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PFA LINED BALL VALVE CATALOG

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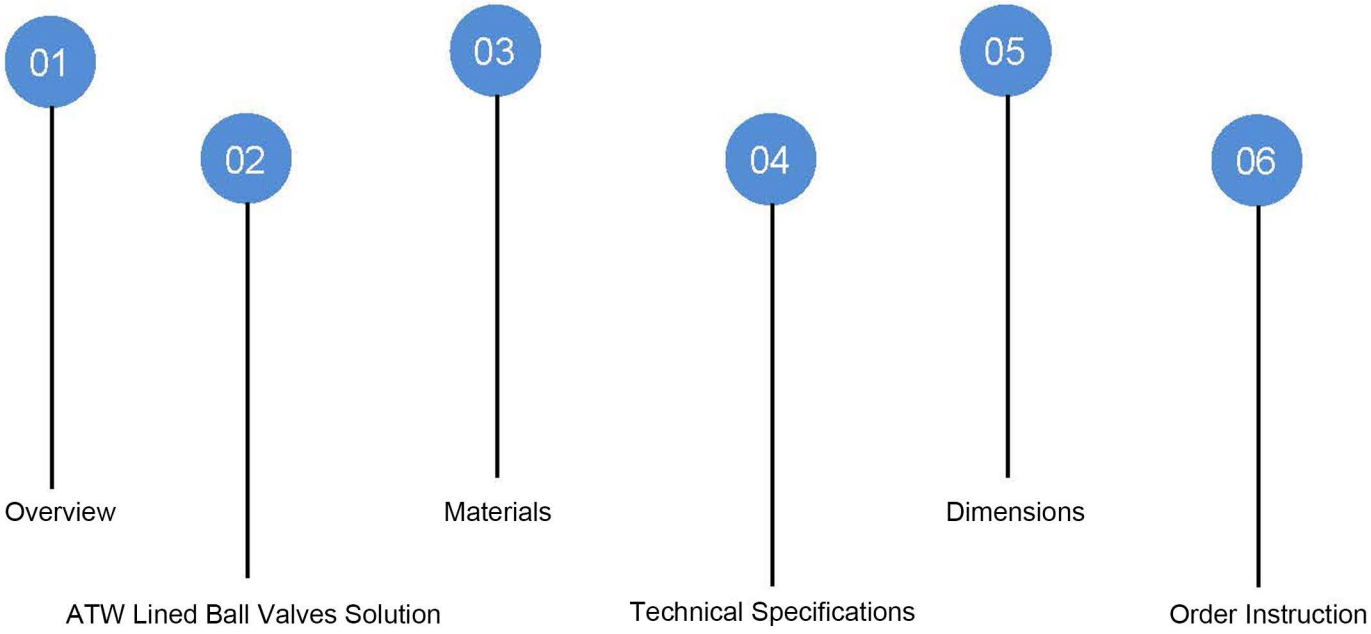
Catalog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Proudct Introduction

Lined ball valves are widely used for corrosive fluid. ATW lined valves accurately control the compression amount, effectively delay the cold flow deformation of soft materials, and meet the customers' requirements for valves, which includes being corrosion resistant, zero leakage, maintaining a long service life and being easy to operate.

Product features

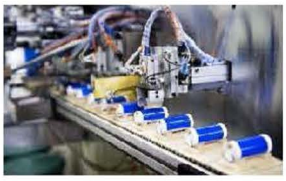
- Zero leakage: zero leakage on internal or external leakage;
- Low operating torque: flexible valve seat design reduces torque;
- No jam under wide temperature range: stable torque even from -65~200℃ with no jam;
- Anti-cold-flow: Preset torque tigntening bolts make sure that the stress is controlled at all positions of the valve seat and body under allowable stress so that cold flow is very slow;
- Lining delamination: The structure implementing dovetail groove and locking hole effectively improve the bonding strength between the lining layer and metal parts;
- Long service life: conventional model, high-performance model, high-frequency model and ceramic model have around 1000 times, 4000 times, 10,000 times and 50,000+ times cycles life respectively;

Serving Field

ATW lined ball valves are widely used in lithium electricity, chlor-alkali, semiconductor and photovoltaics, metal and mining, basic chemicals, food and medicine, papermaking and other industries. In these industries there're high requests for many critical fluid including sulfuric acid, hydrofluoric acid, phosphoric acid, strong alkali, chlorine and other corrosive media.

