

高性能弹性浮动阀座 High-performance Flexible Floating Seat**设计原理：**唇式密封技术**制造范围：**1寸-4寸**适用温度：**-46°C-250°C

适用压力： P.T.F.E:150Lb-600Lb P.T.F.E:150Lb-1500Lb
 DEVLON:150Lb-2500Lb NYLON:150Lb-2500Lb
 PEEK:150Lb-2500Lb NESPEL:150Lb-2500Lb

Design principle: lip shape seal technology

Manufacturing scope:1-4inch

Applicable temperature: -46°C-250°C

Applicable pressure: P.T.F.E:150Lb-600Lb P.T.F.E:150Lb-1500Lb
 DEVLON:150Lb-2500Lb NYLON:150Lb-2500Lb
 PEEK:150Lb-2500Lb NESPEL:150Lb-2500Lb

**技术特点****1. 唇形设计**

想要让密封材料像橡胶一样，受压时可以发生较大的变形，来填补金属表面的微观不平度，而当应力消除后又能回复其原来的形状，这种现象被称为材料的“记忆特性”所以我们的目的，就是要设计一种密封座的形状，克服PTFE的“冷流”和热膨胀特性的缺陷来改善其记忆特性。这种密封结构称之为具有挠性的唇式密封技术。

2. 双层密封结构

由于阀座是唇形设计，在初始密封时是下点密封，当压力升高阀座唇形位置变形，形成两点密封，使密封性能更加可靠。

3. 背压变形结构

阀座背面有一定的弧度来减小直角变形的缺点，同时使唇形阀座具有优良的弹性性能。

4. 外形变形结构

阀座外圆上作出一定的弧度角，用来防止唇形阀座变形带来的挤压应力过大。

Technical Characteristics**1. Lip shape seal design**

The rubber will occur large deformation under pressure to offset the roughness of metal surface, and can recover its original shape when stress relief. This material is called as "Memory Property". We plan to create a new seat material that can overcome the defects of PTFE cold flow and thermal expansion and improve the memory property. This sealing structure is called as Lucky Lip Seal Technology.

2. Double layers sealing structure

The lip shape seal seat has the advantages that its position will be changed due to high temperature, which will form double points sealing, sealing performance is more reliable.

3. Backpressure deformation structure

There is a certain radian on the back side of the seat to prevent the right angle from being deformed, and it also can improve the lip shape seal seat elasticity.

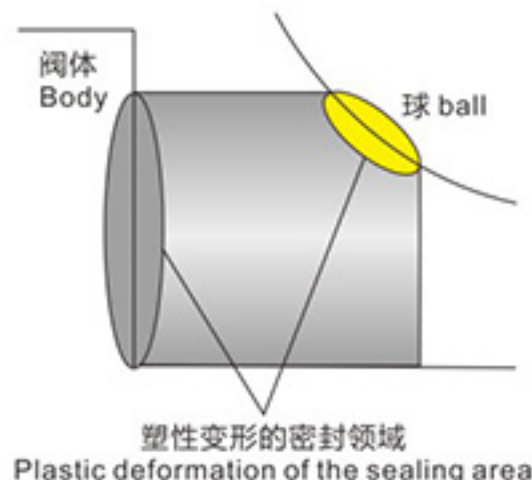
4. Shape deformation structure

The radian angle on the seat mainly avoid the higher extrusion stress occurred because of the deformation of the lip shape seal seat.

铸钢浮动球阀特点比较 Characteristics of Cast Steel Floating Ball Valve

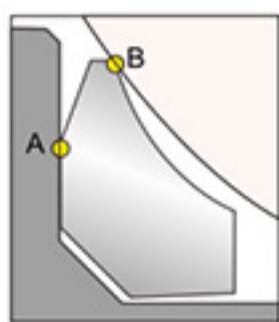
(1) 如右图所示:为传统的填塞式密封方式，塑料应变发生在球体与密封座和阀体与密封座之间，这两个区域的接触应力大小，决定阀门的密封性能。

(1) As shown on the right: It is a conventional packed type seal method, the strain stress of plastic between ball and seat or body and seat, of which contact areas size will decide valve sealing.

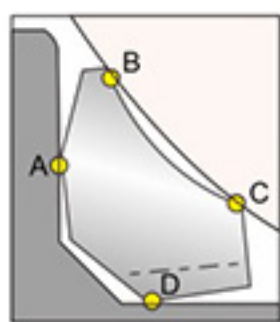


(2) 如下图所示:我公司这一改进使密封座具备下列功能:使球体保持在阀腔中心,球体浮动是微小的;装配后,唇部发生变形,能蓄储弹性变形能,实现低压下的密封;密封座上有一支撑点,当压力升高,温度升高时,平衡部分作用在密封座上的介质力;防止材料可能产生的“冷流”。这种截面形状的唇式密封座装配前的形状和图A所示。装配后的形状如图B所示,有四个接触点,B点是与球体接触的密封点,A点是与阀体接触的密封点,C点是与球体接触的支撑点,D点是与阀体接触的支撑点。装配前后唇缘的形状变化,蓄储了材料的弹性变形能,像弹簧一样。而且当温度或压力升高时,进一步吸收弹性变形能,当温度或压力下降时,泄放弹性变形能来获得记忆特性。

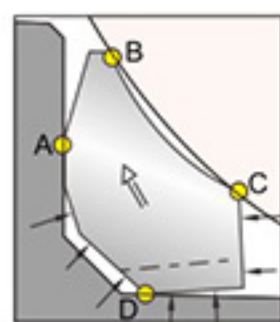
(2) As shown below figure: The improved sealing seat has the following characteristics: keep the ball in the center of body and a little floatation; the lip area will occur a deformation after assembling and obtain low pressure seal; the supporting point, in case of pressure and temperature increasing, to balance the medium force onto seat, this can prevent the cold flow happened. The shape of unmounted lip shape seat cross section as shown figure A, the completed shape as shown figure B, there are 4 contact points, point B refers to sealing point contacting with ball, point A to sealing point contacting with ball, point C to supporting point contacting with ball while point D to supporting point contacting with ball. The elasticity is reserved similar like spring due to deformation. When temperature or pressure increasing, to absorb in the elastic deformation energy; while decreasing, to obtain memory property after release the elastic deformation energy.



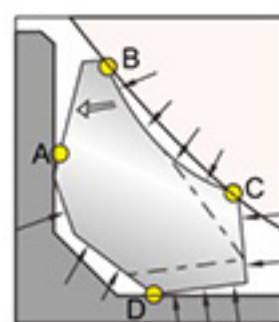
A



B



C



D

(3) 人工开槽,用以实现给与阀座在挤压过程中自我保护。

(3) Grooving to protect the seat from being destroyed in the extrusion process.



