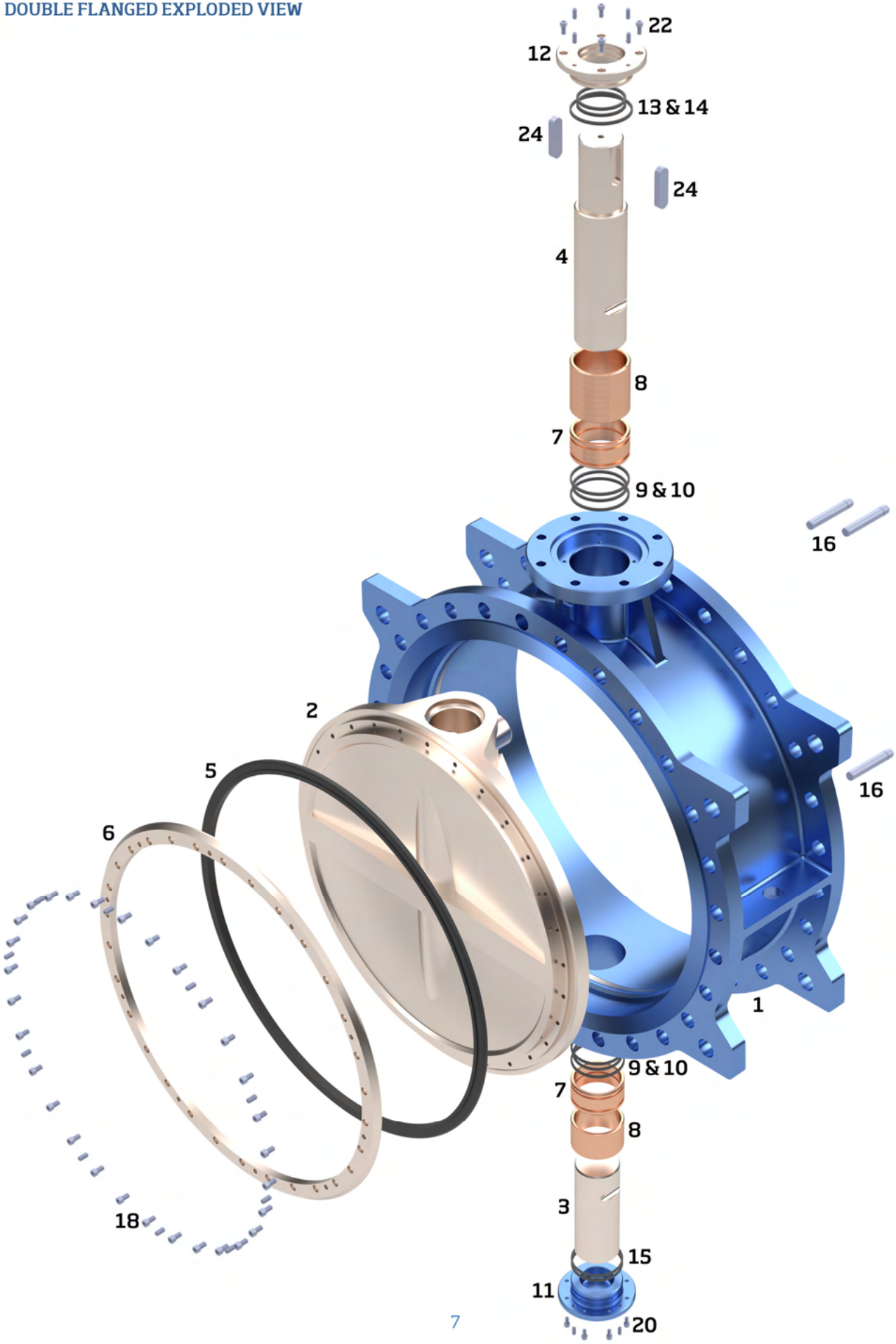
DN350 - DN3000



1. DOUBLE FLANGED REPLACEABLE SEAT EXPLODED VIEW



2. DOUBLE FLANGED EXPLODED VIEW



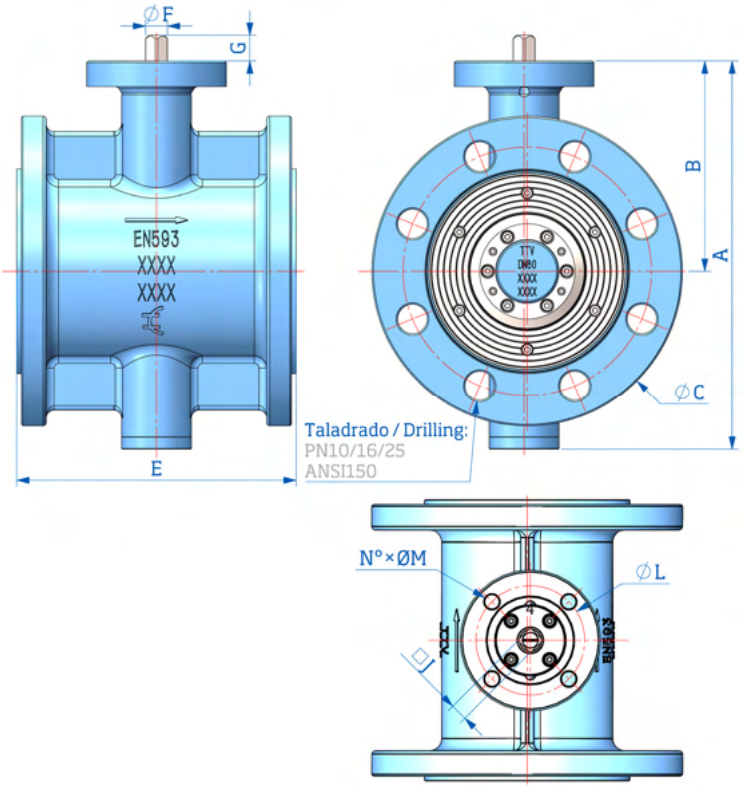
Parts List HYDOR

Item	Description	Material
1	Body	GJS500-7, GJS400, A216 WCB, CF-8M, B148 9D, 4A, 5A, 6A
2	Disc	GJS500-7, GJS400, A216 WCB, CF-8M, B148 9D, 4A, 5A, 6A
3	Down Shaft	SS 316, 1.4462
4	Upper Shaft	SS 316, 1.4462
5	Elastic ring	EPDM, NITRILE, VITON, EBONITE
6	Retainer	SS 316, SS316L, F51/53/55
7	Bushing	Bronze
8	Bushing	SS 316
9	O-Ring	NITRILE, VITON
10	O-Ring	NITRILE, VITON
11	Locking Device bottom cap	GJS500-7, GJS400, A216 WCB, CF-8M, 1.4462
12	Locking sleeve	A4 (F-316)
13	O-Ring	NITRILE, VITON
14	O-Ring	NITRILE, VITON
15	O-Ring	NITRILE, VITON
16	Locking bolt	SS 316
18	Screw	A4 (F-316)
20	Screw	A4 (F-316)
22	Screw	A4 (F-316)
24	Key	ST-60

Parts list replaceable seat HYDOR

Item	Description	Material
1	Body	GJS500-7, GJS400, A216 WCB, CF-8M, B148 9D, 4A, 5A, 6A
2	Disc	GJS500-7, GJS400, A216 WCB, CF-8M, B148 9D, 4A, 5A, 6A
3	Shaft	SS 316, 1.4462
4	Elastic ring	EPDM, NITRILE, VITON, EBONITE
5	Replaceable Seat	SS 316
6	Retainer	Bronze
7	O-Ring	SS 316
8	Screw	NITRILE
9	Bushing	NITRILE
10	O-Ring	F-316
11	Bushing	A4 (F-316)
12	Locking sleeve	NITRILE
13	O-Ring	NITRILE
14	O-Ring	NITRILE
15	Threaded Pin	A4 (F-316)
16	Locking bolt	NITRILE
17	Bottom Cap	GJS500-7, A216 WCB, CF-8M, 1.4462
18	Screw	A4 (F-316)
19	Screw	A4 (F-316)

4. Double Flanged DIMENSIONS



Double Flange Figure

Subject to change without notice. Drawings may not be an exact representation of manufacture.

DN		A	B	C	E		F	G	J	L	N°×ØM	Weight(Kg)	
mm	inch				S13	S14						S13	S14
80	3"	250.5	135.5	200	114	180	14	16.5	11	70	4×9.5	18	25
100	4"	265	149	230	127	190	17	17	14	70	4×9.5	24	38
125	5"	235	135	255	140	200	17	17	14	70	4×9.5	30	46
150	6"	370	220	300	140	210	17	20	14	102	4×11	42	71
200	8"	425	214	345	152	230	26	30	22	102	4×11	68	92
250	10"	487	247	405	165	250	28	30	22	125	4×14	86	150
