

INSTRUCTIONS FOR USE
AND MAINTENANCE

REVISION-0
DATE : 20-02-2002

CE MARKING TECHNICAL DOCUMENTATION TO PED 97/23/CE

"VAMEIN" BUTTERFLY VALVES





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**INSTRUCTIONS FOR USE AND
MAINTENANCE**

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18.1. ASEMBLY.

Based on many years of experience in the manufacturing of butterfly valves, we are able to say that many of the problems arisen are due to the incorrect installation. This is why we believe it is very important that all the Distributors of our valves train their Clients on how to install the **VAMEIN** butterfly valve correctly, which makes the job easier and safer.

The **VAMEIN** butterfly valve has been specially designed to be installed between two flanges without the need of any joints between the valve and the piping, as this function is done by the seat.

The **VAMEIN** butterfly valve can be installed in any flow direction thanks to its special design, which converts it in a bi-directional valve.

The body design makes it's installing easier due to its low weight and its guidance holes to correctly guide the bolts.

The valve-actuator unit does not need any kind of brackets for its installation. excepting large diameter valves with special or oversized actuators.



18.1.1. FLANGE DIMENSIONS.

On installing a valve, it is very important to have the flange dimensions in mind, as their inner diameter must be between the maximum and minimum values shown in the table indicated below and document drawings.

The inner diameter of the flanges must be bigger than "Q" shown in our dimensional drawings, and it can be defined as the chord diameter to valve's face and serving to make the calculation of disc movement inside the pipe easier. If the inner diameter of the flanges is smaller than "Q", the disc will interfere with the flange or the pipe when opening. This may cause damage or may not allow the valve to open or close. The maximum of the inner diameter must not be exceeded, as if the seat liner is not compressed enough, the watertightness with the face of the flanges would not be achieved and it could also come out from its body housing when opening or closing the valve.

D.N. VÁLVE		OUTER DIÁMETER OF	INNER DIÁMETER OF	Dim.
mm	Pulg.	SEAT LINER	SEAT LINER	"Q"
50	2"	83	52	32
65	2½"	103	67	51
80	3"	119	83	69
100	4"	138	102	89
125	5"	166	127	115
150	6"	191	153	143
200	8"	244	203	194
250	10"	301	253	243
300	12"	351	303	293
350	14"	400	343	332
400	16"	454	398	382
450	18"	510	448	432
500	20"	564	497	478
600	24"	676	607	585
700	28"	776	716	683
750	30"	859	788	733
800	32"	870	804	755
900	36"	970	911	852
1.000	40"	1.100	1.016	958
1.050	42"	1.150	1.066	1.013
1.100	44"	1.200	1.116	1.050
1.200	48"	1.290	1.156	1.098



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18.1.2. ASSEMBLY INSTRUCTIONS.

The **VAMEIN** valve is installed through the compression between the valve body and the pipe flanges and no joints are required.

BEFORE ASSEMBLING

- Verify that there are no welding slags or metallic particles on the face of the flanges.
- Verify that the flanges are separated enough to allow the valve to be slotted without damaging the seat.
- Verify that the inner diameter both of the flanges and pipe allows the movement of the disc, and check that the inner diameter of pipe is within the values of the following table.

D.N. VALVE mm	Inch.	MAXIMUM INNER DIAMETER OF FLANGE / PIPE	MINIMUM INNER DIAMETER OF FLANGE / PIPE	Dim. "Q"
50	2"	62	42	32
65	2½"	77	59	51
80	3"	91	76	69
100	4"	116	95	89
125	5"	144	121	115
150	6"	171	146	143
200	8"	223	197	194
250	10"	277	249	243
300	12"	328	297	293
350	14"	372	347	332
400	16"	423	396	382
450	18"	474	446	432
500	20"	524	495	478
600	24"	624	586	585
700	28"	715	692	683
750	30"	787	745	733
800	32"	817	793	755
900	36"	919	890	852
1.000	40"	1.020	994	958
1.050	42"	1.070	1.044	1.013
1.100	44"	1.110	1.090	1.050
1.200	48"	1.200	1.130	1.098

N.B.: To obtain the best working conditions, flanges with the biggest surface contacting the seat must be selected; this way, accidental getting out of the seat from its housing will be avoided and the maximum permissible design pressure can be achieved.

For this reason, the following rule must be taken into consideration:

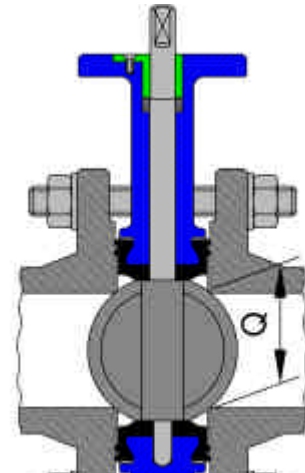
"THE SMALLER CONTACT SURFACE WITH THE SEAT THE FLANGE HAS, THE LOWER WORKING PRESSURE THE VALVE HAS".



EXAMPLES.

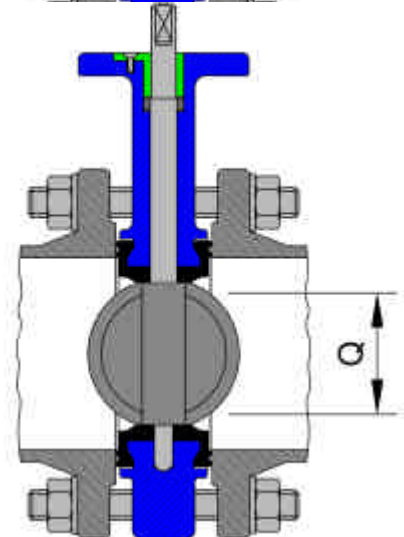
- Too small flanges:

If the inner diameter of flanges is smaller than the dimension "Q", the disc will touch these flanges or the pipe during opening. This will cause damages and will not allow the valve to open or close properly.



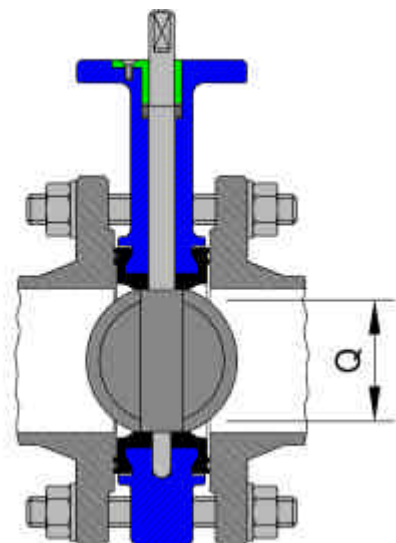
- Too big flanges:

If the inner diameter of flanges is bigger than the one indicated as maximum in chart of the previous page, the liner will not be compressed enough and will not reach the correct water tightness with the flange surfaces. Furthermore, there is the risk that the liner will come off from its housing during an open / close operation of the valve.



- Right flanges:

In order to achieve the maximum contact surface of the flange with the liner and thus reaching the maximum working pressure of the valve it is necessary to select flanges where the inner diameter is as close as possible to the minimum diameter indicated in CHART of previous page, in order to get the maximum contact surface of the flange with the liner and thus to be able to reach the maximum admissible working pressure of the valve.





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DURING THE ASSEMBLY:

- Place the valve half closed to avoid the butterfly to project out of the valve's body.
- Place the valve between the two flanges and center it by means of some braces.
- Open the valve to its full extent to ensure that the disc has no contact with the inner flange or pipe diameter.
- Tighten all the studs and/or bolts in an opposed sequence.
- Operate the valve several times to ensure the free rotation of the disc.
- With DN-500 mm (20") valves and above it is advisable to use a telescopic disassembling spool to make the assembly easier.
- From DN-600 mm (24") onwards, the valve must be installed with its shaft parallel to the ground to ease and secure the support on the bearings, gaining better movement of the disc, avoiding it from resting its weight on the seat or the cover plates, this way you also gain the advantage of the seat selfcleaning, removing any dirt from the rotation area, preventing it from any damage.

18.1.3. BUTTERFLY VALVE POSITIONING.

The **VAMEIN** butterfly valves up to 500 mm (20") Nominal Diameter can be installed in a vertical or horizontal position. Nevertheless, from a mechanical point of view the optimum position for the shaft is to be in a horizontal position as it allows the weight of the butterfly to rest on the valve bearings. From a hydraulic point of view, the horizontal position allows the fluid to have a cleaning effect on the interior pivot point of the valve.

The circuit configuration, in the case of Tees or elbows, especially when the fluid is flowing fast, imposes some conditions on the positioning of the valves:

- a) Avoid close proximity to an elbow, especially when installed downstream.
- b) If the valve is close to an elbow, the shaft of the disc must be placed in the elbows plan to avoid the fluid's vein coming loose and its acceleration effects.