(4) 上下碰触,中部赋予弹性空间的方式保证材料弹性蓄能能力实现记忆特性。同时减少接触面面积,降低扭矩

(4) Up and bottom contact, to reserve material elasticity and obtain memory property, and reduce contact areas and lower torque.



(5) 新型阀座图:

(5) New type seat figure of Cheng Gong:



备注

分体式浮动球阀

下图是统建100mm结构（部件结构随尺寸而变）

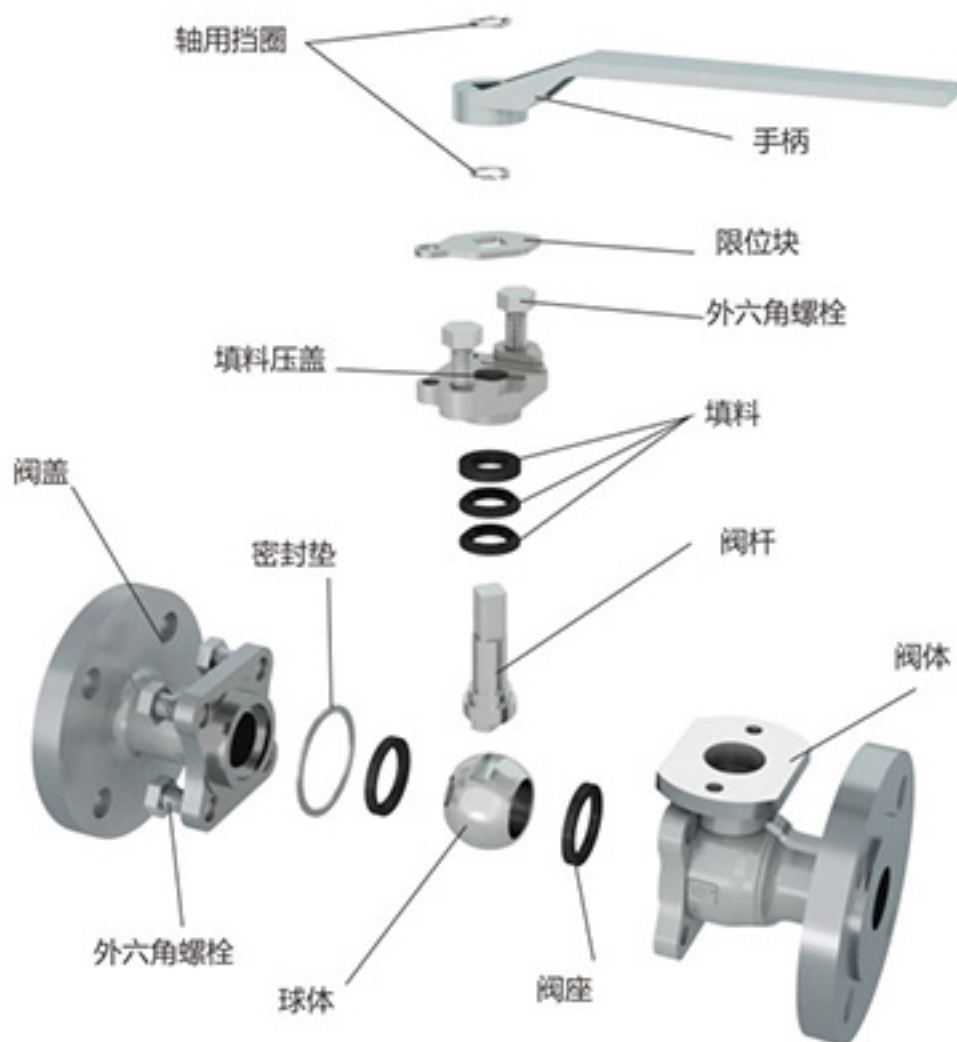
蜗轮驱动器参见手动驱动器介绍

Remarks

Split floating ball valve

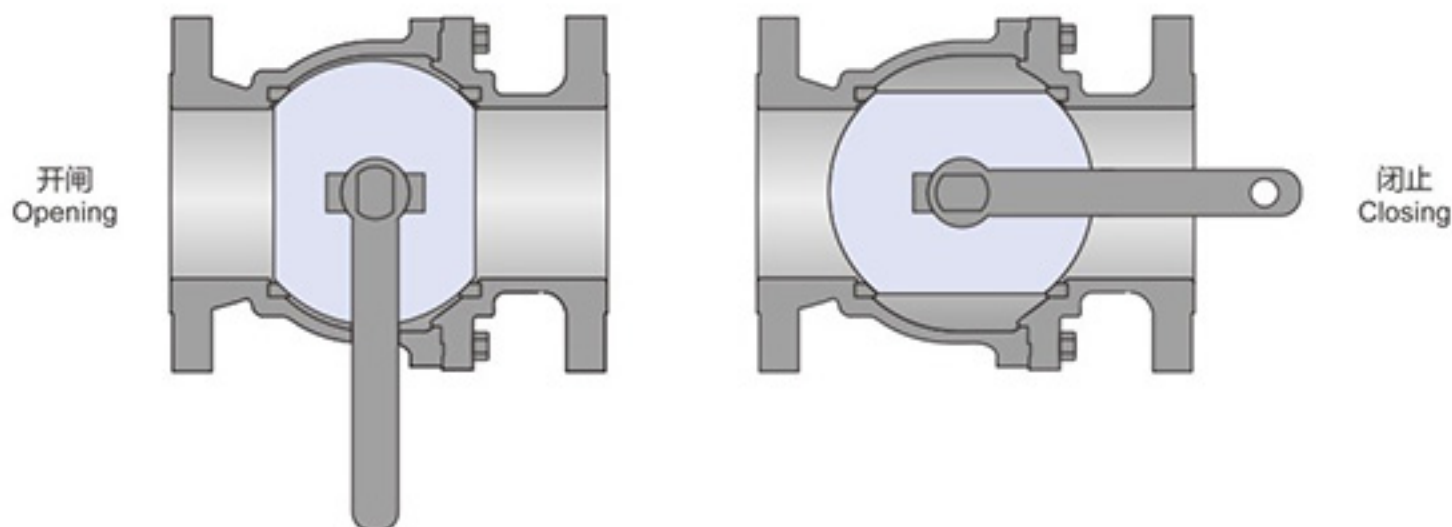
The following figure is a unified 100mm structure
(part structure with size and change)