300	12"	561	284	460	178	270	36	37	27	125	4×14	142	186
350	14"	602	304	520	190	290	39	72	-	140	4×18	178	228
400	16"	687	345	580	216	310	45	72	-	140	4×18	218	285
450	18"	739	372	640	222	330	45	72	-	140	4×18	271	415
500	20"	848	430	715	229	350	60	105.5	-	165	4×22	399	566
600	24"	956	485	840	267	390	60	103.5	-	165	4×22	548	730
700	28"	1104	556	910	292	430	65	119	-	254	8×18	710	1020
800	32"	1175	596	1025	318	470	72	121	-	254	8×18	1044	1350
900	36"	1312	660	1125	330	510	85	119.5	-	298	8×22	1190	1790
1000	40"	1395	719	1255	410	550	100	110	-	298	8×22	1570	1920
1200	48"	1710	852	1485	470	630	120	211	-	356	8×32	2070	2185
1400	56"	2335	1253	1685	530	710	130	230	-	356	8×32	3295	3640
1600	64"	2638	1378	1930	600	790	140	230	-	356	8×32	4080	4525

Other sizes available on request.

5. TORQUE VALUES (Nm)

mm	Inch	PN10	PN16	PN25
80	3"	90	108	184
100	4"	130	192	258
125	5"	210	264	312
150	6"	220	305	396
200	8"	315	466	800
250	10"	505	827	1346
300	12"	788	1163	2018
350	14"	1098	1754	2731
400	16"	1591	2341	3869
450	18"	2015	3074	5085
500	20"	2623	4135	6789
600	24"	4029	6328	9958
700	28"	5758	9166	15815
800	32"	8376	13446	22048
900	36"	11387	17794	27462
1000	40"	15268	23843	39462
1200	48"	23567	37685	49698
1400	56"	33714	43058	72368
1600	64"	48968	65921	89759
1800	72"	74005	117849	184121
2000	80"	82889	133860	290545
2200	88"	97568	154122	385195
2400	96"	114834	176286	309370
2500	100"	129718	181714	348531
2600	104"	154296	212557	390041
2800	112"	205769	265495	469930
3000	120"	265481	395117	560713

Torques for larger diameters are available on request.
In case of regulating service, the torques must be increased by 15%. Safety factor 30%.
Valid for water at ambient temperature.
The operating torques given here are for guidance only, as they have been studied under constant working pressure and conditions. It is recommended taking also into account fluid speed, due to the dynamic stress produced by the flow on the butterfly.