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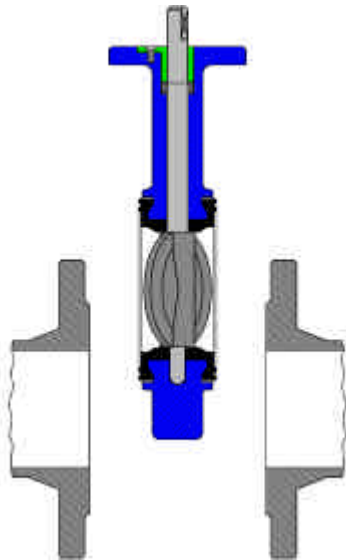
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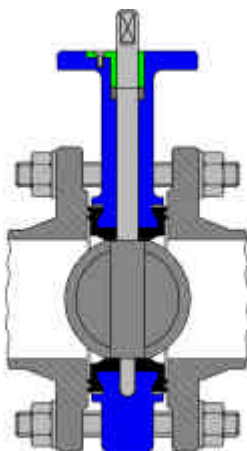
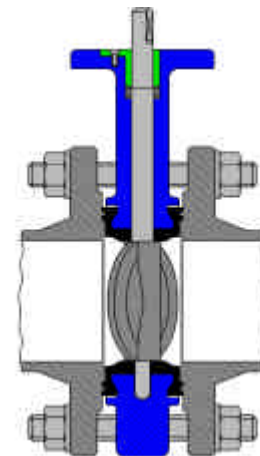
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18.1.4. MOUNTING INSTRUCTIONS (CORRECT INSTALLATION).

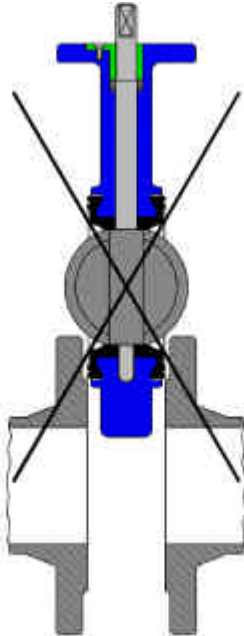


A. Pipe displaced to enable free access to the valve.

B. Valve in semi-closed position to protect the edge of the disc, reduce the friction of the liner during the installation and help to reduce the initial torque.

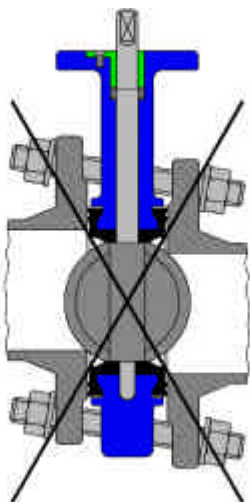
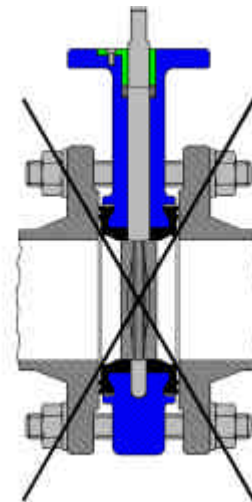


C. Disc should be turned to the full open position after the alignment with flanges and before tightening the bolts, which should be done crosswise.

18.1.5. MOUNTING INSTRUCTIONS (INCORRECT INSTALLATION).

- A. Pipe insufficiently displaced; the liner can be damaged and squeezed out from its housing. Disc in the open position will touch the flange and will be damaged.

- B. The disc in the fully closed position will cause liner distortion. When the flanges are compressed, the rubber distorts creating an excessive initial torque for the operation.



- C. Incorrect pipe alignment may cause interferences between disc edge and flange inner faces, leading to excessive torque and damages to the disc and its coating, and therefore failures in the valve tightness.



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18.2. MAINTENANCE.

The VAMEIN butterfly valves have been designed and manufactured to obtain the maximum life and efficiency at minimum wear.

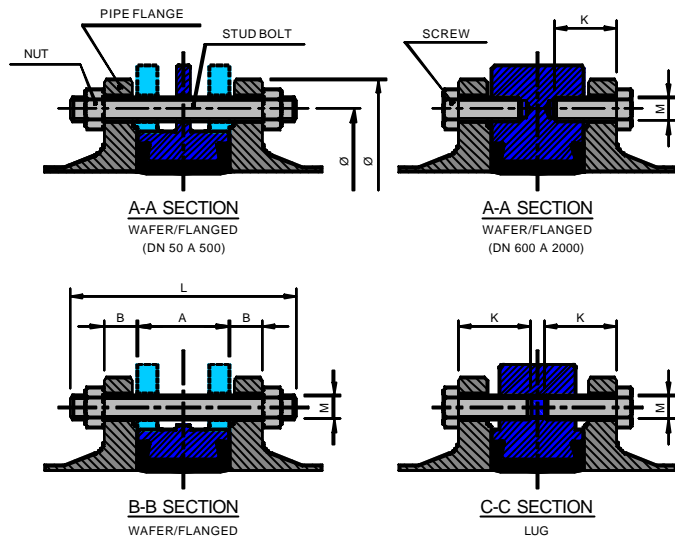
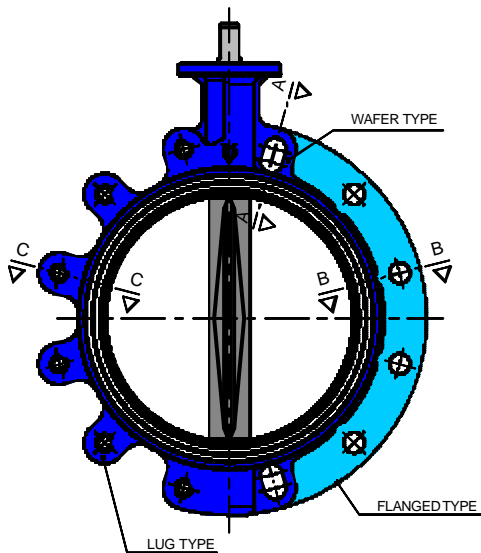
No periodic lubrication or maintenance is required.

All the VAMEIN butterfly valve components are replaceable. In order to replace any component the valve must be removed from the pipeline following steps listed below:

- a) Move the disc near the closed position. As the valve is installed and we do not know the disc position, we must take into account the indication of the torsion parallel flats or the keyway which are in the same position as the shaft and the disc. In case of valves with square end shaft, a notch on the upper part of the shaft indicates the disc position.
- b) Hold the valve and remove the flange bolts.
- c) Replace the damaged component.
- d) Place the valve into installation again.

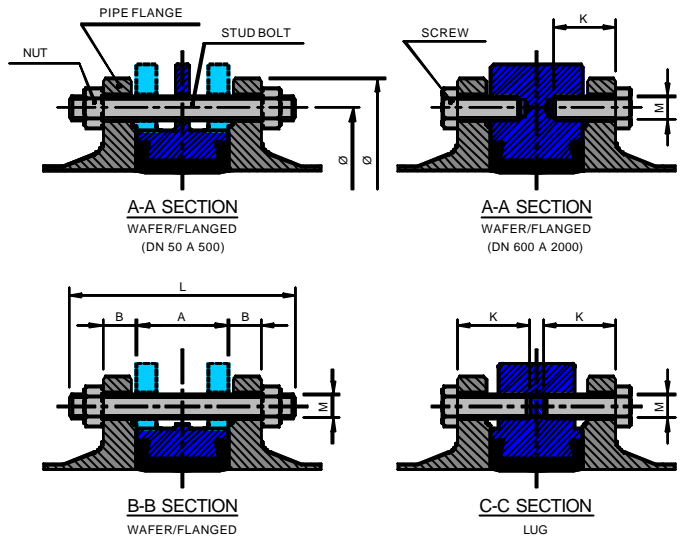
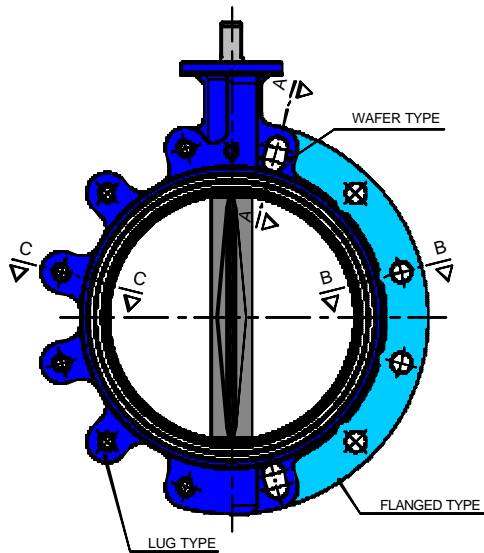
As VAMEIN actuators are replaceable, and thanks to the security system avoiding the shaft to be blown out accidentally, they can be replaced on site without removing the valve from pipeline.