Worm Drive See manual drive introduction

**部件材质（常规配置） Parts Material (General Configuration)**

零件 Components	碳钢 Carbon steel	不锈钢 stainless steel	酸性环境 Acid condition	低温环境 Cryogenic condition
手柄 handle	WCB	不锈钢 stainless steel	不锈钢 stainless steel	不锈钢 stainless steel
内六角螺钉 Socket head cap screws	ASTMA193-B7	ASTMA193-B8	ASTMA193-B7M	ASTMA193-L7M
压板 Platen	碳钢 Carbon steel	ASTMA315-CF8M	碳钢 Carbon steel	ASTMA352-LCB
垫片 Gaskets	316SS+石墨 graphite	316SS+石墨 graphite	316SS+石墨 graphite	316SS+石墨 graphite
填料组 Packing group	石墨 graphite	石墨 graphite	石墨 graphite	石墨 graphite
阀杆 Stem	ASTMA182-F6A	ASTMA182-F316	ASTMA182-F6A	ASTMA182-F316
弹簧 spring	ASTMA193-B7	ASTMA193-B8	ASTMA193-B7M	ASTMA193-L7M
钢球 Steel balls	不锈钢 stainless steel	不锈钢 stainless steel	不锈钢 stainless steel	不锈钢 stainless steel
螺栓 bolt	ASTMA193-B7	ASTMA193-B8	ASTMA193-B7M	ASTMA193-L7M
阀盖 cap	ASTMA216-WCB	ASTMA315-CF8M	ASTMA216-WCB	ASTMA352-LCB
阀体 Body	ASTMA216-WCB	ASTMA315-CF8M	ASTMA216-WCB	ASTMA352-LCB
螺母 Nuts	ASTMA194-2H	ASTMA194-8	ASTMA194-2HM	ASTMA194-7M
阀座 Seat	四氟乙烯 PTFE	四氟乙烯 PTFE	四氟乙烯 PTFE	四氟乙烯 PTFE
球体 ball	ASTMA105/ENP	ASTMA182-F316	ASTMA105/ENP	ASTMA182-F316

浮动球阀杆顶部形式 The Shape of Stem Top Part of Floating Ball Valve



1. 防止误操作手柄

阀门的开、关常常是通过手柄的位置来确认，手柄与管道平行开阀、垂直为关阀。但普通球阀手柄与阀杆的连接是扁四方，容易因手柄与阀杆的连接错误而造成阀门的误操作。而浮动型球阀手柄与阀杆的连接是扁平方不可能造成手柄的连接错误，更不会出现误操作。

1. Avoid Wrongly Operate Lever

Usually, to check valve operation status by checking the lever's position, it means open when the lever is parallel with the pipeline, and if vertical with the pipeline the valve is closed. The general shape connected between the lever and stem is flat rectangle which can cause to wrongly operation due to incorrect connection. However, the shape of floating ball valve is flat square, no wrong connection will be happened and even no wrong operation.

2. 锁定机构

手动球阀在全开、全关位置，可用锁锁定，以防非工作人员扳动手柄，造成阀门的误操作。也可防止因管线震动，或不可测的因素造成阀开或关，出现事故。特别是对于易爆油、化学药品等工作管线、或者野外配管场合，具有更加有效的作用。

2. Ball Valve With Locking Device

Manual ball valve shall be locked in the full on or off position in order to prevent the valve from being operated improperly by non-employee. This also can reduce accident possibilities from pipeline shake or other unexpected things, especially for the valve used in the services of explosive oil, chemicals and field environment.

3. 防止出阀杆凸肩

浮动球阀，为防止因阀门内压的异常升高而使阀杆飞出的危险，在阀杆的下部设置了凸肩，此外为防止火灾出现时，使阀杆密封盘根烧损后，出现泄漏，在阀杆下部凸肩与阀体接触处设置了止推轴承，形成倒密封座，防止泄漏，避免事故的扩大。

3. Blow-out Proof Stem Design

To prevent the stem from being blown out as a result of abnormally rising of floating ball valve internal pressure, a raised shoulder specially designed on the bottom of the stem. And to eliminate the fires and stop the leakage because the packings burned out, thrust bearing mounted on the contact position between raised shoulder and stem, which can generate a reversed seal seat to prevent any leakage.

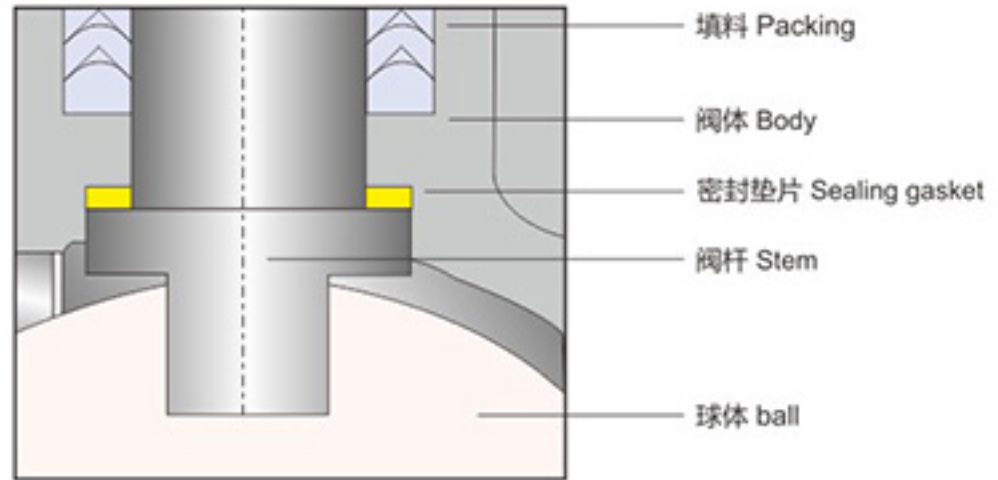
对于普通球阀，若阀杆盘根烧损，或盘根压盖，螺栓有缺损，阀杆手内压的作用容易飞出，流体外溢，出现事故，升值加大事故程度，这是安全要求所不允许的。

Subjected to the internal pressure, the general ball valve has the disadvantages that the stem is easier to be blown out in the case of packings burned out and the damage of gland and bolts. The fluid will spill out lead to big accident happened, that is really forbidden.

浮动球阀阀杆结构 Floating Ball Valve Stem Structure

浮动球阀阀杆转动采用金属TFE(RPPL)作为轴承，可防止阀杆卡死现象，保证操作轻便灵活。

The TFE/RPPL metal material bearing for ball valve can prevent the stem being jammed and easy operation.