- Lithium electricity

  Lithium iron phosphate, ternary materials, lithium hexafluorophosphate and other facilities.

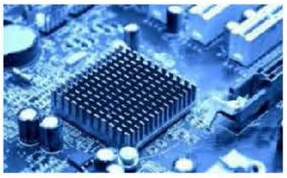


- Chlor-alkali

  Chlor-alkali electrolysis, alkali liquid transport, corrosive steam transport and and other facilities.

- Semiconductors and photovoltaics

  Corrosive media, ultra-pure and ultra-high-purity chemical media occasions.



- Metallurgy

  Leaching, electrolysis, waste liquid & acid-base recovery, metal pickling, anodizing and other sections.

- Basic chemicals

  Production process of basic chemicals such as fertilizer, titanium white powder, TDI and acid production.

- Food and medicine

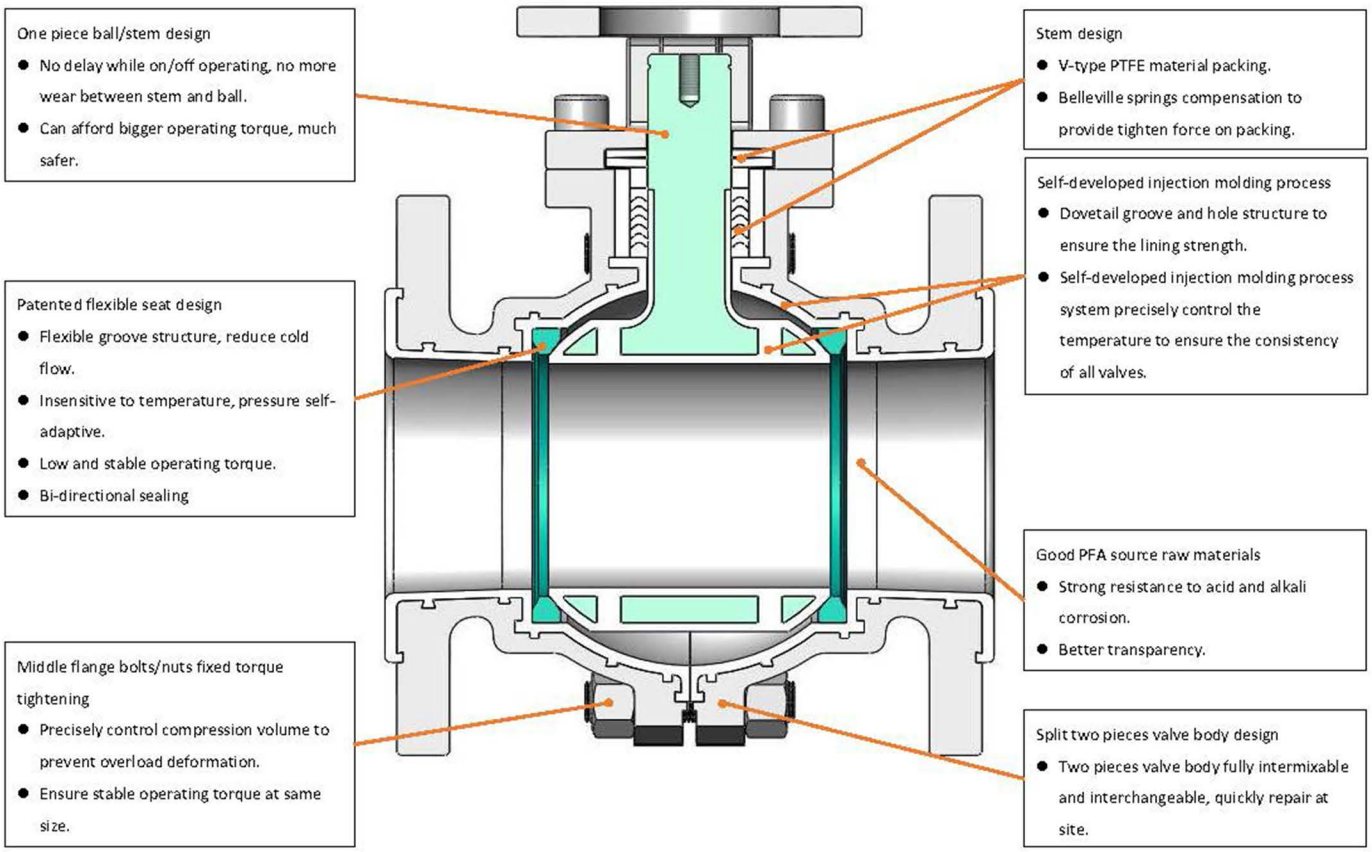
  Online cleaning process of the food & pharmaceutical facilities.