18.3. BOLTS FOR THE INSTALLATION OF THE "VAMEIN" BUTTERFLY VALVES.



DIN PN-10 STANDARD																	
VALVE		FLANGES (DIN-2632)					NECESSARY BOLTS FOR WAFER AND FLANGED TYPE						BOLTS FOR LUG TYPE				
D.N.	FACE TO FACE	THICKNESS	BOLT CENTRE	QUANTITY	EXTERNAL DIAMETER	STUD BOLTS			NUTS		SCREWS			SCREWS			
						LENGT	THREAD	QUANTITY	THREAD	QUANTITY	LENGT	THREAD	QUANTITY	LENGT	THREAD	QUANTITY	
mm	Inch.	A	B	Ø C	Nº	Ø D	L	M	Nº	M	Nº	L	M	Nº	L	M	Nº
50	2"	43	18	125	4	165	120	M-16	4	M-16	8				35	M-16	8
65	2½"	46	18	145	4	185	125	M-16	4	M-16	8				35	M-16	8
80	3"	46	20	160	8	200	130	M-16	8	M-16	16				40	M-16	16
100	4"	52	20	180	8	220	135	M-16	8	M-16	16				40	M-16	16
125	5"	56	22	210	8	250	140	M-16	8	M-16	16				45	M-16	16
150	6"	56	22	240	8	285	150	M-20	8	M-20	16				45	M-20	16
200	8"	60	24	295	8	340	160	M-20	8	M-20	16				50	M-20	16
250	10"	68	26	350	12	395	170	M-20	12	M-20	24				55	M-20	24
300	12"	78	26	400	12	445	180	M-20	12	M-20	24				60	M-20	24
350	14"	78	26	460	16	505	180	M-20	16	M-20	32				60	M-20	32
400	16"	102	26	515	16	565	215	M-24	16	M-24	32				70	M-24	32
(*)450	18"	113	28	565	20	615	230	M-24	20	M-24	40				80	M-24	40
500	20"	126	28	620	20	670	240	M-24	20	M-24	40				85	M-24	40
600	24"	146	28	725	20	780	270	M-27	16	M-27	32	75	M-27	8	75	M-27	8
700	28"	175	30	840	24	895	305	M-27	20	M-27	40	80	M-27	8	95	M-27	32
750	30"	176	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
800	32"	215	32	950	24	1015	355	M-30	20	M-30	40	90	M-30	8	-	-	-
900	36"	246	34	1050	28	1115	390	M-30	24	M-30	48	90	M-30	8	-	-	-
1000	40"	280	34	1160	28	1230	430	M-33	24	M-33	48	90	M-33	8	-	-	-
1050	42"	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1100	44"	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1200	48"	360	38	1380	32	1455	525	M-36	28	M-36	56	95	M-36	8	-	-	-

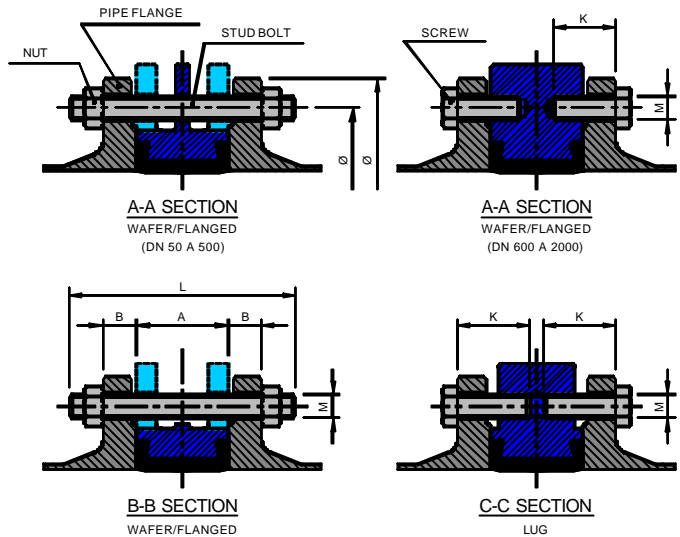
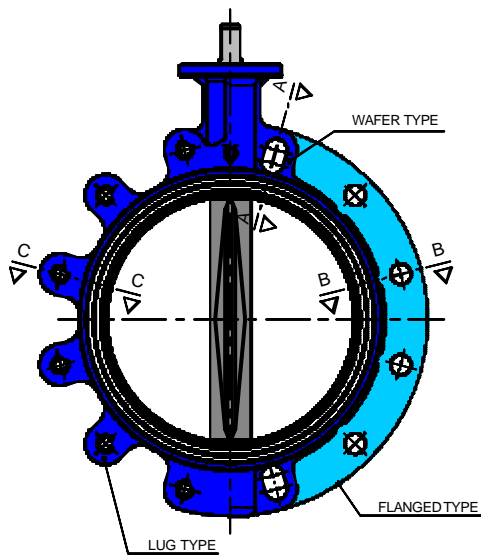
(*): As per B.S. 4504 PN-10.



DIN PN-16 STANDARD

VALVE		FLANGES (DIN-2633)					NECESSARY BOLTS FOR WAFER AND FLANGED TYPE						BOLTS FOR LUG TYPE				
D.N.		FACE TO FACE	THICKNESS	BOLT CENTRE	QUANTITY	EXTERNAL DIAMETER	STUD BOLTS			NUTS		SCREWS			SCREWS		
mm	Inch.						L	M	Nº	THREAD	QUANTITY	THREAD	QUANTITY	L	M	Nº	L
50	2"	43	18	125	4	165	120	M-16	4	M-16	8				35	M-16	8
65	2½"	46	18	145	4	185	125	M-16	4	M-16	8				35	M-16	8
80	3"	46	20	160	8	200	130	M-16	8	M-16	16				40	M-16	16
100	4"	52	20	180	8	220	135	M-16	8	M-16	16				40	M-16	16
125	5"	56	22	210	8	250	140	M-16	8	M-16	16				45	M-16	16
150	6"	56	22	240	8	285	150	M-20	8	M-20	16				45	M-20	16
200	8"	60	24	295	12	340	160	M-20	12	M-20	24				50	M-20	24
250	10"	68	26	355	12	405	180	M-24	12	M-24	24				55	M-24	24
300	12"	78	28	410	12	460	195	M-24	12	M-24	24				65	M-24	24
350	14"	78	30	470	16	520	195	M-24	16	M-24	32				65	M-24	32
400	16"	102	32	525	16	580	235	M-27	16	M-27	32				80	M-27	32
(-)450	18"	113	34	585	20	640	250	M-27	20	M-27	40				85	M-27	40
500	20"	126	34	650	20	715	270	M-30	20	M-30	40				95	M-30	40
600	24"	146	36	770	20	840	300	M-33	16	M-33	32	75	M-33	8	85 100	M-33 M-33	8 32
700	28"	175	36	840	24	910	325	M-33	20	M-33	40	80	M-33	8			
750	30"	176	-	-	-	-	-	-	-	-	-	-	-	-			
800	32"	215	38	950	24	1025	380	M-36	20	M-36	40	90	M-36	8			
900	36"	246	40	1050	28	1125	415	M-36	24	M-36	48	90	M-36	8			
1000	40"	280	42	1170	28	1255	460	M-39	24	M-39	48	90	M-39	8			
1050	42"	280	-	-	-	-	-	-	-	-	-	-	-	-			
1100	44"	280	-	-	-	-	-	-	-	-	-	-	-	-			
1200	48"	360	48	1390	32	1485	565	M-45	28	M-45	56	105	M-45	8			

(*): As per B.S. 4504 PN-16.

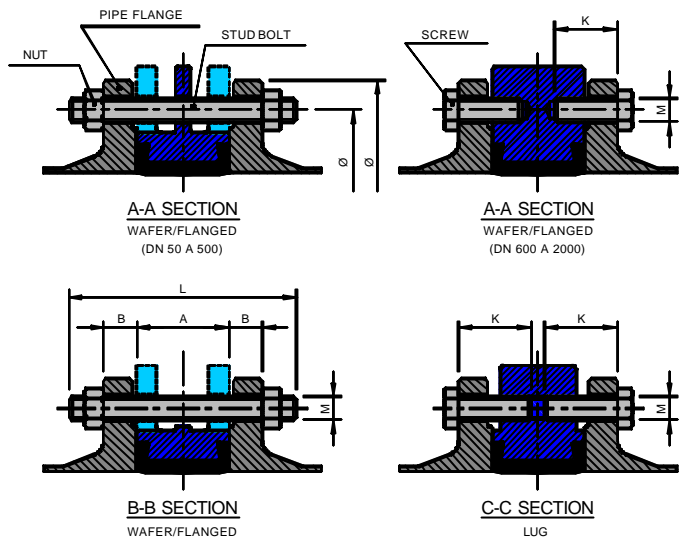
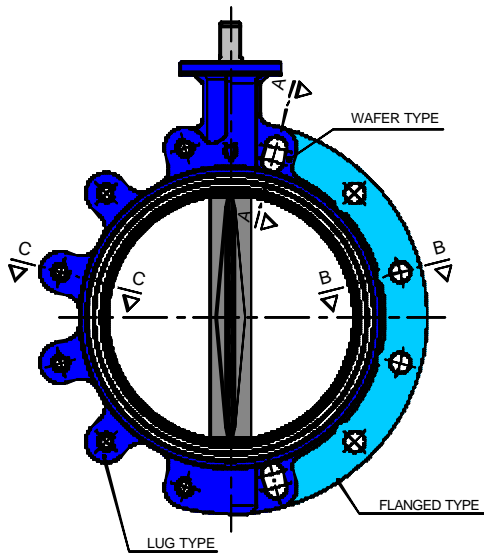