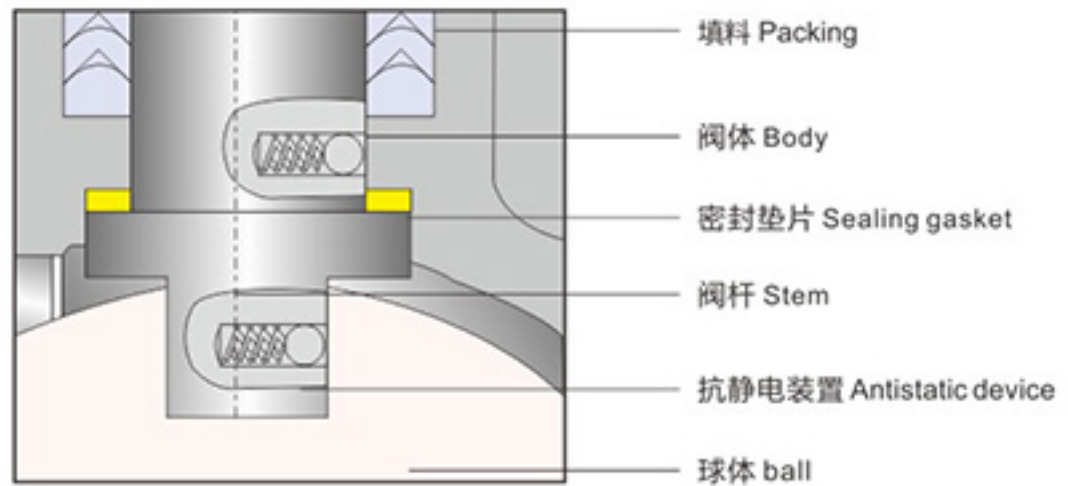


4. 防静电性能

浮动球阀为防止由于球体及阀杆与TFE(或RPPI)的摩擦而产生静电，容易静电打火点燃易爆介质出现工况事故。在阀杆与球体及球体与阀体之间设置了导静电弹簧，使静电通过管路导入地下，保证系统安全。

4. Anti-static Performance

To reduce static electricity which exists in ball, stem and TFE/RPPI seat, it is possible that the static charge will be discharge to burnable or explosive medium and creating spark, we require an anti-static spring in the ball-stem connection and ball-body connection. Therefore, the build-up static electricity will be immediately connected to the ground and ensure system safety.

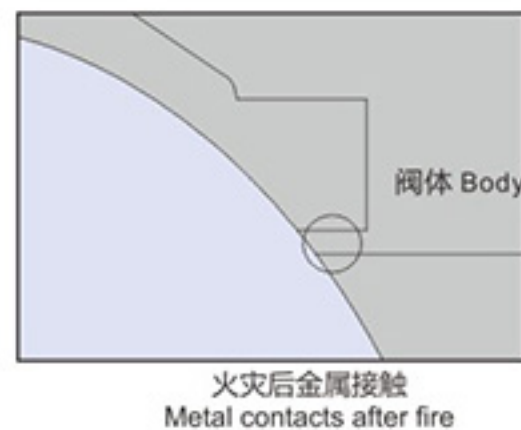
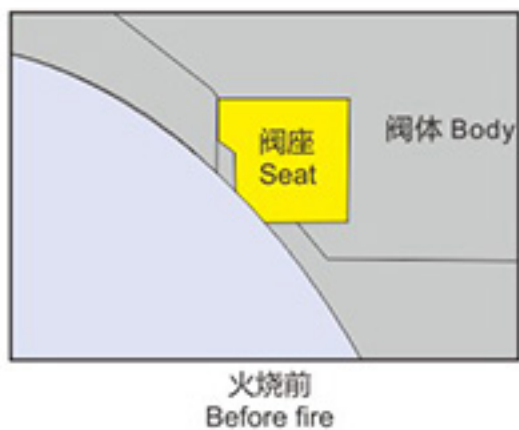


5. 耐火结构

为防止因火灾或聚热的出现，是阀座烧损时，发生较大泄漏，而助长火势，球阀在球体和阀座间设置了防火密封环，当阀座烧损后，介质将球体迅速推向下游端的金属密封环上，形成金属——金属接触，起一定程度的密封。从而保证系统的安全。

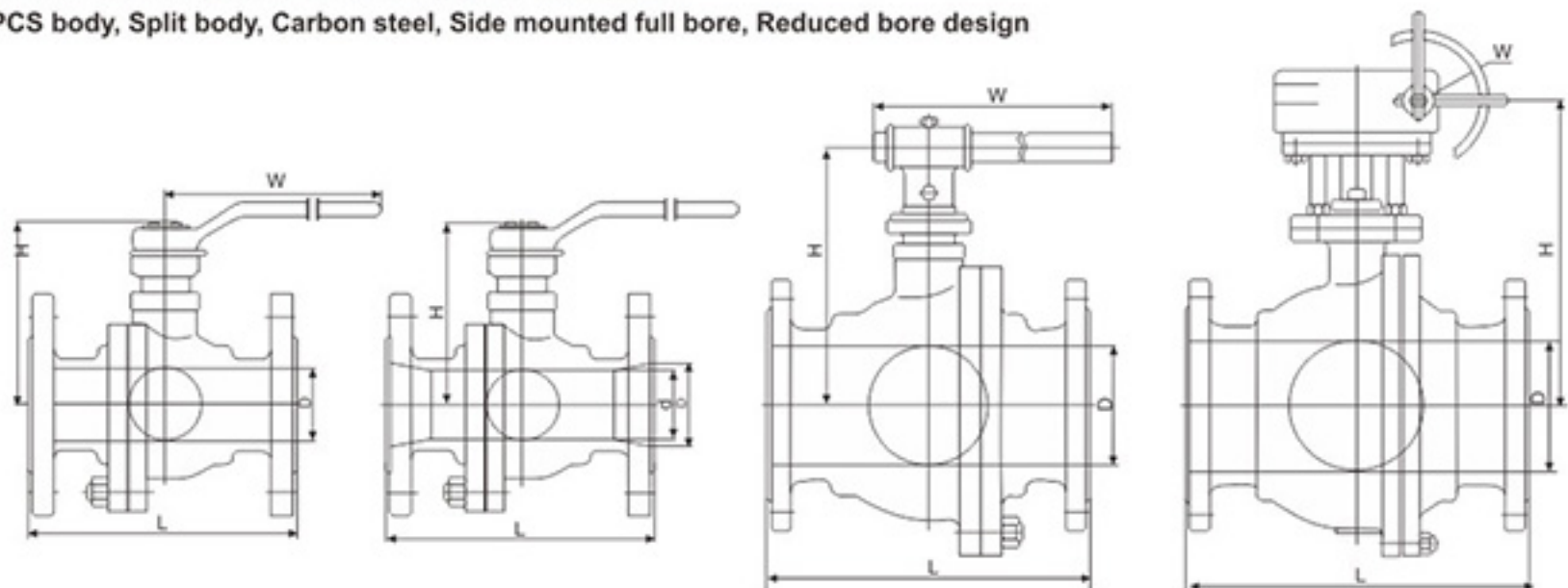
5. Fire-proof Protective Structure

Set a fire-proof seal ring to protect seat in case of fire. The ball will be pushed into the downstream immediately under the action of medium, it can help to seal once connected with each others to safeguard the system safety.