- Papermaking

  Bleaching, wastewater treatment and other sections.

ATW Lined Ball Valves

Design features

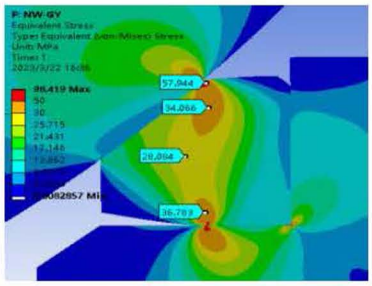


Note: ATW reserves the right to modify the structure.

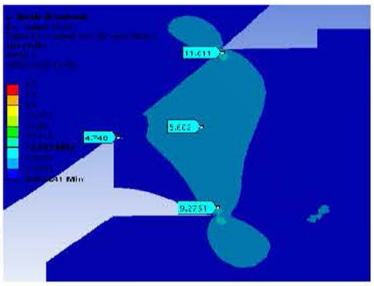
Core design concept：slow down the cold flow

The phenomenon of thermoplastic materials flowing under ambient temperature and pressure is called cold flow, which will cause internal leakage, external leakage and jamming of the valve. The speed of cold flow is mainly effected by the stress, ambient temperature and fulid, thus ambient temperature and fluid is part of working conditions which cannot be changed. Therefore, the best way to slow down the cold current is to reduce the stress. How to reduce the internal stress of thermoplastic materials is the key to extending the life of the lining valve, actually it can be said that "low stress means long service life".

ATW believes that the internal stress of thermoplastic materials such as PFA should not exceed the allowable stress (17MPa), otherwise it will accelerate the cold flow to cause damage and even shorten the service life. Under the concept of "slowing down the cold flow", ATW has developed a targeted structure and design. The following figure shows the general structure stress distribution of ATW's patent ball/seat design.



Over-stressed distribution of normal design valve ball/seat



Stress distribution of ATW patented design ball/seat

Patented fexible valve seat design

For the lined ball valve, in order to reduce the impact of the cold flow effect on the sealing performance of the valve seat, ATW has designed three different structures of elastic valve seats;

SF-CY01 Structure (conventional type)

It is suitable for working conditions below temperature <80℃ and working pressure ≤17bar. It has the following features:

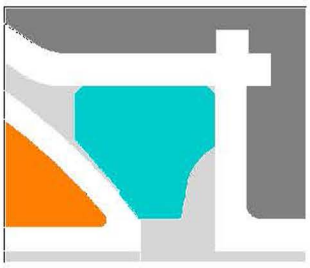
- The sealing surface is wide;
- The cantilever beam is thick and strong;
- Anti-fatigue;
- It is sensitive to temperature and not suitable for high temperature use.

SF-CY01 Series

SF-CY02 (high-performance type)

It is suitable for working conditions below temperature -50~160℃ and working pressure ≤17Bar. It has the following features:

- Prevents cold flow;
- Small torque;
- Stress adaptive;
- No jam under high temperature;
- Stable torque;
- Long life.