ANSI B.16.5. 150 Lbs. STANDARD

VALVE		FLANGES					NECESSARY BOLTS FOR WAFER AND FLANGED TYPE									BOLTS FOR LUG TYPE		
D.N.		FACE TO FACE	THICKNESS	BOLT CENTRE	QUANTITY	EXTERNAL DIAMETER	STUD BOLTS			NUTS		SCREWS			SCREWS			
mm	Inch.						LENGT	THREAD.	QUANTITY	THREAD	QUANTITY	LENGT	THREAD	QUANTITY	LENGT	THREAD	QUANTITY	
50	2"	A	B	Ø C	Nº	Ø D	L	M	Nº	M	Nº	L	M	Nº	L	M	Nº	
50	2"	43	19.1	120.6	4	152.4	120	5/8"UNC	4	5/8"UNC	8				35	5/8"UNC	8	
65	2½"	46	22.2	139.7	4	177.8	130	5/8"UNC	4	5/8"UNC	8				40	5/8"UNC	8	
80	3"	46	23.8	152.4	4	190.5	135	5/8"UNC	4	5/8"UNC	8				40	5/8"UNC	8	
100	4"	52	23.8	190.5	8	228.6	140	5/8"UNC	8	5/8"UNC	16				45	5/8"UNC	16	
125	5"	56	23.8	215.9	8	254	155	3/4"UNC	8	3/4"UNC	16				45	3/4"UNC	16	
150	6"	56	25.4	241.3	8	279.4	155	3/4"UNC	8	3/4"UNC	16				45	3/4"UNC	16	
200	8"	60	28.6	298.4	8	342.9	165	3/4"UNC	8	3/4"UNC	16				50	3/4"UNC	16	
250	10"	68	30.2	361.9	12	406.4	185	7/8"UNC	12	7/8"UNC	24				60	7/8"UNC	24	
300	12"	78	31.7	431.8	12	482.6	200	7/8"UNC	12	7/8"UNC	24				65	7/8"UNC	24	
350	14"	78	34.9	476.2	12	533.4	215	1"UNC	12	1"UNC	24				70	1"UNC	24	
400	16"	102	36.5	539.7	16	596.9	245	1"UNC	16	1"UNC	32				85	1"UNC	32	
450	18"	113	39.7	577.8	16	635	265	1 1/8"UN	16	1 1/8"UN	32				90	1 1/8"UN	32	
500	20"	126	42.9	635	20	698.5	285	1 1/8"UN	20	1 1/8"UN	40				100	1 1/8"UN	40	
600	24"	146	47.6	749.3	20	812.8	305	1 1/4"UN	16	1 1/4"UN	32	90	1 1/4"UN	8	90	1 1/4"UN	8	
															110	1 1/4"UN	32	

MSS-SP-44. 150 Lbs. STANDARD

700	28"	175	71.4	863.6	28	927.1	390	1 1/4"UN	24	1 1/4"UN	48	115	1 1/4"UN	8
750	30"	176	74.6	914.4	28	984.2	400	1 1/4"UN	24	1 1/4"UN	48	120	1 1/4"UN	8
800	32"	215	81	977.9	28	1060.4	460	1 1/2"UN	24	1 1/2"UN	48	135	1 1/2"UN	8
900	36"	246	90.5	1085.8	32	1168.4	510	1 1/2"UN	28	1 1/2"UN	56	140	1 1/2"UN	8
1000	40"	280	90.5	1200.1	36	1289	545	1 1/2"UN	32	1 1/2"UN	64	145	1 1/2"UN	8
1050	42"	280	96.8	1257.3	36	1346.2	570	1 1/2"UN	32	1 1/2"UN	64	155	1 1/2"UN	8
1100	44"	280	101.6	1314.5	40	1403.4	580	1 1/2"UN	36	1 1/2"UN	72	160	1 1/2"UN	8
1200	48"	360	108	1422.4	44	1511.3	670	1 1/2"UN	40	1 1/2"UN	80	165	1 1/2"UN	8



B.S 10 TABLE-E. STANDARD

VALVE		FLANGES (AS-2129)					NECESSARY BOLTS FOR WAFER AND FLANGED TYPE						BOLTS FOR TYPE				
		THICKNESS	BOLT CENTRE	QUANTITY	EXTERNAL DIAMETER	STUD BOLTS			NUTS		SCREWS			SCREWS			
D.N.	FACE TO FACE					LENGHT	THREAD	QUANTITY	THREAD	QUANTITY	LENGHT	THREAD	QUANTITY	LENGHT	THREAD	QUANTITY	
mm	Inch.	A	B	Ø C	Nº	Ø D	L	M	Nº	M	Nº	L	M	Nº	L	M	Nº
50	2"	43	19	114.3	4	152.4	120	5/8"UNC	4	5/8"UNC	8				35	5/8"UNC	8
65	2½"	46	19	127	4	165.1	125	5/8"UNC	4	5/8"UNC	8				(1)	(1)	(1)
80	3"	46	19	146.1	4	184.2	125	5/8"UNC	4	5/8"UNC	8				(1)	(1)	(1)
100	4"	52	22	177.8	8	215.9	135	5/8"UNC	8	5/8"UNC	16				45	5/8"UNC	16
125	5"	56	22	209.6	8	254	150	3/4"UNC	8	3/4"UNC	16				45	3/4"UNC	16
150	6"	56	22	235	8	279.4	150	3/4"UNC	8	3/4"UNC	16				45	3/4"UNC	16
200	8"	60	25	292.1	8	336.6	160	3/4"UNC	8	3/4"UNC	16				50	3/4"UNC	16
250	10"	68	25	355.6	12	406.4	175	7/8"UNC	12	7/8"UNC	24				55	7/8"UNC	24
300	12"	78	29	406.4	12	457.2	190	7/8"UNC	12	7/8"UNC	24				65	7/8"UNC	24
350	14"	78	32	469.9	12	527.1	210	1"UNC	12	1"UNC	24				65	1"UNC	24
400	16"	102	32	520.7	12	577.9	235	1"UNC	12	1"UNC	24				(1)	(1)	(1)
450	18"	113	35	584.2	16	641.4	255	1 1/8"UN	16	1 1/8"UN	32				85	1 1/8"UN	32
500	20"	126	38	641.4	16	704.9	275	1 1/8"UN	16	1 1/8"UN	32				(1)	(1)	(1)
600	24"	146	48	755.7	16	825.5	320	1 1/4"UN	12	1 1/4"UN	24	95	(1)	(1)	(1)	(1)	(1)
700	28"	175	51	845	20	910	355	1 1/4"UN	16	1 1/4"UN	32	100	1 1/4"	8			
750	30"	176	54	927.1	20	997	365	1 1/4"UN	16	1 1/4"UN	32	100	1 1/4"	8			
800	32"	215	54	984	20	1060	420	1 1/2"UN	16	1 1/2"UN	32	110	1 1/2"	8			
900	36"	246	64	1092.2	24	1174.8	470	1 1/2"UN	20	1 1/2"UN	40	120	1 1/2"	8			
1000	40"	280	67	1175	24	1255	510	1 1/2"UN	20	1 1/2"UN	40	125	1 1/2"	8			
1050	42"	280	70	1251	28	1335	515	1 1/2"UN	24	1 1/2"UN	48	130	1 1/2"	8			
1100	44"	280	-	-	-	-	-	1 1/2"UN	-	1 1/2"UN	-	-	-	-			
1200	48"	360	79	1410	32	1490	615	1 1/2"UN	28	1 1/2"UN	56	140	1 1/2"	8			

(1): This standard is not possible in LUG TYPE valves..