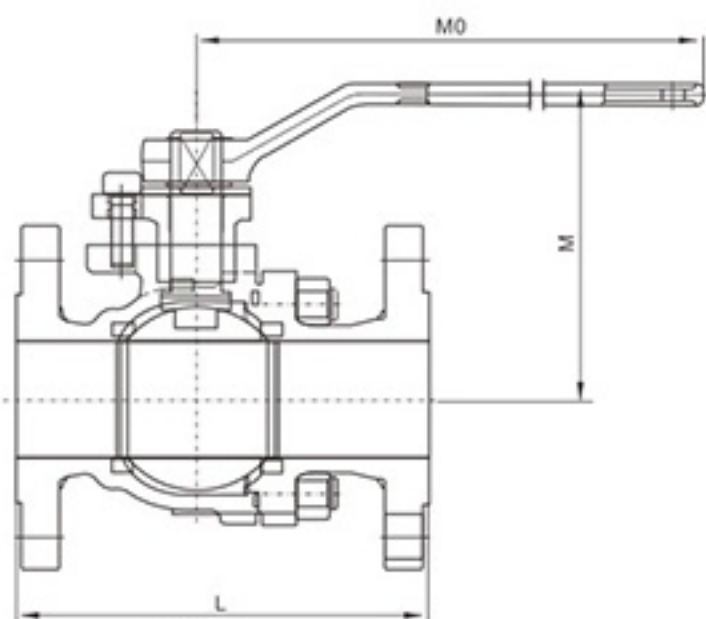


二片式、分体、铸钢、侧装式全通径、缩径设计

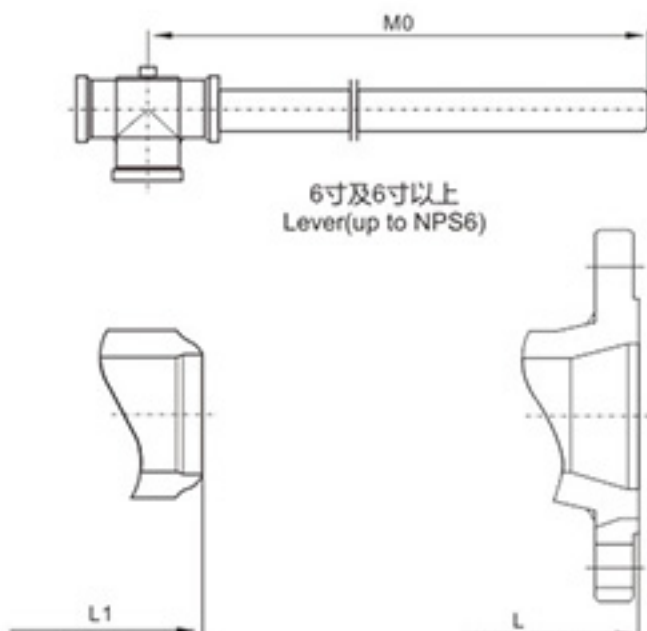
2 PCS body, Split body, Carbon steel, Side mounted full bore, Reduced bore design

**主要外形尺寸 Main Dimensions**

全通径 Full diameter					缩径 Reduction					
口径 caliber (英寸inch)	DN mm	L mm	H mm	W mm	口径 caliber (英寸inch)	DN mm	DN mm	L mm	H mm	W mm
150Lb										
1/2	15	108	59	130	3/4*1/2*3/4	15	20	117.5	82	130
3/4	20	117	63	130	1*3/4*1	20	25	127	85	130
1	25	127	76	160	1-1/2*1-2/2	25	38	165	100	160
1-1/2	38	165	97	230	2*1-1/2*2	38	50	178	115	230
2	50	178	107	230	2-1/2*2*2-1/2	50	64	190	120	230
2-1/2	64	190	142	400	3*2*3	50	76	203	153	400
3	76	203	152	400	4*3*4	76	102	229	162	400
4	102	229	178	400	6*4*6	102	152	394	191	460
5	127	356	252	800	8*6*6	152	203	457	290	800
6	152	394	272	800	10*8*10*	203	254	533	340	1000
8	203	457	342	1000	12*10*12*	254	305	610	442	300*
10	254	533	345	400*	-	-	-	-	-	-
12	305	610	479	600*	-	-	-	-	-	-
300Lb										
1/2	15	140	59	130	3/4*1/2*3/4	15	20	152	82	130
3/4	20	152	63	130	1*3/4*1	20	25	165	85	130
1	25	165	75	160	1-1/2*1-2/2	25	38	190	100	160
1-1/2	38	190	97	230	2*1-1/2*2	38	51	216	115	230
2	50	216	107	230	2-1/2*2*2-1/2	50	64	241	120	230
2-1/2	64	241	142	400	3*2-1/2*3	64	76	283	153	400
3	76	283	152	400	4*3*4	76	102	305	162	400
4	102	305	178	400	6*4*6	102	152	403	191	460
5	127	381	252	800	8*6*8	152	203	502	290	300*
6	152	403	272	300*	10*8*10	203	254	568	340	400*
8	203	502	342	400*	-	-	-	-	-	-
10	254	568	345	400*	-	-	-	-	-	-



手动操作 CMA
Lever-Operated



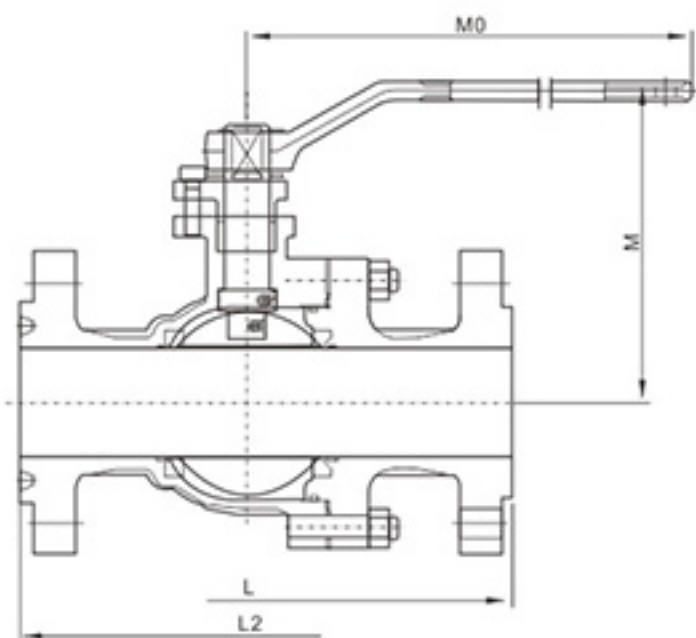
6寸及6寸以上
Lever(up to NPS6)