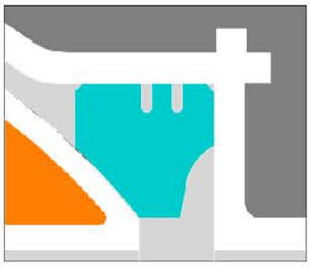


SF-CY02 Series

SF-GSM-CY01(high-frequency type)

It is suitable for working conditions with less than the number of switches <10,000 times, and it has the following features:

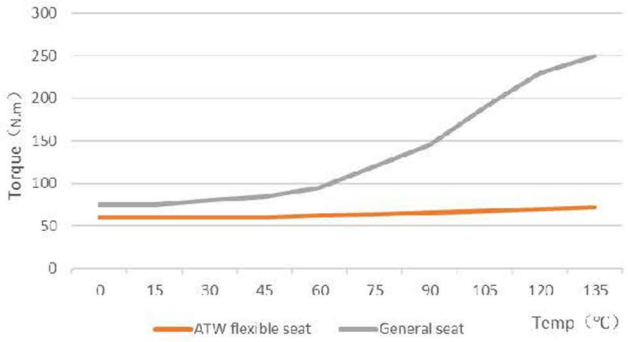
- Prevents cold flow;
- Small torque;
- No jam under high temperature;
- Stable torque;
- Self-compensation by C-type spring;
- It has a longer service life and is more ideal for high-frequency switches.



SF-GSM-CY01 Series

Compared with the valve seat of the design of conventional type, the biggest advantage of the ATW elastic valve seat is that it is insensitive to temperature. It can be seen from the following comparative test data that as the temperature rises, the torque increase of the ATW elastic valve seat is very small, while the valve torque of the ordinary valve seat significantly increases once the temperature rises above 80℃, and it is very easy to get stuck or unable to be operated.

Patented high-performance elastic valve seat torque

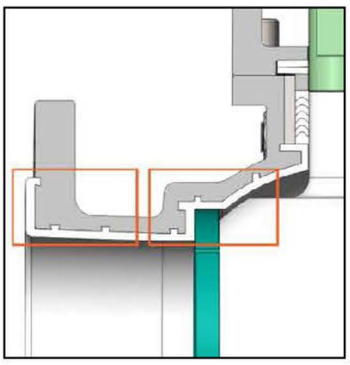


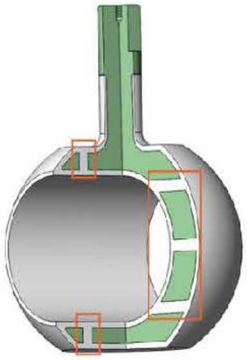
Note: The above data is based on 2"-150lb lining ball, PTFE valve seat, SF-CY01 structure

Self-developed locking glue and injection molding process

From the perspective of slowing down cold flow and reducing stress, the valve body and valve ball have respectively adopted the rubber-locking dovetail groove and the locking rubber hole structure. Additionally, a uniformly-covered lined layer, which is at least 3mm thick everywhere, ensures the bonding strength of the inner lining layer and the metal structure to prevent degumming, cracking and failure of the lining layer.