18.4. FLANGE DRILLING STANDARD SUITABLE TO VAMEIN BUTTERFLY VALVES.

DN		DIN												ANSI B 16.5 Class 150				MSS SP-44 Class 150			
		PN-6				PN-10				PN-16				W	WL	B	L	W	WL	B	L
mm	Inches	W	WL	B	L	W	WL	B	L	W	WL	B	L	W	WL	B	L	W	WL	B	L
50	2"	Green	Yellow	White	Green	Green	Green	White	Green	Green	Green	White	Green	Green	Green	White	Green	Blue	Blue	White	Blue
65	2½"	Green	Yellow	White	Green	Green	Green	White	Green	Green	Green	White	Green	Green	Green	White	Green	Blue	Blue	White	Blue
80	3"	Green	Yellow	White	Green	Green	Green	White	Green	Green	Green	White	Green	Green	Green	White	Green	Blue	Blue	White	Blue
100	4"	Green	Yellow	Green	Yellow	Green	Green	White	Green	Green	Green	White	Green	Green	Green	White	Green	Blue	Blue	White	Blue
125	5"	Green	Yellow	Green	Green	Green	Green	White	Green	Green	Green	White	Green	Green	Green	White	Green	Blue	Blue	White	Blue
150	6"	Green	Red	Green	Green	Green	Green	White	Green	Green	Green	White	Green	Green	Green	White	Green	Blue	Blue	White	Blue
200	8"	Green	Yellow	Green	Green	Green	Green	White	Green	Green	Green	White	Green	Green	Green	White	Green	Blue	Blue	White	Blue
250	10"	Green	Red	Red	Red	Green	Green	White	Green	Green	Green	White	Green	Green	Green	White	Green	Blue	Blue	White	Blue
300	12"	Green	Red	Green	Green	Green	Green	White	Green	Green	Green	White	Green	Green	Green	White	Green	Blue	Blue	White	Blue
350	14"	Red	White	Red	Green	White	Green	White	Green	White	Green	White	Green	White	Green	White	Green	Blue	White	White	Blue
400	16"	Red	White	Red	Green	White	Green	White	Green	White	Green	White	Green	White	Green	White	Green	Blue	White	White	Blue
450	18"	Blue	White	Blue	Blue	Green	Green	White	Green	White	Green	White	Green	White	Green	White	Green	Blue	White	White	Blue
500	20"	Red	White	Red	Red	Green	Green	White	Green	White	Green	White	Green	White	Green	White	Green	Blue	White	White	Blue
600	24"	Red	White	Red	Red	Green	Green	White	Green	White	Green	White	Green	White	Green	White	Green	Blue	White	White	Blue
700	28"	Red	White	Red	White	Green	Green	White	Green	White	Green	White	Green	White	Green	White	Blue	Blue	White	Green	White
750	30"	Blue	White	Blue	Blue	Green	Green	White	Blue	White	Blue	White	Blue	White	Blue	White	Green	Green	White	Green	White
800	32"	Red	White	Red	Green	Green	Green	White	Green	White	Green	White	Green	White	Blue	Blue	Green	Green	White	Green	White
900	36"	Red	White	Red	Green	Green	Green	White	Green	White	Green	White	Green	White	Blue	Blue	Green	Green	White	Green	White
1.000	40"	Red	White	Red	Green	Green	Green	White	Green	White	Green	White	Green	White	Blue	Blue	Green	Green	White	Green	White
1.050	42"	Blue	White	Blue	Blue	Green	Green	White	Blue	White	Blue	White	Blue	White	Blue	White	Green	Green	White	Green	White
1.100	44"	Blue	White	Blue	Blue	Green	Green	White	Blue	White	Blue	White	Blue	White	Blue	White	Green	Green	White	Green	White
1.200	48"	Red	White	Red	Green	Green	Green	White	Green	White	Green	White	Green	White	Blue	Blue	Green	Green	White	Green	White
1.300	52"	Blue	White	Blue	Blue	Green	Green	White	Blue	White	Blue	White	Blue	White	Blue	White	Green	Green	White	Green	White
1.400	56"	Red	White	Red	Green	Green	Green	White	Green	White	Green	White	Green	White	Blue	Blue	Green	Green	White	Green	White
1.500	60"	Blue	White	Blue	Blue	Green	Green	White	Blue	White	Blue	White	Blue	White	Blue	White	Green	Green	White	Green	White
1.600	64"	Red	White	Red	Green	Green	Green	White	Green	White	Green	White	Green	White	Blue	Blue	Green	Green	White	Blue	White
1.800	72"	Red	White	Red	Green	Green	Green	White	Green	White	Green	White	Green	White	Blue	Blue	Green	Green	White	Blue	White
2.000	80"	Red	White	Red	Green	Green	Green	White	Green	White	Green	White	Green	White	Blue	Blue	Green	Green	White	Blue	White


W : Wafer.


WL: Wafer Light.


B : Flanged.

L : Lug.

 Standard mounting.

 Special mounting (consult).

 Mounting not possible.

 Not covered by this standard.

FLANGE DRILLING STANDARD SUITABLE TO VAMEIN BUTTERFLY VALVES.

DN		BS 10 / AS 2129								AWWA C-207 (B, D y E)				JIS B 2210											
		Tabla D				Tabla E								5 K				10 K				15 K			
mm	Inches	W	WL	B	L	W	WL	B	L	W	WL	B	L	W	WL	B	L	W	WL	B	L	W	WL	B	L
50	2"	Green	Yellow	White	Green	Green	Yellow	White	Green	Blue	Blue	White	Blue	Red	Red	White	Red	Green	Green	White	Green	Red	Red	White	Red
65	2½"	Green	Red	White	Red	Green	Red	White	Red	Blue	Blue	White	Blue	Green	Yellow	White	Green	Green	White	Green	Red	Red	White	Red	
80	3"	Green	Red	White	Red	Green	Red	White	Red	Blue	Blue	White	Blue	Green	Red	White	Red	Yellow	Yellow	White	Green	Yellow	Yellow	White	Green
100	4"	Green	Yellow	White	Yellow	Green	Yellow	White	Green	Green	Green	Green	Green	Red	Red	Red	Red	Yellow	Yellow	White	Green	Yellow	Yellow	White	Green
125	5"	Green	Green	White	Green	Green	Green	White	Green	Green	Green	Green	Green	Green	Red	Red	Green	Green	Yellow	White	Green	Red	Yellow	Green	Green
150	6"	Green	Green	White	Green	Green	Yellow	White	Green	Green	Green	Green	Green	Green	Yellow	Green	Green	Yellow	White	Green	Yellow	Yellow	Yellow	Red	Green
200	8"	Green	Green	White	Green	Green	Yellow	White	Green	Green	Green	Green	Green	Green	Red	Red	Red	Green	Yellow	White	Green	Yellow	Yellow	Green	Green
250	10"	Green	Green	White	Red	Green	Green	White	Green	Green	Green	Green	Green	Green	Red	Red	Green	Green	Green	Green	Red	Yellow	Yellow	Red	Green
300	12"	Green	Green	White	Green	Green	Green	White	Green	Green	Green	Green	Green	Red	Red	Red	Red	Green	Red	Red	Red	Red	Red	Green	Red
350	14"	Green	White	White	White	Green	White	White	White	Green	White	White	White	Red	White	White	White	White	White	White	Red	White	White	Green	Green
400	16"	Yellow	Green	White	Red	Green	Green	White	Red	Green	Green	Green	Green	Red	Red	Red	Red	Green	Green	White	Green	Green	Green	Green	Green
450	18"	Yellow	Green	White	Red	Green	Green	White	Red	Green	Green	Green	Green	Red	Green	Green	Green	Green	Green	White	Green	Yellow	Yellow	Green	Green
500	20"	Green	Green	White	Red	Green	Green	White	Red	Green	Green	Green	Green	Red	Red	Green	Green	Green	Green	White	Green	Green	Green	Green	Green
600	24"	Yellow	Green	White	Red	Green	Green	White	Red	Green	Green	Green	Green	Yellow	Green	Yellow	Green	Green	Red	Yellow	Green	Red	Yellow	Green	Red
700	28"	Yellow	Green	White	Yellow	Green	White	White	White	Green	White	White	White	Yellow	Green	White	Green	White	White	White	Green	White	White	Green	White
750	30"	Yellow	Green	White	Green	Green	Yellow	White	Green	Green	Green	Green	Green	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green	Green
800	32"	Yellow	Green	White	Yellow	Green	Green	White	Green	Green	Green	Green	Green	Red	Red	Red	Green	Green	Green	White	Yellow	Yellow	Green	Green	Green
900	36"	Yellow	Green	White	Green	Green	Green	White	Green	Green	Green	Green	Green	Yellow	Green	Green	Green	Green	Green	White	Green	Green	Green	Green	Green
1.000	40"	Green	Green	White	Green	Green	Green	White	Green	Green	Green	Green	Green	Red	Red	Red	Green	Green	Green	Red	Red	Red	Red	Red	Red
1.050	42"	Green	Green	White	Green	Green	Green	White	Green	Green	Green	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
1.100	44"	Blue	Green	White	Blue	Green	Blue	White	Blue	Green	Green	Green	Green	Red	Red	Red	Yellow	Green	Green	Yellow	Green	Yellow	Green	Green	Green
1.200	48"	Green	Green	White	Green	Green	Green	White	Green	Green	Green	Green	Green	Red	Red	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green
1.300	52"	Blue	Green	White	Blue	Green	Blue	White	Blue	Green	Green	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
1.400	56"	Green	Green	White	Green	Green	Blue	White	Blue	Green	Green	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
1.500	60"	Blue	Green	White	Blue	Green	Blue	White	Blue	Green	Green	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
1.600	64"	Green	Green	White	Green	Green	Blue	White	Blue	Green	Green	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
1.800	72"	Green	Green	White	Green	Green	Blue	White	Blue	Green	Green	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
2.000	80"	Green	Green	White	Green	Green	Blue	White	Blue	Green	Green	Green	Green	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue

W : Wafer.

WL: Wafer Light.

B : Flanged.

L : Lug.



Standard mounting.

Special mounting (consult).

Mounting not possible.

Not covered by this standard.

18.5. TIGHTENING TORQUE FIGURES.

On placing a butterfly valve in a line it is very important to take the tightening torque figure of bolts and screws into account. As resistance of materials is limited, the screws cannot be tightened too much as they may lose their thread and this could cause watertightness problems in the pipe flanges with the valve.

A list with the tightening torque figures of the most usual screws in the mounting of "VAMEIN" butterfly valves is shown herebelow.

TIGHTENING TORQUE FIGURES OF SCREWS (N.m)			
THREAD/D		QUALITY	
METRIC	U.N.C. / U.N	5.6	8.8
M-12		41	87
M-16		109	232
	5/8"	120	255
	3/4"	190	407
M-20		212	452
	7/8"	316	675
M-24		366	781
	1"	403	860
M-27		503	1073
	1-1/8"	597	1275
	1-1/4"	630	1346
M-30		664	1417
M-33		821	1753
	1-1/2"	1045	2229
M-36		1105	2358
M-39		1320	2817
	1-3/4"	1420	3030
M-45		1978	4221
M-52		2976	6349
M-56		3776	8056

N.B.: Torque figures valid for slightly greased screws.
Quality of material to DIN 267.