6. FLOW COEFFICIENT (KV)

The valve KV provides a capacity index that allows easy estimation of the required restriction size in order to ensure a correct fluid flow control of any piping system.
Usable sizing range for High Performance butterfly valves is between 20° and 70° of opening degree .

Liquid → $Fc = 1{,}72 \cdot Q \cdot \sqrt{\frac{G}{\Delta P}}$

Gas → $If\ \Delta P < \frac{P_1}{2}\ ;\ Fc = \frac{Q}{272} \cdot \sqrt{\frac{G(273+T)}{\Delta P\ (P^1+P^2)}}$ If $\Delta P \geq \frac{P_1}{2}\ ;\ Fc = \frac{\sqrt{G\ (273+T)}}{236\ P_1}$

Steam → If $\Delta P < \frac{P_1}{2}\ ;\ Fc = \frac{WK}{13.5 \cdot \sqrt{\Delta P \cdot (P_1 + P_2)}}$ $If\ \Delta P < \frac{P_1}{2}\ ;\ Fc = \frac{WK}{11.9 \cdot P_1}$

Note: $When\ P^2 < \frac{P_1}{P_2}\ use\ \frac{P_1}{2}\ instead\ \Delta P$

Q	Fluid Flow (liquid cbm/h , gas Nm³/h)
W	Fluid Flow (steam Kg/h)
P_1	Inlet pressure (Liquid Kgf/cm², gas and steam Kgf/cm² abs.)
P_2	Outlet pressure (LiquidKgf/cm², gas and steam Kgf/cm² abs.)
ΔP	Pressure Drop P_1 - P_2
G	Specific gravity of the fluid
T	Fluid Temperature (C°)
K	Steam superheat correction coefficient, 1+0.0013 × deg C° of superheat

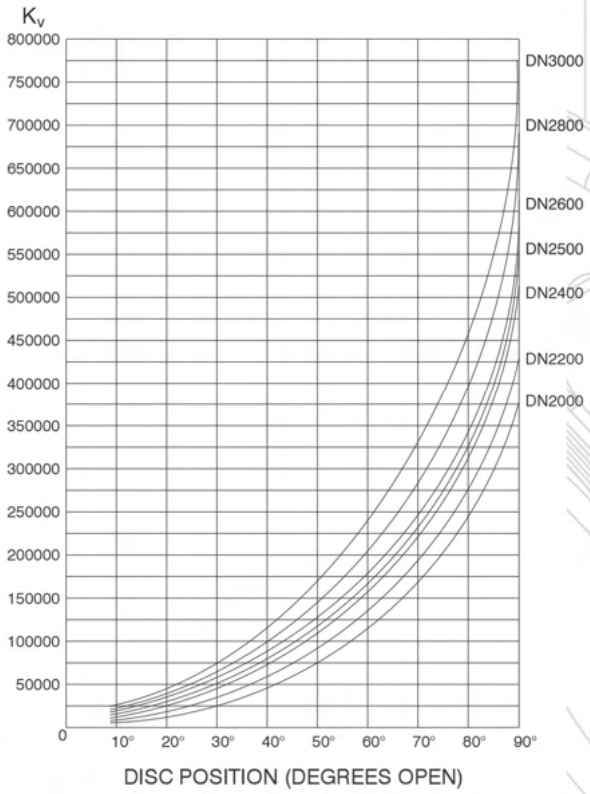
6.1. Characteristic Curve

$$K_v = q_v \cdot \sqrt{\frac{\rho}{\Delta P_v \cdot \rho_0}}$$

K_v	:	Flow coefficient
q_v	:	Flow rate in m³/h
ρ	:	Density of water in kg/m³
ρ_0	:	Density of water at 15°C in kg/m³
ΔP_v	:	Pressure loss of the valve in bar

$$C_v = 1.16 \times K_v$$

C_v	:	Flow coefficient based on US gallon/min and psi



7. CAVITATION

Cavitation occurs when a fluid moves in a high speed through a region producing a decompression of the fluid generally caused by a local pressure drop below the steam pressure of the fluid.

This phenomenon can create accelerated wear and deterioration of valves and piping as well as noise and vibration problems.

Following formulas can be used to avoid cavitation:

$$\xi = 1{,}57 \cdot 10^{-3} \cdot \frac{DN^4}{KV^2}$$

$$z = 0.1 \cdot \log \xi + 0.14$$

$$X_f = \frac{\Delta P}{P_1 - P_v}$$

$$X_f < Z_y$$

ξ	Valve restriction factor	Z_Y	Cavitation value
X_f	Pressure ratio	ΔP	Pressure drop $P_1 - P_2$
P_1	Inlet Pressure	P_v	Liquid steam Pressure
DN	Diameter	K_v	Flow coefficiente Kv