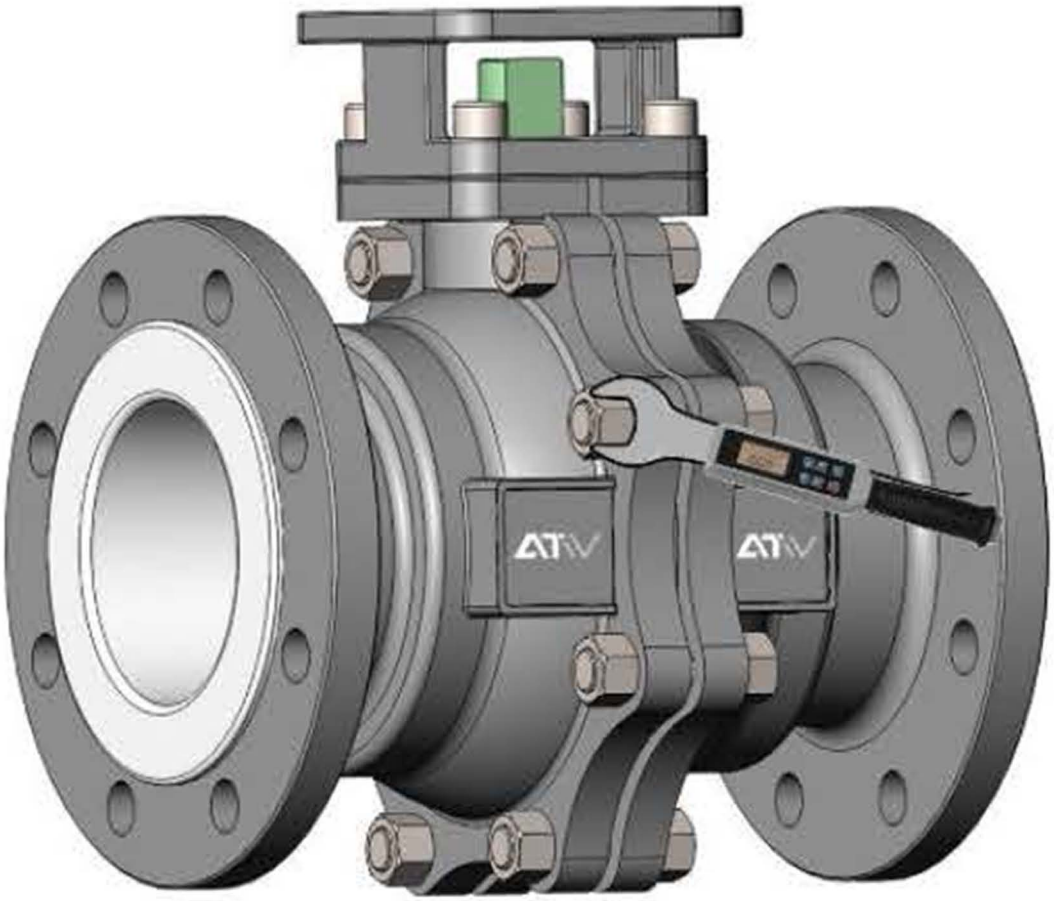
At the same time, in order to fundamentally reduce the negative impacts on the service life caused by problems of jamming, leakage, etc. coming from the injection molding process, ATW has done targeted research starting from the most underlying technologies. The resultant injection molding system ATW has developed is then able to customize the injection molding equipment and control system with accurate temperature control, realize intelligent automatic adjustment of injection molding process parameters to ensure the quality consistency of injection molding parts and help to avoid product problems such as degumming, cracking, uneven thickness.





Fixed torque fastening

The valve body and valve cap are both covered by thermoplastic lining material. Usually under the influence of cold flow deformation of thermoplastic material and deviations during assembling, the lining layer is prone to pressure deformation, which consequently can lead to leakage in the middle stud. Based on both material characteristics and simulation results, ATW implements a quantitative tightening method with torque wrench for tightening the middle stud to ensure the consistency in the amount of compression within the middle stud in each valve given that these valves are of the same type and specifications. Under this design, the assembly is highly repeatable and independent of the operator in charge of the assembly while also ensuring the reliability of the valve torque.



Middle stud fixed torque fastening

Other features

Integrated valve ball/valve stem design

The integrated valve ball/valve stem design can effectively avoid mutual squeezing between the valve ball and the valve stem so that the PFA lining would not be damaged. Additionally, due to this integrated design, when switched on and off, the valve stem and the valve ball will be in place at the same time without any delay.

All-in-one valve ball/valve stem

The design of the split valve body

The valve body and cap are identical and totally interchangeable with one another, which allows quick on-site repairing and maintenance by replacement.

The consistency of the valve body and valve cap is easier to maintain.