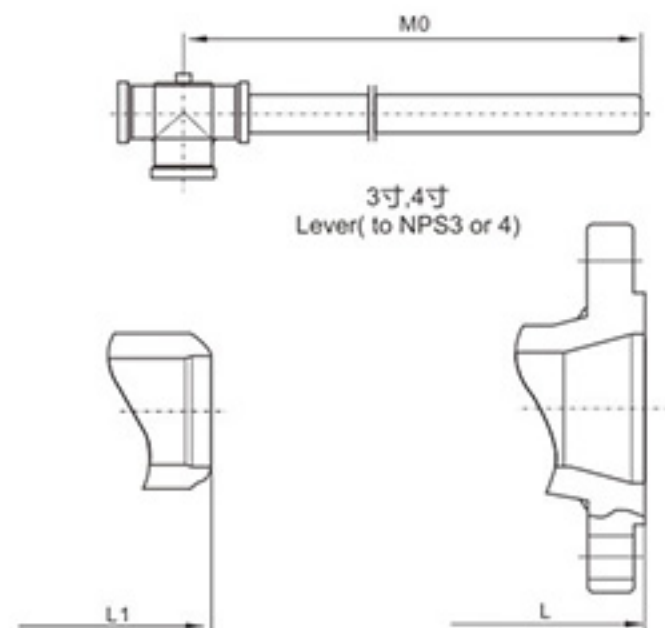
焊接端WN
Welding end WN

缩径流道RB
Reduced runoff Road RB

主要外形尺寸 Main Dimensions

全通径 Full diameter						缩径 Reduction					
NPS inch	DN mm	LRF mm	L1WN mm	M mm	M0 mm	NPS×NPS' inch	DN×DN' mm	LRF mm	L1WN mm	M mm	M0 mm
PN16/PN20/Class150											
1/2	15	108	140	85	140	3/4×1/2	20×15	117	152	85	140
3/4	20	117	152	90	140	1×3/4	25×20	127	165	90	140
1	25	127	165	99	150	1 1/2×1	40×25	165	190	99	150
1 1/2	40	165	190	126	200	2×1 1/2	50×40	178	216	126	200
2	50	178	216	140	250	3×2	80×50	203	293	140	250
2 1/2	65	191	241	165	300	4×3	100×80	229	305	178	350
3	80	203	283	178	350	6×4	150×100	394	457	230	500
4	100	229	305	230	500	8×6	200×150	457	521	310	800
6	150	394	457	310	800	10×8	250×200	533	559	350	1000
8	200	457	521	350							
10	250	533	559	400							
PN25/PN40/Class300											
1/2	15	140	140	85	140	3/4×1/2	20×15	152	152	85	140
3/4	20	152	152	90	140	1×3/4	25×20	165	165	90	140
1	25	165	165	99	150	1 1/2×1	40×25	190	190	99	150
1 1/2	40	190	190	126	200	2×1 1/2	50×40	216	216	126	200
2	50	216	216	140	250	3×2	80×50	283	293	140	250
2 1/2	65	241	241	165	300	4×3	100×80	305	305	178	350
3	80	293	283	178	350	6×4	150×100	457	457	230	500
4	100	305	305	230	500	8×6	200×150	502	521	310	800
6	150	457	457	310	800						
8	200	502	521	350	1000						


 手动操作 CMA
 Lever-Operated

 环连接端RJ
 Catenin end RJ

 焊接端WN
 Welding end WN

 缩径流道RB
 Reduced runoff Road RB
主要外形尺寸 Main Dimensions**全通径 Full diameter**

NPS inch	DN mm	LRF mm	L1WN mm	L2RJ mm	M mm	M0 mm
PN100/PN110/Class600						
1/2	15	165	165	163.5	79	140
3/4	20	191	191	191	83	140
1	25	216	216	216	114	200
1 1/2	40	241	241	241	125	250
2	50	292	292	295	156	300
2 1/2	65	330	330	333	172	350
3	80	356	356	359	220	500
4	100	432	432	435	250	650

主要外形尺寸 Main Dimensions**缩径 Reduction**

NPS×NPS' inch	DN×DN' mm	LRF mm	L1WN mm	L2RJ mm	M mm	M0 mm
PN100/PN110/Class600						
3/4×1/2	20×15	191	191	191	79	140
1×3/4	25×20	216	216	216	83	140
1 1/2×1	40×25	241	241	241	114	200
2×1 1/2	50×40	292	292	295	125	250
3×2	80×50	356	356	359	156	300
4×3	100×80	432	432	435	220	500
6×4	150×100	559	559	562	250	650

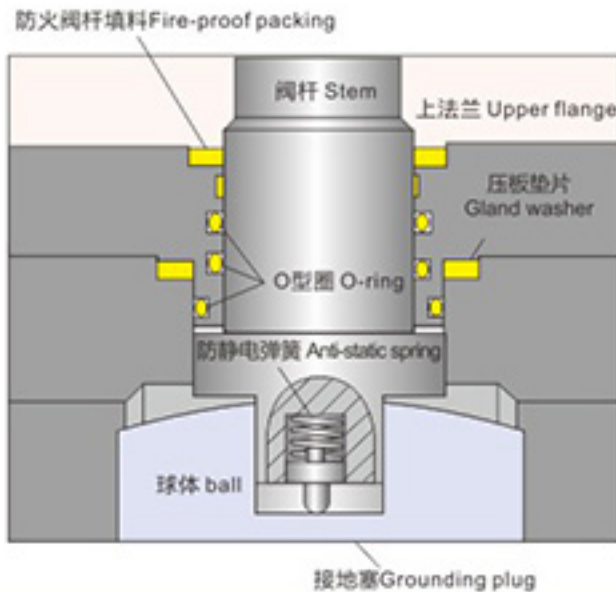
固定球阀设计特点 Design Features of Trunnion-mounted Ball Valve

1. 阀杆防吹出设计

阀杆与球是独立的，阀杆靠近球的一端设计成整体结构，压盖法兰可挡住该T型阀杆，避免被内腔压力吹出。

2. 防静电装置处

防静电装置是超特球阀的标准设计。阀杆上装有弹簧接地塞钉，使球、阀杆与阀体之间相接触，形成导通电路，可将电荷转移，从而避免阀门开关时摩擦产生静电积聚或流体冲击阀体内腔产生静电积聚。这种静电积聚对一些危险区域内的管线来说是极其危险的。