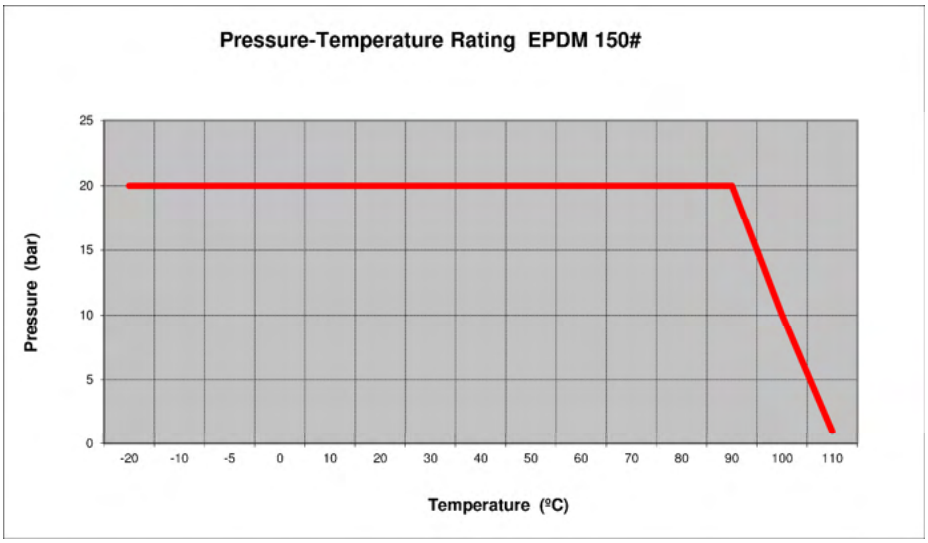
8. SPARE PARTS

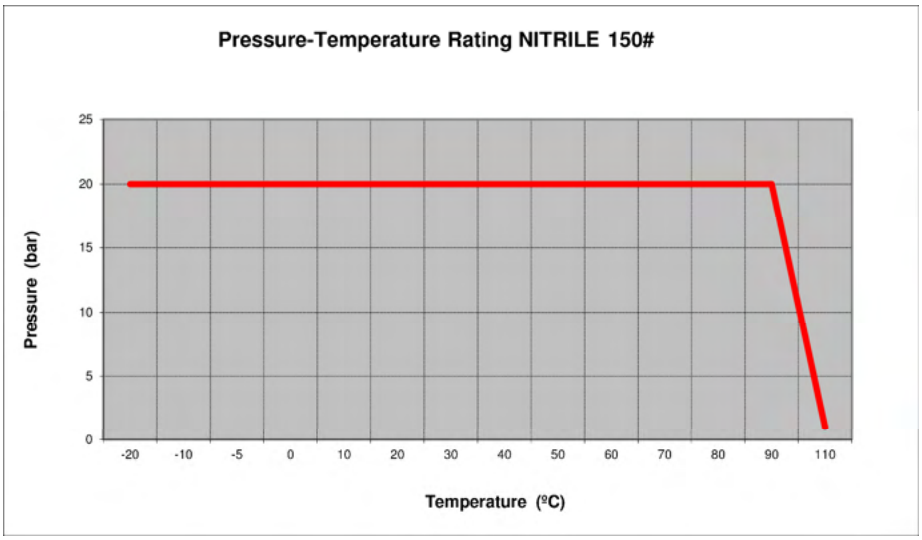
- The standard kit of spares includes the rubber seat on disc and rubber orings.
- No spare kits are reccommended for commissioning.
- Spares recommended for 2 years operation: 1 kit per every 5 valves of the same size/material/type originally supplied.
- Spares recommended for 5 years operation: 1 kit per every 3 valves of the same size/material/type originally supplied.
- Additional spares like discs, shafts, etc...are available on request.

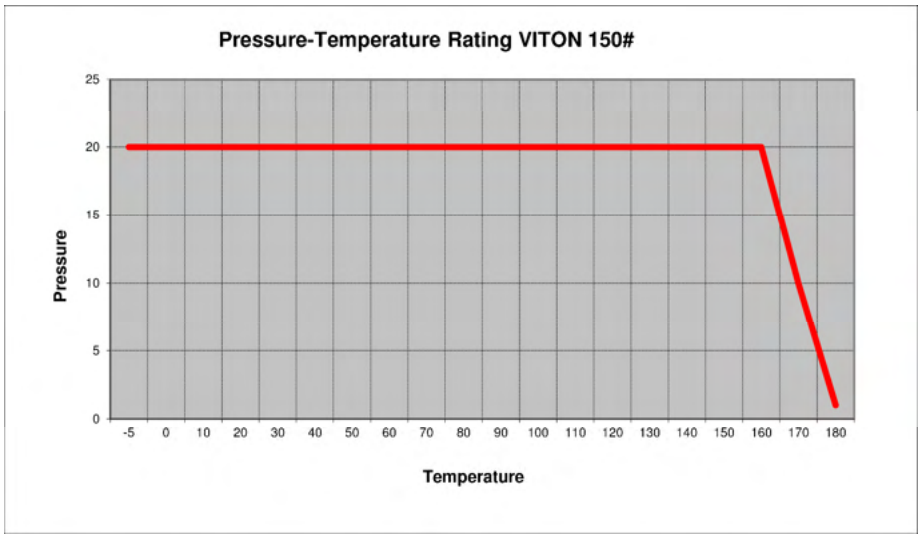
9. PRESSURE | TEMPERATURE

Study and simulation of the evolution of the mechanical properties of the material subjected to heating at high temperatures or cooling at low temperatures.

Following graphs show temperature - pressure ranges according to the disc sealing ring material selected .