High-quality lining raw materials

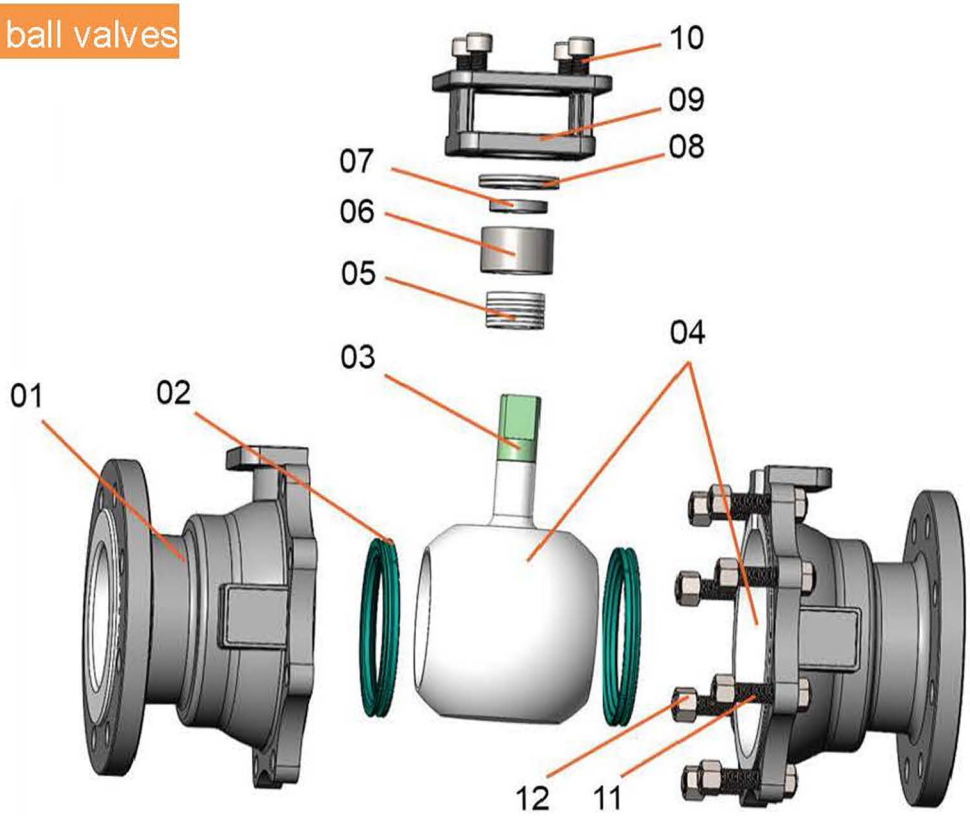
ATW provides a variety of lining materials such as F40/F46/PFA, which can meet the requirements of usage for different scenarios and suit variant on-site working conditions. Moreover, these lining raw materials specifically selected by ATW are of better clarity, which enables direct observations to be able to catch defects in the metal parts and injection molding parts as well as other variants that may affect the service lives of the valve, thereby improving the delivery qualities of these valves.

Basic physical properties of lining materials

Name of lining material	ETFE(F40)	FEP(F46)	PFA
Density /(g/cm^3)	1.73~1.79	2.12~2.18	2.12~2.18
Tensile strength /MPa	30~47	20~32	27~32
Elongation rate /%	200~400	250~330	280~315
Recommended temperature /℃	-50~95	-50~120	-50~160
Maximum operating temperature /℃	120	150	200
Applicable media	Strong acid, strong alkali, strong oxidizer, etc.	Any organic solvents or reagents, dilute or concentrated inorganic acids, bases, ketones, aromatic hydrocarbons, chlorinated hydrocarbons, etc.	Any organic solvents or reagents, dilute or concentrated inorganic acids, bases, ketones, aromatic hydrocarbons, chlorinated hydrocarbons, etc.

Material composition

For split-lined ball valves



Number	Name	Material		
01	Valve body	A216 WCB		A351 CF8
02	Valve seat	PTFE		
03	Valve ball/valve stem	A216 WCB		A351 CF8
04	Lining layer	F40	F46	PFA
05	Filling	PTFE		
06	Filler cover	PFA/PTFE		
07	Filler pressing ring	304		
08	Standard disc spring	50CrVa		
09	Filler pressing cover	A216 WCB		A351 CF8
10	Screw	B7/2H		B8-2/8
11	Stud	B7/2H		B8-2/8
12	Nut	B7/2H		B8-2/8

Note: The materials listed in the above table are only regular materials. For more materials, please consult ATW. ATW reserves the right to modify the materials.