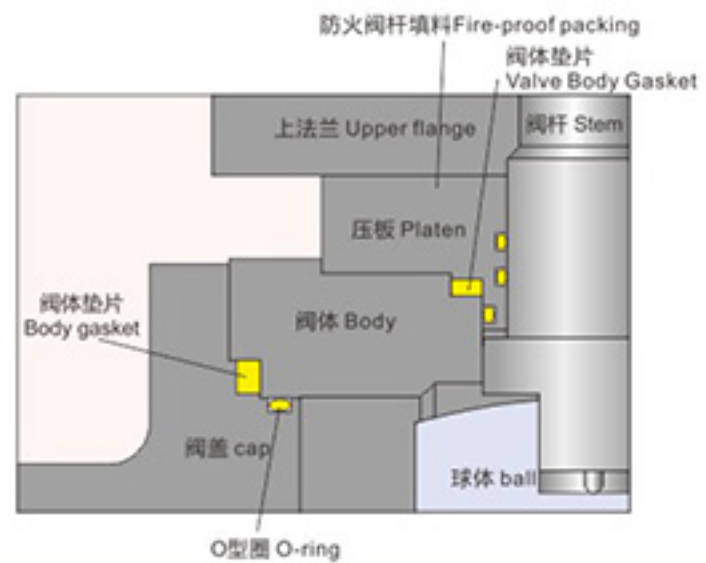


1. Blow-out proof stem design

Both stem and body are separated, the stem part connected with the ball is integral and the gland can hold down the T type stem, which could protect the stem blown out.

2. Anti-static device

The anti-static device mainly used in the special ball valve. A ground plug installed on the stem to form the current path and charge transfer when contacting with body and ball, in this way, it can avoid the build-up of static electricity due to friction or electrostatic accumulation from fluid impacting on the body cavity when on and off valve. This electrostatic accumulation is extremely dangerous in hazardous areas.



超强防火设计 Super Fire-proof Design

防止外漏

在正常情况下，双O型圈加压盖石墨垫片的设计可防止阀杆处的泄漏，O型圈加阀体石墨垫片也保证了阀体，阀盖连接部位的密封，当火灾发生时，O型圈因溶化而失效，此时压盖石墨垫片，阀体石墨垫片和阀杆石墨填料将承担防止流体外泄漏功能。

防止内漏

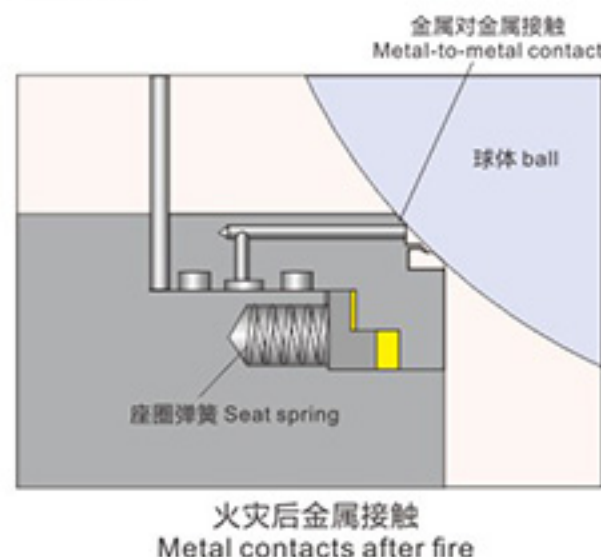
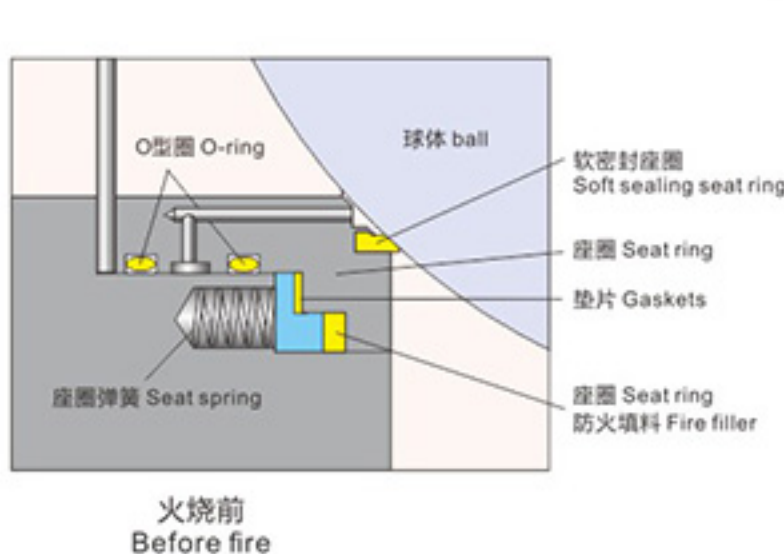
火灾发生时，当非金属材料如O型圈，软密封座圈和阀座挡圈被分解或溶化后，则二道密封的金属座圈唇在弹簧的预紧力作用下将推向球体接触而阻断管线流体，最大程度减小阀门通道中的内漏。另外，柔性石墨座圈填料同时受座圈压缩而密封，阻流体在阀体与座圈间泄漏。

Avoid external leakage

In the normal circumstance, O ring and graphite gasket not only can stop the leakage from the stem but also ensure the sealing connecting between body and cover. If fire happened, the O ring will be burned off and lose its function, but the graphite gasket of gland, body and stem can replace the O ring to prevent leakage.

Avoid internal leakage

In case of fire, the non-metal material e.g.: O ring, soft seal seat and seat retainer ring will be broken down and melted, at this time, the second sealing metal seal lip is pushed up to contact the ball and stop leaking under the pre-tightening force of spring, which could lower internal leakage on the greatest extent. Moreover, the flexible graphite packings compressed by seat ring can prevent the leakage between body and seat ring.