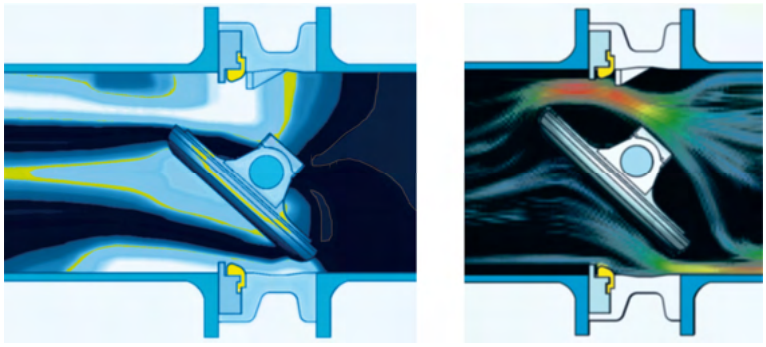






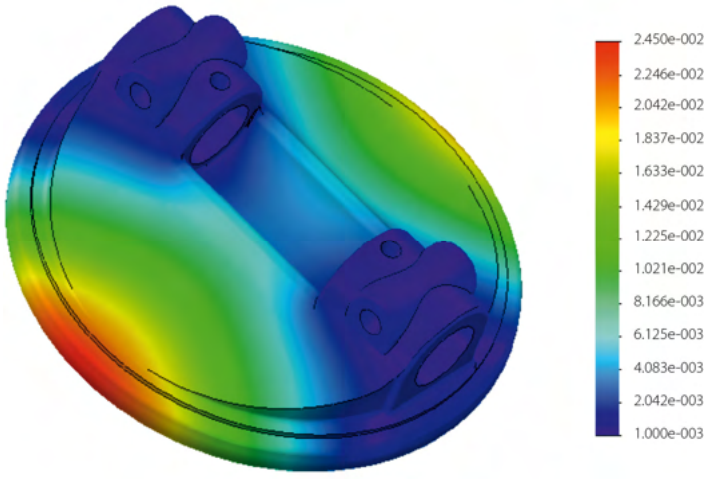
10. FLUID SIMULATION

3D fluid simulation to develop an aerodynamic disc with reduced noise and turbulence .

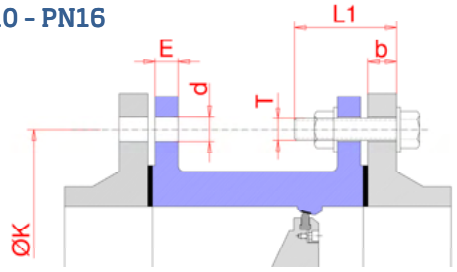


11. DISC MATERIAL RESISTANCE ANALYSIS UNDER PRESSURE

Performance and stress analysis according to ISO-5208 / API598 / EN12266 / AWWA C504.



12. DOUBLE FLANGED BOLTING | PN10 - PN16



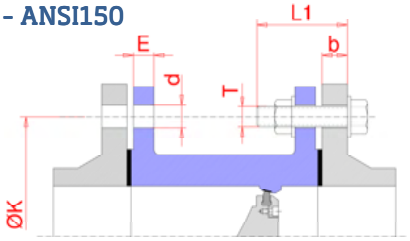
PN10

VALVE		FLANGE				SCREWS		
DN	E	b	ØK	N°	d	N° Scr.	ØT	L1
80	24	20	160	8	18	8	M16	78
100	24	20	180	8	18	8	M16	78
125	26	22	210	8	18	8	M16	82
150	28	22	240	8	23	8	M20	87
200	30	24	295	8	23	8	M20	91
250	32	26	350	12	23	12	M20	95
300	34	26	400	12	23	12	M20	97
350	38	26	460	16	23	16	M20	101
400	40	26	515	16	27	16	M24	107
450	40	28	565	20	27	20	M24	109
500	44	28	620	20	27	20	M24	113
600	46	28	725	20	30	20	M27	118
700	46	30	840	24	30	24	M27	120
800	50	32	950	24	33	24	M30	128
900	54	34	1050	28	33	28	M30	134
1000	58	34	1160	28	36	28	M33	141
1200	70	38	1380	32	39	32	M36	160
1400	93	42	1590	36	42	36	M39	190
1600	110	46	1820	40	48	40	M45	217
1800	119	50	2020	44	48	44	M45	230
2000	132	54	2230	48	48	48	M45	247
2200	139	58	2440	52	55	52	M52	265
2400	145	62	2650	56	55	56	M52	275
2600	145	66	2850	60	55	60	M52	279
2800	157	70	3070	64	55	64	M52	295
3000	166	74	3290	68	60	68	M56	312

PN16

VALVE		FLANGE				SCREWS		
DN	E	b	ØK	N°	d	N° Scr.	ØT	L1
80	24	20	160	8	18	8	M16	81
100	24	20	180	8	18	8	M16	81
125	26	22	210	8	18	8	M16	85
150	28	22	240	8	23	8	M20	90
200	30	24	295	12	23	12	M20	94
250	32	26	355	12	27	12	M24	98
300	34	28	410	12	27	12	M24	102
350	38	30	470	16	27	16	M24	108
400	40	32	525	16	30	16	M27	116
450	40	32	585	20	30	20	M27	116
500	44	34	650	20	33	20	M30	122
600	46	36	770	20	36	20	M33	129
700	46	36	840	24	36	24	M33	129
800	50	38	950	24	39	24	M36	138
900	54	40	1050	28	39	28	M36	134
1000	58	42	1170	28	42	28	M39	154
1200	58	48	1390	32	48	32	M45	163
1400	60	52	1590	36	48	36	M45	173
1600	60	58	1820	40	56	40	M52	187
1800	119	62	2020	44	55	44	M52	237
2000	132	66	2230	48	60	48	M56	258
2200	139	70	2440	52	60	52	M56	269
2400	145	76	2650	56	60	56	M56	279
2600	145	80	2908	72	60	72	M56	283