Optional:

Valve ball made of high-purity zirconium oxide/PEEK material

● For more severe working conditions, especially corrosive media containing solid particles, high-purity zirconium oxide valve balls or PEEK valve balls can be selected.

High-purity zirconium oxide valve ball

Anti-static PFA

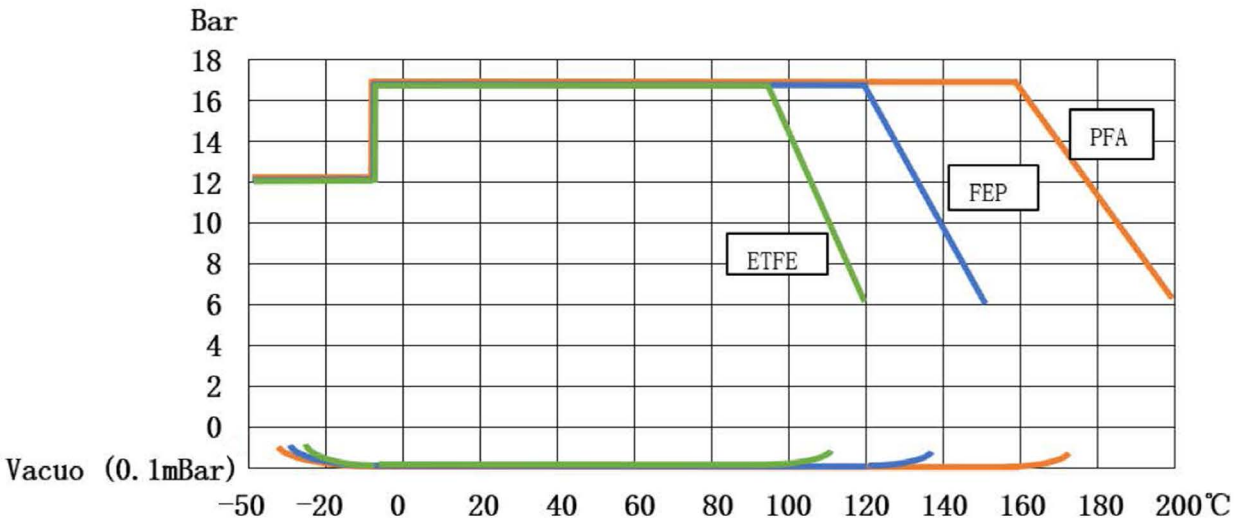
● Anti-static PFA can effectively disperse the electrostatic charge accumulated in the material, which is more suitable for electrostatic-sensitive scenes.

Technical specifications

Performance indicators

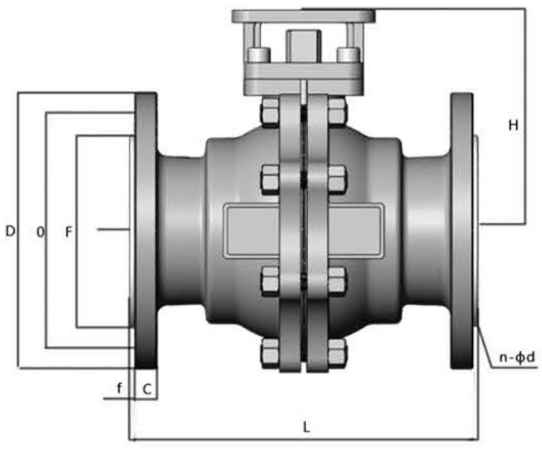
Size	• DN 15~DN200 • NPS1/2~NPS8
Flange Standard	• ASME B16.5 • HG/T20592
Pressure Rate	• Vacuum（0.1mBar）to 17Bar
Design Temperature	• -50℃ to 200℃
Structure length standard	• ASME B16.10 • HG/T12221 • HG/T3704 • JB/T 14312
Design Standard	• API 608 • ASME B16.34 •GB/T 12237 •GB/T 12224 • JB/T 14312 • HG/T 3704
Inspection and test Std	• API 608 • ISO5208 • GB/T 13927 • FCI70.2
Low fugitive emission Std	• TA Luft VDI244 • ISO 15848-1 • API 641