18.6. MATERIAL SELECTION TABLE.

18.6.1. INTRODUCTION TO THE MATERIAL SELECTION TABLE.

This part deals with the physical state of the fluid to flow, taking into account that the table's columns 18.6.4 where the fluids condition is not stated, it will be assumed that the concentration level is between 0 - 100 % and the maximum work temperature will be related to the chosen seat, as well as to the disc coating, as per indicated in the following charts:

18.6.2. TEMPERATURE CHART FOR LINERS.

TEMPERATURE CHART FOR LINERS.				
MATERIALS	VAMEIN CODE	COMMERCIAL CODE	MINIMUM TEMPERATURE° C	MAXIMUM TEMPERATURE ° C
EPDM	E	E.P.D.M	-15	100 (110)
HIGH TEMPERATURE EPDM	EC	E.P.D.M	-15	120 (135)
NON TOXIC EPDM	EA	E.P.D.M	-15	90 (100)
NBR	N	NBR	-15	100 (115)
WHITE NBR	NB	NBR	-15	100 (110)
NATURAL RUBBER	NA	NR	-25	90 (100)
NON TOXIC RUBBER	CB	NR	-25	90 (100)
ANTIABRASIVE NATURAL RUBBER	CA	NR	-25	90 (100)
BUTYL	B	IIR	-20	110 (125)
HYPALÓN	H	CSM	-15	105 (115)
VITON	V	FKM	-20	180 (200)
SILICON	S	VMQ	-40	180 (200)
NEOPRENE	Ne	Cr	-15	100 (115)

NOTES:
 -This chart shows two maximum temperatures, depending on constant or intermittent (peak) temperature service. Those in brackets correspond to intermittent service temperature.

18.6.3. CHART OF COATING TEMPERATURES.

CHART OF COATING TEMPERATURES.		
TYPE OF COATING	SERVICE TEMPERATURE	
	MINIMUM	MAXIMUM
PAINTING	0° C	90° C
RILSAN	-60° C	80° C (110° C)

NOTE: This chart shows two maximum temperatures, depending on constant or intermittent (peak) temperature service. Those in brackets correspond intermittent the service temperature.

18.6.4. MATERIAL SELECTION TABLES.

The following material selection list has been made up based on our experience and customer's comments.

You must take into account that there is a wide range of factors that come with each type of fluid and installation in the specific field, as well as other factors such as: Temperature- Concentration - Velocity – Pressure - Suspended particles - Fluid conditions - Other hydraulic effects, etc.

Each of these factors can have serious effects on the material as many different combinations of the fluid components and concentration, status and chemical composition of fluids, can also exist.

Because of these many different combinations it is impossible to make up a table for the materials.

For these reasons, VAMEIN DE ESPAÑA, S.A. cannot guarantee the accuracy of the material selection tables, nor assuming any responsibilities for the use of these tables.

RECOMMENDATIONS

The life of materials will depend, at least, on the following factors: ambient conditions, service conditions, type of fluid, hydraulic factors, number of operations, time of service or fitted, etc.

This is why it is recommended to check the effectiveness of the valve periodically to verify that it meets the service required

EXPLANATIONS AND MEANING OF THE ABBREVIATIONS IN THE MATERIAL SELECTION TABLES:

Physical status of fluid is shown with the initial letter of the word, such as it is shown below:

PHYSICAL STATUS OF FLUID		
GAS	=	G
LIQUIDS	=	L
SOLID	=	S

You must take into account that most solids flow in form of solutions and only a few, such as cement, plaster, caustic soda, sugar, flour, sand, etc, are driven as solids.

For Ductile Iron discs with a RILSAN coating, you must not exceed 80° C. If driving at temperatures higher than 80° C, it is advisable to use Stainless Steel, Bronze and Aluminum Bronze discs, among others.

The selections marked on the tables, have been made taking into account the most economic materials tough enough to resist the fluid to be used, and they are identified according to the following abbreviations depending on their behaviour.

E.- RECOMMENDED. Based on our own experience and the recommendations made by suppliers, this material gathers all the necessary conditions regarding quality and price.

A.- GOOD. Based on our own experience with the featured materials and our suppliers recommendations.

B.- AVERAGE. It can be used depending on the application, such as concentration and temperature. It is advisable to undertake some tests, before using it on a large scale.

N.- NOT USABLE. We do not recommend its use.

The **VAMEIN** valve system, with the seat rapped around the body and a centered shaft, ensures that only the seat and the disc are in contact with the fluid. This is why the table for the selection of materials only deals with these two components of the valve.

FLUID	PHYSICAL STATE	DISC MATERIALS			SEAT MATERIALS							
		CONDITION	DUCTILE IRON. (EN 1563)	ALUMINUM BRONZE. (EN 1982)	STAINLESS STEEL. (EN 10213-4)	CONDITION	E.P.D.M	BUNA-N	HYPALON	NEOPRENE	VITON	SILICONE
ACETALDEHYDE	L	<25°C	N	A	A		E	N	N	N	N	
ACETIC ACID	L	<50%	N	N	E	<30% <95°C	E	N	A	A	N	B
ACETIC ACID-GLACIAL	L		N	B	B		N	N	A	N	N	
ACETIC ANHYDRIDE	L		N	N	E	<28°C	B	N	A	A	N	
ACETONE	L	<25°C	E	A	A		A	N	B	B	N	N
ACETYLENE	G	<25°C	E	N	A	<70°C	E		B	B	A	
ACETYLENE (DRY)	G		B	N	A		B				A	
AIR	G		E	A	A		E	A		A	A	
ALUMINUM CHLORIDE	S		N	N	N	<25% <70°C	E	A	A	A	A	
ALUMINUM FLUORIDE	S					<25°C	E	A			A	
ALUMINUM HYDROXIDE	S		N	A	A		E	A	A	A	A	
ALUMINUM SULFATE	S	<25% <65°C	N	N	A	<40°C	A	A	A	A	A	
AMMONIA, ANHYDROUS	G		B	N	E		N	B	B	A	N	
AMMONIA, LIQUID	L			N	E		E	B				A
AMMONIUM BICARBONATE	S		E	N	A		A	A			A	
AMMONIUM CHLORIDE	S		N	N	N	<25% <65°C	A	A	A	A	A	
AMMONIUM HYDROXIDE	L		N	N	A	<40°C	A	N	A	A	A	A
AMMONIUM NITRATE	S	<25% <65°C	N	N	A	<70°C	A	B		A	A	
AMMONIUM PHOSPHATE	S	<25% <65°C	N	N	E	<80°C	A	B		A	A	
AMMONIUM SULFATE	S	<25% <65°C	N	N	A	<40°C	A	A	A	A	A	
AMYL ACETATE	L		N	B	A		E	N	N	N	N	
AMYL ALCOHOL	L		N	A	A		E	B	A	A	A	

FLUID	PHYSICAL STATE	DISC MATERIALS			SEAT MATERIALS							
		CONDITION	DUCTILE IRON. (EN 1563)	ALUMINIUM BRONZE. (EN 1982)	STAINLESS STEEL. (EN 10213-4)	CONDITION	E.P.D.M	BUNA-N	HYPALON	NEOPRENE	VITON	SILICONE
ANTIMONY TRICHLORIDE	L		N	N	N					B		
ARSENIC ACID	S		N	N	E		E	A		B		
ASPHALT	L	<25°C	E	A	A	<70°C	N	A	B	B	A	
BARIUM CARBONATE	S			B	A		E	B			A	
BARIUM HYDROXIDE	S	<50% <25°C	B	N	A	<70°C	E	A	A	A	A	
BARIUM SULFATE	S		B	A	A		E	A			A	
BARIUM SULFIDE	S	<25% <65°C	N	N	A		E	A			A	
BEER-BREWERIES	L		N	N	A		E	A	A	A	A	A
BEET SUGAR LIQUORS	L		N	A	A		A	A			A	
BENZALDEHYDE	L	<25°C	E	A	A	<28°C	E	N	N	N	N	
BENZENE	L		A	A	A		N	N	N	N	B	N
BENZENE SULFONIC ACID	S	<50%		E	B	<100%	A	N				
BENZOIC ACID	L		N	A	A		N	N			B	
BORIC ACID	S	<40°C	N	A	A	<70°C	E	A	A	A	A	
BROMINE ANHYDROUS	S		N	N	N		N	N	B	N	B	
BUTANE	G		B	A	A	<25°C	N	E	A	A	A	
BUTTER	L		N	N	A		B	A				A
BUTYL ALCOHOL	L	<25°C		A	A	<28°C	B	E		B	A	N
BUTYRALDEHYDE	L		N	N	E		B	N	N	N	N	
BUTYRIC ACID	L	<5% <65°C	N		E	<30% <40°C	N	B	N	N		
CALCIUM BISULFITE	L		N	N	A	<70°C	N	E	A	A	A	
CALCIUM CHLORIDE	S	<25% <65°C	N	A	B	<70°C	A	A	A	A	A	
CALCIUM HYDROXIDE (LIME)	S	<25°C	N	A	A		A	A	A	A	A	B