13. DOUBLE FLANGED BOLTING | PN25 - ANSI150



	VALVE		FLANGE				SCREWS		
	DN	E	b	ØK	N°	d	N° Scr.	ØT	L1
PN25	80	24	24	160	8	18	8	M16	82
	100	24	24	190	8	23	8	M20	85
	125	26	26	220	8	26	8	M24	93
	150	28	28	250	8	26	8	M24	97
	200	30	30	310	12	26	12	M24	101
	250	32	32	370	12	30	12	M27	108
	300	34	34	430	16	30	16	M27	112
	350	38	38	490	16	33	16	M30	122
	400	40	40	550	16	36	16	M33	129
	500	44	45	660	20	36	20	M33	137
	600	46	48	770	20	39	20	M36	144
	700	46	50	875	24	42	24	M39	147
	800	50	54	990	24	48	24	M45	161
	900	54	58	1090	28	48	28	M45	169
	1000	58	62	1210	28	56	28	M52	184
	1200	70	70	1420	32	56	32	M52	208
	1400	93	76	1640	36	62	36	M56	241
	1600	110	82	1860	40	62	40	M56	264
	1800	119	90	2070	44	70	44	M64	287
	2000	132	98	2300	48	70	48	M64	308

	VALVE		FLANGE				SCREWS		
	DN	E	b	ØK	N°	d	N° Scr.	ØT	L1
ANSI150	80	24	28.6	152.4	4	19	4	Ø19	88
	100	24	31	190.5	8	19	8	Ø19	90
	125	26	34.9	215.9	8	23	8	Ø22.4	101
	150	28	36.5	241.3	8	23	8	Ø22.4	104
	200	30	41.3	298.4	8	23	8	Ø22.4	111
	250	32	47.6	362	12	26	12	Ø25.4	123
	300	34	50.8	431.8	12	26	12	Ø25.4	129
	350	38	54	476.2	12	29	12	Ø28.5	139
	400	40	57.1	539.8	16	29	16	Ø28.5	144
	450	40	60.3	577.9	16	32	16	Ø31.8	151
	500	44	63.5	635	20	32	20	Ø31.8	158
	600	46	69.8	749.3	20	36	20	Ø35	170
	700	46	69.9	863	28	36	28	Ø35	170
	800	50	79.4	978	28	41	28	Ø41	191
	900	54	88.9	1086	32	41	32	Ø41	204
	1000	58	88.9	1200	36	41	36	Ø41	208
	1200	58	106.4	1422	44	41	44	Ø41	226
	1400	60	122.3	1651	48	48	48	Ø48	251
	1600	60	140	1879.6	52	51	52	Ø51	273