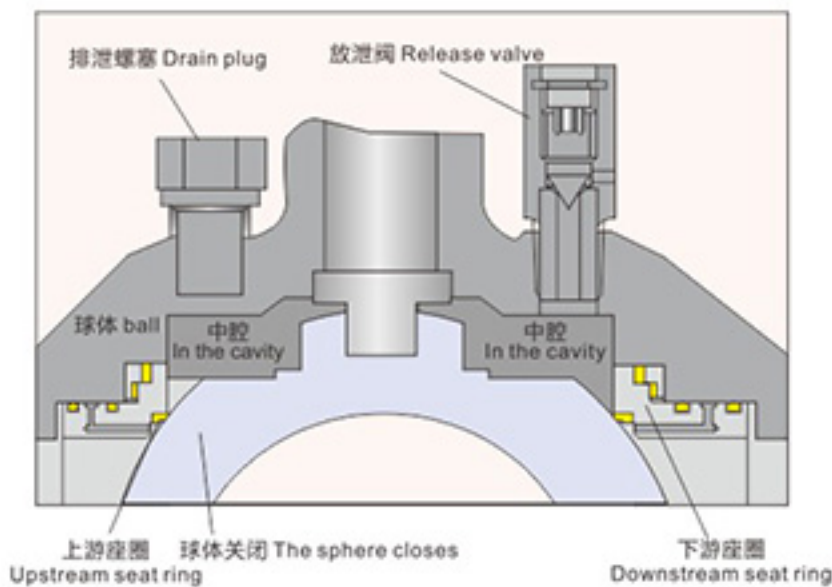
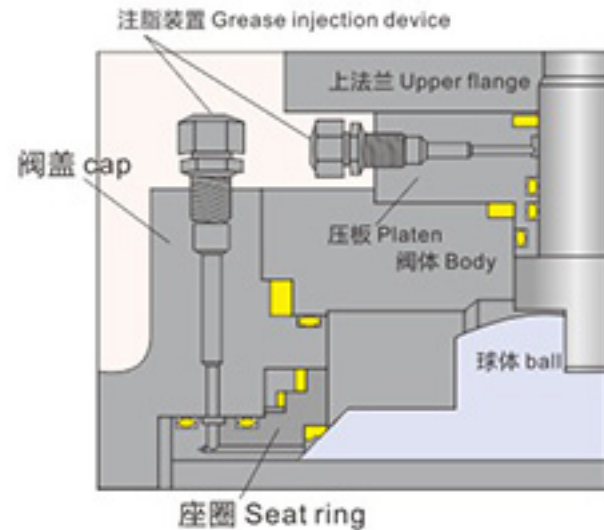


紧急注脂装置

6"(150)和6"以上的固定球阀，阀杆和座圈上均装有注射密封脂装置。当密封材料(密封环或O型圈)被火灾或其他意外事故破坏分解时，向该注射器注射密封脂可阻止源自阀杆和座圈的泄漏，该装置内设一道止回阀起后备密封作用。

Emergency sealant injection valve device

Sealant injection valve is inserted in the position of stem and seat ring for the trunnion-mounted ball valve 6" and above 150 class. If the sealing material (Sealing ring or O ring) is broken down and melted in the fire or other incident, the leakage from stem and seat ring can be restrained by injecting sealant to the valve, there is also a check valve that can prepare to make a sealing.



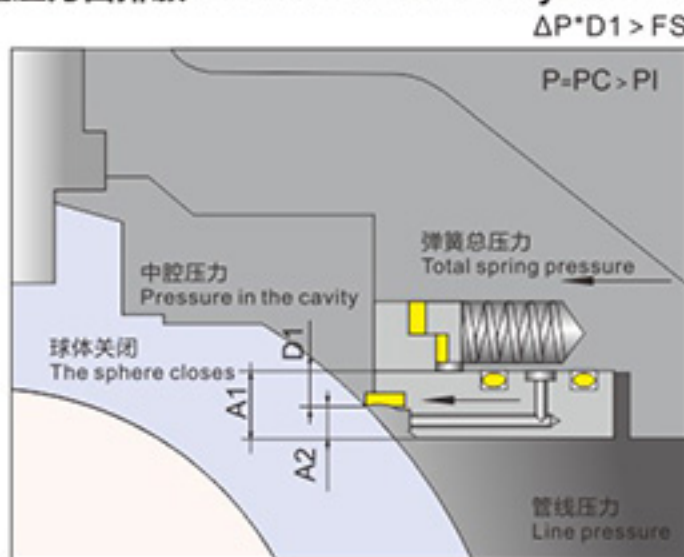
双阻断及泄放功能

固定球阀两阀座能独立切断进口端和出口端流体，如此实现双阻断功能。当球体关闭时，即使阀门两面同时受压，阀门中游和两端通道是被互相阻断的，中游中的剩余介质可通过泄放阀排出。

DBB (double-block-and-bleed) function

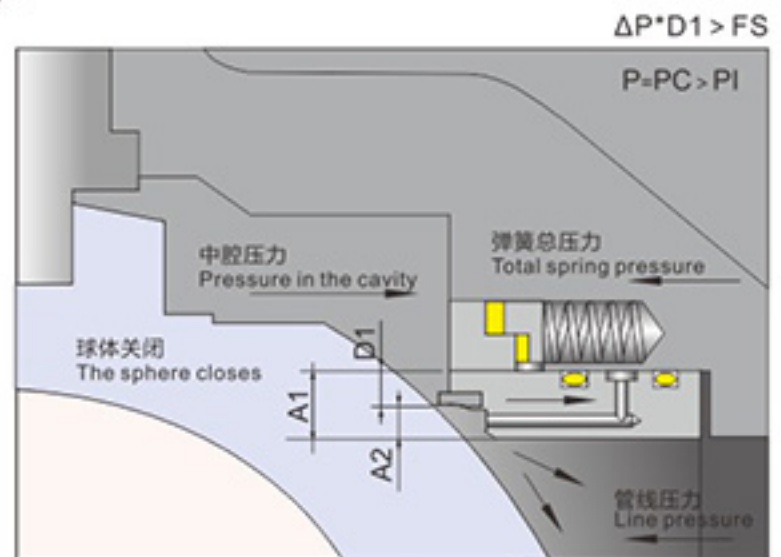
The double seats of trunnion-mounted ball valve can individually isolate and block the flow of fluid from downstream to upstream, it can realize DBB function. After closing the valve, the ball cavity and the both side pipeline will be isolated and blocked even though the both sides stressed from the fluid, the remaining medium could be released by the vent valve.

中游压力自排放 Pressure in the cavity from the discharge



当阀门中游压力(PC)小于座圈弹簧的预紧力(FS)和管线流体压力(P1)，即 $\Delta P \cdot D1 > FS$ ，则球体和阀座预紧力接触确保密封。

If the pressure of cavity(PC) less than set ring spring pre-tightened stress(FS) and fluid pressure(P1): $\Delta P \cdot D1 > FS$, good sealing can be realized when ball contacts with seat.



反之，当阀门中游压力(PC)大于座圈弹簧的预紧力(FS)和管线流体压力(P1)，即 $\Delta P \cdot D1 > FS$ 时，中游压力将座圈轻微推开，使之与球体之间产生一小间隙，这样内腔过载压力自动泄放到管线中，重新达到阀门中游和管线(上下游)的压力平衡。

Vice versa, If the pressure of cavity(PC) larger than set ring spring pre-tightened stress(FS) and fluid pressure(P1): $\Delta P \cdot D1 > FS$, The body cavity pressure pushes slightly the seat ring away, and there will be a little gap between seat ring and ball, in this way, the overloading pressure will be bled off into the pipeline and achieve pressure balance again.