FLUID	PHYSICAL STATE	DISC MATERIALS			SEAT MATERIALS							
		CONDITION	DUCTILE IRON. (EN 1563)	ALUMINIUM BRONZE. (EN 1982)	STAINLESS STEEL. (EN 10213-4)	CONDITION	E.P.D.M	BUNA-N	HYPALON	NEOPRENE	VITON	SILICONE
CALCIUM HYPOCHLORITE	S	<25% <66°C	N	N	N	<25% <21°C	A	N	A	B	B	
CALCIUM SULFATE	S	<10% <25°C	N	B	A		A	A			A	
CARBON BISULFIDE	L		N	N	E		N	N	N	N	A	
CARBON DIOXIDE- (GAS, DRY)	G		E	A	A		E	A		A	A	
CARBON DIOXIDE- (LIQUID, WET)	L		N	N	A		E	A	A	A	A	
CARBON MONOXIDE	G	<40°C	E	A	A	<40°C	E	A	A	A		
CARBON TETRACHLORIDE	L	<25°C	N	A	E		N	N	N	N	A	N
CARBONIC ACID	L		N	N	A		A	E		A	A	
CHLORINATED SOLVENTS	L		N	N	B		N	N	B	N	B	
CHLORINE (WET or DRY)	L		N	N	N		A	N	B	B	A	
CHLOROACETIC ACID	S		N	N	N	<25% <70°C	E	N	A	A	N	
CHLOROBENZENE	L		N	A	A		N	N	N	N	A	
CHLOROBROMOMETHANE	L						B	N				N
CHLOROFORM	L		N	A	E		N	N	N	N	A	N
CHLOROSULFONIC ACID (WET or DRY)	L		N	N	N		N	N	N	N	N	
CHROMIC ACID	L	<50% <20°C	N	N	B		N	N	A	N	A	
CITRIC ACID	S	<40°C	N	B	A		E	A	A	A	A	
COFFEE (DRY or WET)	S		N	A	A		E	A				A
COLA SYRUP	L		N	N	E		E	B				A
COPPER CHLORIDE (DRY)	S		N	N	N	<80°C	E	A	A	A	A	
COPPER NITRATE	S	<5% <25°C	N	N	E		E	A			A	

FLUID	PHYSICAL STATE	DISC MATERIALS			SEAT MATERIALS							
		CONDITION	DUCTILE IRON. (EN 1563)	ALUMINUM BRONZE. (EN 1982)	STAINLESS STEEL. (EN 10213-4)	CONDITION	E.P.D.M	BUNA-N	HYPALON	NEOPRENE	VITON	SILICONE
COPPER SULFATE	S	<10% <99°C	N	N	B		E	A	A	A	A	N
CYCLOHEXANE	L	<25°C	A	A	A		N	B	N	N	A	N
DIACETONE ALCOHOL	L	<40°C	A	A	A		E	N				B
DIBUTYL PHTHALATE	L				E	<60°C	E	N	N	N	B	A
DIBUTYL SEBACATE	L				E		B	N				A
DIETHYL ETHER	L				E		N	N				N
DIETHYL SEBACATE	L				E		B	N	B	N	B	B
DIOCTYL PHTHALATE	L				A		B	N	N	N	B	B
ETHYL ACETATE	L		N	A	A		N	N	N	N		
ETHYL ALCOHOL	L		N	A	A	<80°C	E	A	A	A	A	A
ETHYL CHLORIDE (DRY)	G		B	B	A		E	B	N	N	A	
ETHYL ETHER	L		N	A	E		N	N	N	N	N	N
ETHYLENE DICHLORIDE	L		N	N	B		N	N	N	N	A	N
ETHYLENE GLICOL	L	<40°C	E	A	A		E	A	A	A	A	A
ETHYLENE OXIDE	G	<12°C	B	N	A		A	N	N	N	N	N
FERRIC CHLORIDE	S	<25% <65°C	N	N	N	<25% <95°C	A	B	A	A	A	A
FORMALDEHYDE	G	<40% <99°C	N	B	A	<40%	E	N	A	A	A	
FORMIC ACID	L	<90% <99°C	N	A	E	<60%	N	N	A	A	B	
FREON 11	G		N	E	A	<20°C	N	E	A	A	A	N
FREON 11	G						N	B		B		N
FREON 12	G		N	E	A		B	E	A	A	A	N
FREON 13	G		N	E	A		B	E				N
FREON 13B1	G		N	E	A		B	E				N

FLUID	PHYSICAL STATE	DISC MATERIALS			SEAT MATERIALS							
		CONDITION	DUCTILE IRON. (EN 1563)	ALUMINUM BRONZE. (EN 1982)	STAINLESS STEEL. (EN 10213-4)	CONDITION	E.P.D.M	BUNA-N	HYPALON	NEOPRENE	VITON	SILICONE
FURFURAL	L	<40°C	N	A	E		A	N	B	B	B	
GASOLINE REGULAR	L		B	A	A	<30°C	N	E	B	B	A	
GELATINE	S		N	A	A		E	A	A		A	A
GLUCOSE	L			A	A		E	A	A		A	A
GLUE	L			E	A		E	A	A	A	A	
GLYCERINE	L	<40°C	B	A	A		E	A	A	A	A	
GLYCOLS	L		E	A	A		E	A	A		A	A
HEPTANE	L		A	A	A	<20°C	N	E	B	B	A	B
HEXANE	L	<99% <25°C	A	A	A		N	A	A	A	A	
HYDROCHLORIC ACID	L			N	N	<20% <110C	E	B	A	A	A	B
HYDROCHLORIC ACID	L					<37% <70°C			A	A	A	
HYDROCYANIC ACID	L		N	N	A	<25°C	A	N	A	A	A	
HYDROFLUORIC ACID	L	<15%	N	N	N	<48% <70°C	B	N	A	A	A	
HYDROFLUORIC ACID	L					<75% <70°C	N	N	A	B	B	
HYDROGEN GAS	G		E	A	A		E	A	A	A	A	
HYDROGEN PEROXIDE	L	<25°C	N	N	E	<90*%	E	N	A	B	A	B
HYDROGEN SULFIDE	G	<25°C	N	N	E		E	N	A	A	B	
ISOBUTYL ALCOHOL	L				A	<70°C	E	A	A		A	A
ISOPROPYL ALCOHOL	L		E	A	A		E	B	A	A	A	A
ISOPROPYL ETHER	L		A	A	E		N	B	B	N	N	
KEROSENE	L	<25°C	E	A	A		N	E	B	N	A	B
KEROSENE	L		N	A	A		N		N	N	B	
LACQUER SOLVENTS	L		A	A	E		N	N	N	N	N	

FLUID	PHYSICAL STATE	DISC MATERIALS			SEAT MATERIALS							
		CONDITION	DUCTILE IRON. (EN 1563)	ALUMINIUM BRONZE. (EN 1982)	STAINLESS STEEL. (EN 10213-4)	CONDITION	E.P.D.M	BUNA-N	HYPALON	NEOPRENE	VITON	SILICONE
LACTIC ACID	L		N	N	A		E	N	A	A	A	A
LARD	L		N	A	A		N	E			A	B
MAGNESIUM CHLORIDE	S		N	N	B	<80°C	E	A	A	A	A	
MAGNESIUM HYDROXIDE	S		N	A	A		E	B	A	A	A	
MAGNESIUM SULFATE	S	<25% <65°C	N	A	A	<80°C	E	A			A	
MALEIC ACID	S		N	N	A		A	N			A	
MERCURIC CHLORIDE	L		N	N	N	<10% <40°C	E	A	A	A	A	
MERCURIC CYANIDE	S		N	N	B			B			A	
MERCURY	L		N	N	A		A	E	A	A	A	
METHANE	G			A	A		N	E	A		A	A
METHYL ALCOHOL	L	<25%	B	A	A		E	B	A	A	B	A
METHYL CHLORIDE	G		N	A	E		N	N				N
METHYL ETHYL KETONE	L	100% <25°C	E	A	A		E	N	N	N	N	
METHYL METHACRYLATE	L				E		N	N				N
MILK	L		N	A	A		B	B				A
MOLASSES	L		N	B	A		E	A			A	
MONOCHLOROBENZENE (DRY)	L		A	A	E		N	N				N
MURIATIC ACID	L	<50%	N	N	N		N	N		B		
NAPHTHA	L		A	A	A		N	N	N	N	A	
NAPHTHALENE	S		N	A	A		N	N	N	N	A	
NATURAL ALCOHOL	L			A	A		N	N			A	
NICKEL CHLORIDE	S		N	N	B		E	A			A	
NICKEL NITRATE	S		N	N	A			B			A	