14. STANDARD BOLT TIGHTENING TORQUE | PN10/16 - ANSI150

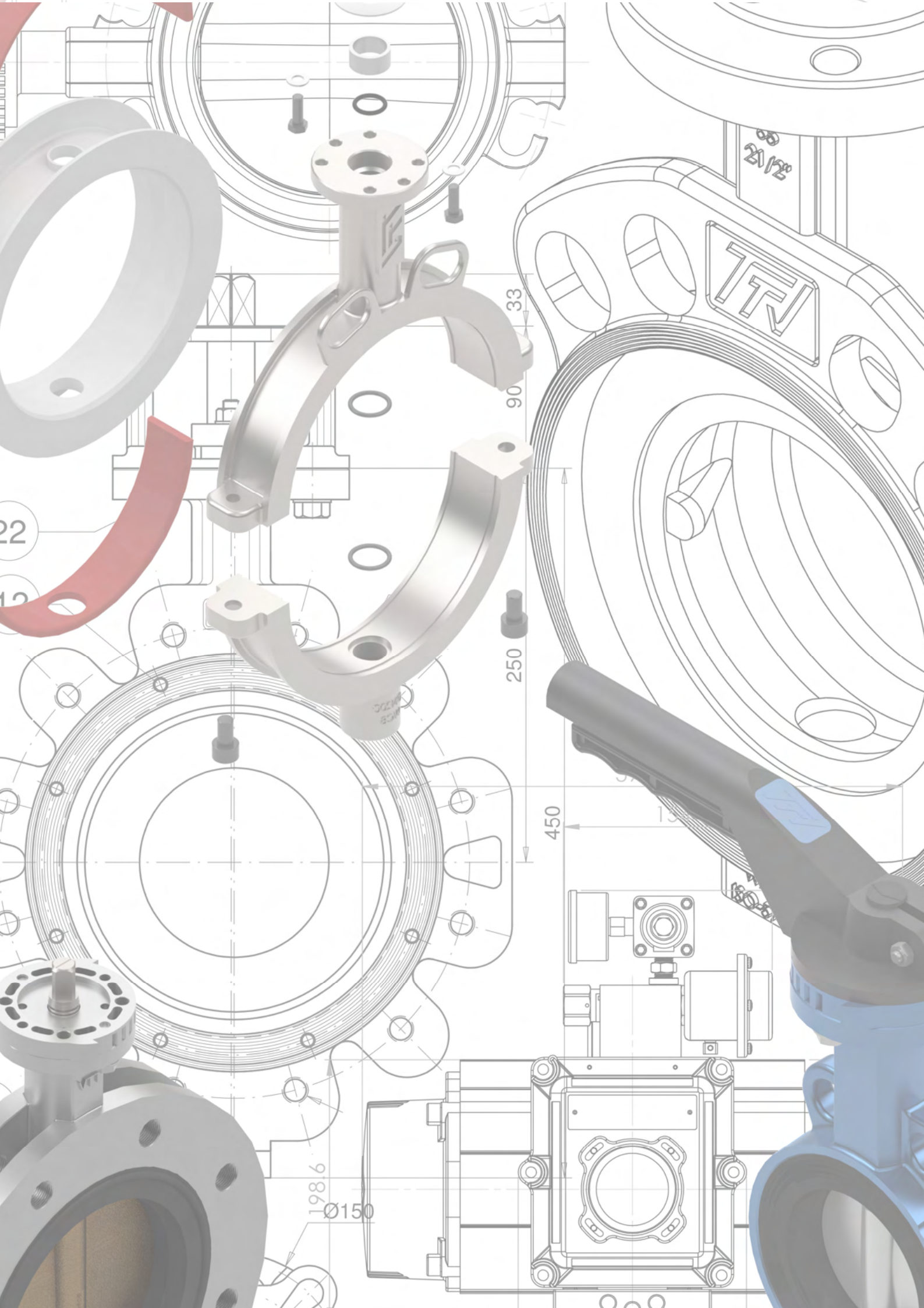
DN VALVE	PN	BOLT	PITCH	5.6 Rm: 500 N/mm² Re: 340 N/mm² Cs (Nm)	5.6 F. Max. (N)	8.8 Rm: 800 N/mm² Re: 640 N/mm² Cs (Nm)	8.8 F. Max. (N)	10.9 Rm: 1000 N/mm² Re: 940 N/mm² Cs (Nm)	10.9 F. Max. (N)	12.9 Rm: 1200 N/mm² Re: 1140 N/mm² Cs (Nm)	12.9 F. Max. (N)	A4 Cs (Nm)	A4 F. Max. (N)
100	10/16	M16	2	98	31385	209	66955	307	98340	359	115079	157	50457
	ANSI150	5/8"	11 t/h									156	46737
125	10/16	M16	2	98	31385	209	66955	307	98340	359	115079	157	50457
	ANSI150	3/4"	10									274	69766
150	10/16	M20	2.5	190	49039	406	104617	596	153657	698	179811	306	78777
	ANSI150	3/4"	10 t/h									274	69766
200	10/16	M20	2.5	190	49039	406	104617	596	153657	698	179811	306	78777
	ANSI150	3/4"	10 t/h									274	69766
250	10	M20	2.5	190	49039	406	104617	596	153657	698	179811	306	78777
	16	M24	3	328	70616	699	150649	1027	221266	1202	258928	526	113478
	ANSI150	7/8"	9 t/h									439	96900
300	10	M20	2.5	190	49039	406	104617	596	153657	698	179811	306	78777
	16	M24	3	328	70616	699	150649	1027	221266	1202	258928	526	113478
	ANSI150	7/8"	9 t/h									439	96900
350	10	M20	2.5	190	49039	406	104617	596	153657	698	179811	306	78777
	16	M24	3	328	70616	699	150649	1027	221266	1202	258928	526	113478
	ANSI150	1"	8 t/h									655	127301
400	10	M24	3	328	70616	699	150649	1027	221266	1202	258928	526	113478
	16	M27	3	486	93042	1038	198491	1524	291534	1784	341157	781	149303
	ANSI150	1"	8 t/h									655	127301
450	10	M24	3	328	70616	699	150649	1027	221266	1202	258928	526	113478
	16	M27	3	486	93042	1038	198491	1524	291534	1784	341157	781	149303
	ANSI150	1 1/8"	7 t/h									959	167737
500	10	M24	3	328	70616	699	150649	1027	221266	1202	258928	526	113478
	16	M30	3.5	660	113045	1408	241163	2069	354209	2421	414500	1060	181585
	ANSI150	1 1/8"	7 t/h									959	167737
600	10	M27	3	486	93042	1038	198491	1524	291534	1784	341157	781	149303
	16	M33	3.5	897	141009	1914	300819	2811	441828	3290	517033	1441	226493
	ANSI150	1 1/4"	7 t/h									1346	213965
700	10	M27	3	486	93042	1038	198491	1524	291534	1784	341157	781	149303
	16	M33	3.5	897	141009	1914	300819	2811	441828	3290	517033	1441	226493
	ANSI150	1 1/4"	7 t/h									1346	213965
750	10	M30	3	660	113045	1408	241163	2069	354209	2421	414500	1060	181585
	16	M33	3.5	897	141009	1914	300819	2811	441828	3290	517033	1441	226493
	ANSI150	1 1/4"	7 t/h									1346	213965
800	10	M30	3.5	660	113045	1408	241163	2069	354209	2421	414500	1060	181585
	16	M36	4	1151	165409	2456	352873	3607	518282	4221	606501	1849	265633
	ANSI150	1 1/2"	6 t/h									2399	322985
900	10	M30	3.5	660	113045	1408	241163	2069	354209	2421	414500	1060	181585
	16	M36	4	1151	165409	2456	352873	3607	518282	4221	606501	1849	265633
	ANSI150	1 1/2"	6 t/h									2399	322985
1000	10	M33	3.5	897	141009	1914	300819	2811	441828	3290	517033	1441	226493
	16	M39	4	1496	198910	3191	424342	4686	623253	5484	729339	2402	31948
	ANSI150	1 1/2"	6 t/h									2399	322985
1100	10	M33	3.5	897	141009	1914	300819	2811	441828	3290	517033	1441	226493
	16	M39	4	1496	198910	3191	424342	4686	623253	5484	729339	2402	319418
	ANSI150	1 1/2"	6 t/h									2399	322985
1200	10	M36	4	1151	165409	2456	352873	3607	518282	4221	606501	1849	265633
	16	M45	4.5	2309	266697	4925	568953	7234	835650	8465	977888	3708	428284
	ANSI150	1 1/2"	6 t/h									2399	322985
1400	10	M39	4	1496	198910	3191	424342	4686	623253	5484	729339	2402	319418
	16	M45	4.5	2309	266697	4925	568953	7234	835650	8465	977888	3708	428284
	ANSI150	1 3/4"	5 t/h									3901	454062
1600	10	M45	4.5	2309	266697	4925	568953	7234	835650	8465	977888	3708	428284
	16	M52	5	3590	359886	7661	767757	11251	1127644	13166	1319583	5766	577935
	ANSI150	1 7/8"	4.5 t/h									4832	527865
1800	10	M45	4.5	2309	266697	4925	568953	7234	835650	8465	977888	3708	428284
	16	M52	5	3590	359886	7661	767757	11251	1127644	13166	1319583	5766	577935
2000	10	M45	4.5	2309	266697	4925	568953	7234	835650	8465	977888	3708	428284
	16	M56	5.5	4473	415493	9543	886385	14016	1301879	16401	1523475	7183	667233
2200	10	M52	5	3590	359886	7661	767757	11251	1127644	13166	1319583	5766	577935
	16	M56	5.5	4473	415493	9543	886385	14016	1301879	16401	1523475	7183	667233
2400	10	M52	5	3590	359886	7661	767757	11251	1127644	13166	1319583	5766	577935
	16	M56	5.5	4473	415493	9543	886385	14016	1301879	16401	1523475	7183	667233
2600	10	M52	5	3590	359886	7661	767757	11251	1127644	13166	1319583	5766	577935
	16	M56	5.5	4473	415493	9543	886385	14016	1301879	16401	1523475	7183	667233
2800	10	M52	5	3590	359886	7661	767757	11251	1127644	13166	1319583	5766	577935
3000	10	M56	5.5	4473	415493	9543	886385	14016	1301879	16401	1523475	7183	667233