Temperature and pressure curve



Pressure Rate	Size	Dimensions（mm）								Weight
	DN	L	H	D	O	F	f	C	n-φd	（Kg）
PN16	15	140	83	95	65	45	2	14	4-14	3
	20	140	83	105	75	58	2	16	4-14	3
	25	150	88	115	85	68	2	16	4-14	6
	40	180	118	150	110	88	2	16	4-18	8
	50	200	128	165	125	102	2	16	4-18	11
	65	220	140	185	145	122	2	16	8-18	17
	80	250	159	200	160	138	2	18	8-18	25
	100	280	176	220	180	158	2	18	8-18	35
	125	320	218	250	210	188	2	20	8-18	42
	150	360	262	285	240	212	2	20	8-22	50
	200	457	348	340	295	268	2	22	12-22	62

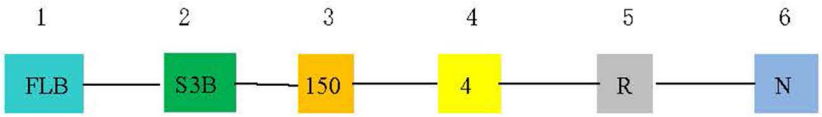
Pressure Rate	Size	Dimensions（mm）								Weight
	DN	L	H	D	O	F	f	C	n-φd	（Kg）
PN25 (＜17Bar)	15	140	83	95	65	45	2	14	4-14	4
	20	140	83	105	75	58	2	16	4-14	4
	25	150	88	115	85	68	2	16	4-14	8
	40	180	118	150	110	88	2	16	4-18	10
	50	200	128	165	125	102	2	18	4-18	14
	65	220	140	185	145	122	2	20	8-18	22
	80	250	159	200	160	138	2	22	8-18	30
	100	280	176	235	190	162	2	22	8-22	42
	125	320	218	270	220	188	2	24	8-26	52
	150	360	262	300	250	218	2	26	8-26	60
	200	457	348	360	310	278	2	28	12-26	72



Pressure Rate	Size	Dimensions（mm）								Weight
	NPS	L	H	D	O	F	f	C	n-φd	（Kg）
CLASS150	1/2	108	85	90	60.3	35	2	8	4-16	3
	3/4	117	90	100	69.9	43	2	8.9	4-16	3
	1	127	99	110	79.4	51	2	9.6	4-16	6
	1 1/2	165	126	125	98.4	73	2	12.7	4-16	8
	2	178	140	150	120.7	92	2	14.3	4-18	11
	2 1/2	190	165	180	139.7	105	2	15.9	4-18	17
	3	203	178	190	152.4	127	2	17.5	4-18	25
	4	229	230	230	190.5	157	2	22.3	8-18	35
	5	356	280	255	215.9	186	2	22.3	8-22	42
	6	394	310	280	241.3	216	2	23.9	8-22	50
	8	457	350	345	298.5	270	2	27	8-22	62

Order Instruction

Model compilation



1、Model: FLB-lined ball valve

2、Series:

Structure & Material	Conventional valve seat + F40/F46/PFA lining	High-performance valve seat + F40/F46/PFA lining	High-frequency valve seat + F40/F46/PFA lining
Code	S1A/S1B/S1C	S2A/S2B/S2C	S3A/S3B/S3C

3、Pressure Rate

Pressure	PN10	PN16	PN25（below 17Bar）	Class150
Code	10	16	25	150

4、Nominal Size

NPS	0.5	0.75	1	1.5	2	2.5	3	4	5	6	8
DN	15	20	25	40	50	65	80	100	125	150	200

5、Connect Flange

Flange
RF

6、Options

Anti-static PFA	PEEK material ball	Zirconium oxide ball	None
FN	KN	ON	NN

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Antiwear (Suzhou) Industrial Intelligent Technology Co., Ltd.
ADD:No. 18, Yunfan Road, Bixi Sub-district, Changshu City, Suzhou City, Jiangsu Province
TEL:+86-512-82880588
FAX:+86-512-82079059
WEB:www.antiwearvalve.com