FLUID	PHYSICAL STATE	DISC MATERIALS				SEAT MATERIALS						
		CONDITION	DUCTILE IRON. (EN 1563)	ALUMINUM BRONZE. (EN 1982)	STAINLESS STEEL. (EN 10213-4)	CONDITION	E.P.D.M	BUNA-N	HYPALON	NEOPRENE	VITON	SILICONE
NICKEL SULFATE	S	<25% <65°C		N	B	<80°C	A	A			A	
NITRIC ACID	L	<5%	N	N	E	<10%	E	B	A	B	A	B
NITRIC ACID	L	<40% <95°C	N	N	E	<30%	N	N	A	N	A	
NITRIC ACID	L	<80% <40°C	N	N	E	<60%	N		B	N	A	
NITRIC ACID	L	<95% <25°C	N	N	E	<70%	N		N	N	A	
NITROBENZENE	S		B	N	A		A	N	N	N	B	
OIL - ANILINE	L		N	N	E		N	N			B	
OIL - ANIMAL	L		E	B	A		N	E			A	
OIL - CASTOR	L			A	A		B	E			A	
OIL - CHINA WOOD	L			A	A		B	E			A	
OIL - COCONUT	L		N	N	A		B	E			A	
OIL - CREOSOTE	L		E	A	A		N	N			A	
OIL - CRUDE (SWEET)	L		A	A	A		N	E			A	
OIL - CRUDE (SOUR)	L		B	E	A		N	A			A	
OIL - FISH	L			N	A		N	E			A	
OIL - FUEL	L		B	A	A		N	E			A	
OIL - LINSEED	L		E	A	A		N	E	A	A	A	
OIL - LUBRICATING (PETROLEUM)	L		E	A	A		N	E			A	
OIL - HYDRAULIC (PETROLEUM BASE)	L		E	A	A		N	E			A	
OIL - HYDRAULIC (WATER BASE)	L		E	A	A			E			A	
OIL - MINERAL	L		B	A	A		N	E			A	N
OIL - MOTOR	L		E	A	A		N	E			A	

FLUID	PHYSICAL STATE	DISC MATERIALS			SEAT MATERIALS							
		CONDITION	DUCTILE IRON. (EN 1563)	ALUMINUM BRONZE. (EN 1982)	STAINLESS STEEL. (EN 10213-4)	CONDITION	E.P.D.M	BUNA-N	HYPALON	NEOPRENE	VITON	SILICONE
OIL - OLIVE	L		N	B	A		B	E		N	A	B
OIL - PALM	L			B	A		N	E			A	
OIL - SILICONE	L		E	A	A		A	E			A	
OIL - SOYBEAN	L			B	A		N	E			A	
OIL - TALL	L			E	A		N	E			A	
OIL - TRANSFORMER	L		E	A	A		N	E			A	
OIL - TURBINE	L		E	A	A		N	E			A	
OIL - VEGETABLE	L		N	B	A		N	E			A	B
OLEIC ACID	L		N	A	A		B	B	B	B	B	
OLEUM	L		N	N	E	<25%	N	N	B	N	A	
OXYGEN - GAS	G		E	A	A		E	B			A	
OZONE (DRY-WET)	G		N		E		A	N	A		A	
PALMITIC ACID	S		B	N	E		N	E	B	B	A	
PARAFFIN	S			A	A			E			A	B
PENTANE	G		E	A	A			E			A	
PERCHLORETHYLENE	L	<40°C	A	A	A		N	N	N	N	A	
PHOSPHORIC ACID	L	<40% <95°C	N	N	E	<20%	E	B	A	A	A	N
PHOSPHORIC ACID	L	<50°C	N	N	E	<60%	B	N	A	A	A	
PHOSPHORIC ACID	L		N	N	B	<70%- 85%	A		A	A	A	N
PICRIC ACID-AQUEOUS	L	<65°C	N	N	E	<20°C	E	N	A	A	A	
POTASSIUM BICARBONATE	S			A	A		E	B			A	
POTASSIUM BROMIDE	S		N	N	N		A	N			A	
POTASSIUM HYDROXIDE	L	<50% <40°C		N	A	<80°C	E	B	A	A	A	B
POTASSIUM SULFATE	S		N	A	A		E	A			A	

FLUID	PHYSICAL STATE	DISC MATERIALS			SEAT MATERIALS							
		CONDITION	DUCTILE IRON. (EN 1563)	ALUMINUM BRONZE. (EN 1982)	STAINLESS STEEL. (EN 10213-4)	CONDITION	E.P.D.M	BUNA-N	HYPALON	NEOPRENE	VITON	SILICONE
POTASSIUM SULFIDE	S		N	N	A		B	N			A	
PROPANE	G	<25°C	E	A	A		N	E			A	
RESINS	L		A	A	A		N	N			A	
SALICYLIC ACID	S		N	A	A		E	A			A	
SALINA SOLUTIONS	L		N	B	A						A	
SILVER NITRATE	S	<60% <25°C	N	N	E	<75% <70°C	E	B			A	
SOAP SOLUTIONS	L		B	A	A		E	A	A	A	A	
SODIUM ACETATE	S		N	E	A		E	B			A	
SODIUM ALUMINATE	S		B	A	A		N	E			A	
SODIUM BICHROMATE SOLUTION	L				E		E	A			A	
SODIUM BORATE (BORAX)	S		N	A	A		E	B			A	
SODIUM BROMIDE	S		N	N	N		N	N			A	
SODIUM CARBONATE	S		N	N	A		E	A			A	A
SODIUM CHLORATE	S		N	N	E		A	B			A	
SODIUM CHLORIDE	S		N	N	N	<55°C	E	A	A	A	A	
SODIUM CYANIDE	S		N	N	A		E	A			A	
SODIUM DICHROMATE	S			N	E	<20%	E	B	A	B	A	
SODIUM FLUORIDE	S		N	B	E		A	B			A	
SODIUM HYDROXIDE (LYE, CAUSTIC SODA)	L	<50% <40°C	N	N	A		E	B				A
SODIUM HYPOCHLORITE	S	<3%	N	N	N	<5%	E	B	A	A	A	
SODIUM PERBORATE	S	<10% <20°C	N	N	A	<10% <99°C	E	A			A	
SODIUM PEROXIDE	S	<99°C	N	N	E	<10% <50°C	E	N	A	A	A	
SODIUM SULFATE	S		N	A	A						A	

FLUID	PHYSICAL STATE	DISC MATERIALS			SEAT MATERIALS							
		CONDITION	DUCTILE IRON. (EN 1563)	ALUMINUM BRONZE. (EN 1982)	STAINLESS STEEL. (EN 10213-4)	CONDITION	E.P.D.M	BUNA-N	HYPALON	NEOPRENE	VITON	SILICONE
SODIUM SULFIDE	S	<25°C	N	N	A		E	A			A	
SODIUM THIOSULFATE	S		N	N	E		E	A			A	
STANNIC CHLORIDE	L		N	N	N		B	E	B	B	A	
STEAM AND HOT WATER	L	<120C	N	N	A	<120C	A	N	A	A	B	B
STEARIC ACID	S		N	N	A	<70°C	N	A	B	B	B	N
STYRENE	L		A	A	A		N	N	N	N	A	
SULFUR DIOXIDE (DRY)	G		E	A	A		E	A	A	A	B	A
SULFUR DIOXIDE (WET)	G		N	N	E		A	N	A	A	B	B
SULFUR TRIOXIDE (DRY)	S		E	A	A	<50°C	E	N	N	N	B	
SULFURIC ACID	L	<20% <20°C	N	N	A	<10% <20°C	E	N	A	A	A	B
SULFURIC ACID	L	<80% <20°C	N	N	B	80% <20°C	N	N	A	B	A	
SULFURIC ACID	L	<95% <20°C	N	N	B	<90% <20°C	N	N	A	N	A	N
SULFURIC ACID COLLYRIC	L		N	N	A		N	N	N	N	A	
SULFUROUS ACID	L		N	N	B		N	N	A	N	N	
TANNIC ACID (TANNIN)	S		B	E	A	<10%	E	B	A	A	A	
TAR	S		A	A	A		N	B			A	B
TARTARIC ACID	S	<15%	N	B	A	<10% <100C	B	E	A	A	A	
TETRAHYDROFURAN	L	<40°C		A	A		N		N	N	N	N
TOLUENE	L		A	A	A		N	N	N	N	B	N
TRIBUTYL PHOSPHATE	L				E		E	N	N	N	N	
TRICHLOROACETIC ACID	S			N	N	<10% <40°C	B	B			A	
TRICHLOROETHANE	L		N				N	N			A	
TRICHLOROETHYLENE	L	<25°C	N	N	A		N	N	N	N	A	N

FLUID	PHYSICAL STATE	DISC MATERIALS			SEAT MATERIALS							
		CONDITION	DUCTILE IRON. (EN 1563)	ALUMINIUM BRONZE. (EN 1982)	STAINLESS STEEL. (EN 10213-4)	CONDITION	E.P.D.M	BUNA-N	HYPALON	NEOPRENE	VITON	SILICONE
TRICRESYL PHOSPHATE	L		B	N			E	N	N	N	A	
TRIETHANOL AMINE	L		B	E			A	E	A	A	N	
TRISODIUM PHOSPHATE	L				A		A	B	A	A	A	
TURPENTINE	L		N	E	A	<25°C	N	E	N	N	A	
UREA	S	<40°C	N	N	A		E	A			N	
VINEGAR	L		N	N	A		E	B				A
WATER, ACIDIC MINE	L		N	N	B		E	A				B
WATER, FRESH	L		N	A	A		E	A		A	A	
WHISKEY	L		N	N	A		E	B				A
XYLENE	L		B	A	A		N	N	N	N	B	N
ZINC CHLORIDE	S		N	N	N		E	A	A	A	A	
ZINC SULFATE	S		N	N	A		E	A			A	