Calculate torque with Re 85% and coefficient MU=coefficient of friction = 0.15
(Coefficient K = torque coefficient = 0.20)

15. STANDARD BOLT TIGHTENING TORQUE | PN25

DN VALVE	PN	BOLT	PITCH	5.6 Rm: 500 N/mm² Re: 340 N/mm²		8.8 Rm: 800 N/mm² Re: 640 N/mm²		10.9 Rm: 1000 N/mm² Re: 940 N/mm²		12.9 Rm: 1200 N/mm² Re: 1140 N/mm²		A4	
				Cs (Nm)	F. Max. (N)	Cs (Nm)	F. Max. (N)	Cs (Nm)	F. Max. (N)	Cs (Nm)	F. Max. (N)	Cs (Nm)	F. Max. (N)
100	25	M20	2.5	190	49039	406	104617	596	153657	698	179811	306	78777
125	25	M24	3	328	70616	699	150649	1027	221266	1202	258928	526	113478
150	25	M24	3	328	70616	699	150649	1027	221266	1202	258928	526	113478
200	25	M24	3	328	70616	699	150649	1027	221266	1202	258928	526	113478
250	25	M27	3	486	93042	1038	198491	1524	291534	1784	341157	781	149303
300	25	M27	3	486	93042	1038	198491	1524	291534	1784	341157	781	149303
350	25	M30	3	660	113045	1408	241163	2069	354209	2421	414500	1060	181585
400	25	M33	3.5	897	141009	1914	300819	2811	441828	3290	517033	1441	226493
450	25	M33	3.5	897	141009	1914	300819	2811	441828	3290	517033	1441	226493
500	25	M33	3.5	897	141009	1914	300819	2811	441828	3290	517033	1441	226493
600	25	M36	4	1151	165409	2456	352873	3607	518282	4221	606501	1849	265633
700	25	M39	4	1496	198910	3191	424342	4686	623253	5484	729339	2402	319418
800	25	M45	4.5	2309	266697	4925	568953	7234	835650	8465	977888	3708	428284
900	25	M45	4.5	2309	266697	4925	568953	7234	835650	8465	977888	3708	428284
1000	25	M52	5	3590	359886	7661	767757	11251	1127644	13166	1319583	5766	577935
1100	25	M52	5	3590	359886	7661	767757	11251	1127644	13166	1319583	5766	577935
1200	25	M52	5	3590	359886	7661	767757	11251	1127644	13166	1319583	5766	577935
1400	25	M56	5.5	4473	415493	9543	886385	14016	1301879	16401	1523475	7183	667233
1600	25	M56	5.5	4473	415493	9543	886385	14016	1301879	16401	1523475	7183	667233
1800	25	M64	6.5	5283	462703	11622	933595	16553	1349089	19371	1570685	7924	714443
2000	25	M64	6.5	5283	462703	11622	933595	16553	1349089	19371	1570685	7924	714443

Calculate torque with Re 85% and coefficient MU=coefficient of friction = 0.15
(Coefficient K = torque coefficient = 0.20)


33
90
250
450
198.6
Ø150

NOTES

NOTES

Calle de Severo Ochoa, 11
Polígono Ind. Ntra. Sra. De Butarque
28914 Leganes (Madrid)

T: +34 916 857 365
F: +34 916 800 660
valves@ttv.es