

API 美标三段式固定球阀

API Standard Three-Piece Trunnion Mounted Ball Valve

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开维喜阀门集团有限公司
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API 美标三段式固定球阀

型号: API	规格: 2"-24"
公称压力: 150LB~2500LB	适用介质: 水、气、油
适用温度: ≤450℃	阀体材质: 锻钢、锻不锈钢
连接方式: 法兰	驱动方式: 手动、气动、电动、涡轮
其他参数: 制造标准按 API608/API6D	

API Standard Three-Piece Trunnion Mounted Ball Valve

Model: API	Specifications: 2"-24"
Nominal Pressure: 150LB~2500LB	Applicable Media: water, gas, oil
Applicable Temperature: ≤450℃	Body Material: forged steel, forged stainless steel
End Connection: Flange	Operation: Manual, pneumatic, electric, gear
Other Parameters: Manufacturing standard according to API6D.	

API 美标三段式固定球阀概述

API 美标三段式固定球阀是严格遵循美国石油学会（API）标准设计制造的高端工业阀门，采用三段式阀体结构与固定球设计。阀体由左、中、右三段通过高强度合金钢螺栓连接而成，球体由上下精密轴承固定支撑。该阀门符合 API 6D、API 608 等标准，密封副采用金属硬密封或高性能软密封，适用于高温、高压及严苛介质工况。其模块化结构设计便于维护和部件更换，广泛应用于石油、天然气、化工、长输管线及能源领域的关键管路系统，是要求高可靠性和易维护性的重要截断设备。

API Standard Three-Piece Trunnion Mounted Ball Valve Overview

The API Standard Three-Piece Trunnion Mounted Ball Valve is a high-end industrial valve designed and manufactured in strict compliance with the standards of the American Petroleum Institute (API). It features a three-piece body construction and a trunnion-mounted ball design. The valve body consists of left, center, and right sections connected by high-strength alloy steel bolts, with the ball fixed and supported by upper and lower precision bearings. This valve complies with API 6D, API 608, and other relevant standards. The sealing pair employs either metal hard seals or high-performance soft seals, making it suitable for high-temperature, high-pressure, and demanding media conditions. Its modular structure facilitates maintenance and component replacement. Widely used in critical pipeline systems across the petroleum, natural gas, chemical, long-distance transmission pipeline, and energy sectors, it serves as an essential isolation device where high reliability and easy maintenance are required.



API 美标三段式固定球阀产品图

API Standard Three-Piece Trunnion Mounted Ball Valve Product Image

API 美标三段式固定球阀特点

1. 三段式模块化结构：阀体采用三段式螺栓连接设计，无需从管道拆下即可对中段阀体进行维护、清洗或更换密封件，大幅减少维护停机时间。
2. 严格 API 标准符合性：设计、材料、制造及测试全过程遵循 API 6D、API 608 等标准，确保阀门在高压、高温工况下的可靠性和互换性。
3. 固定球低扭矩操作：球体由轴承精密固定，操作扭矩小且稳定。阀座采用弹簧预紧或压力辅助设计，确保双向可靠密封。
4. 防火与安全设计：通常符合 API 607 防火标准，软密封失效时可通过金属副密封保持基本密封性能。阀杆防吹出结构符合 API 安全规范。
5. 长寿命易维护：硬质密封面耐磨损、耐冲蚀，使用寿命长。三段式结构使在线或离线维护极为便捷，显著降低全生命周期维护成本。

API Standard Three-Piece Trunnion Mounted Ball Valve Features

1. Three-Piece Modular Design:

The valve body employs a three-piece bolted connection design, allowing maintenance, cleaning, or seal replacement of the center section without removing the valve from the pipeline. This significantly reduces maintenance downtime.

2. Strict Compliance with API Standards:

The entire process of design, material selection, manufacturing, and testing adheres to standards such as API 6D and API 608, ensuring reliability and interchangeability under high-pressure and high-temperature operating conditions.

3. Low-Torque Operation with Trunnion-Mounted Ball:

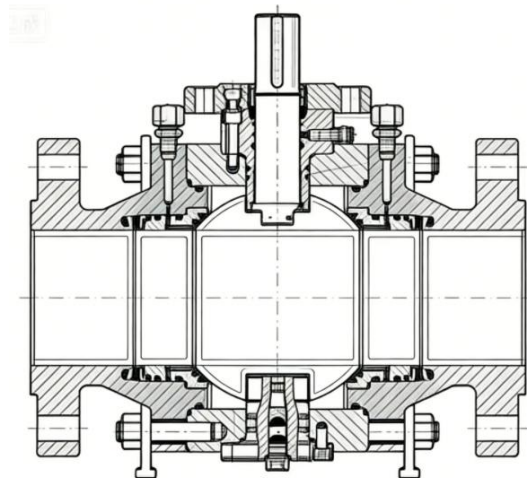
The ball is precisely fixed by bearings, providing low and stable operating torque. The seats are designed with spring preload or pressure assistance to ensure reliable bidirectional sealing.

4. Fire-Safe and Safety Design:

Typically compliant with API 607 fire-safe standards, the valve maintains basic sealing performance through its metal secondary seal in case of soft seal failure. The stem is equipped with an anti-blowout structure in accordance with API safety regulations.

5. Long Service Life and Easy Maintenance:

The hard-seal surfaces offer excellent resistance to wear and erosion, ensuring a long service life. The three-piece structure facilitates both online and offline maintenance, significantly reducing lifecycle maintenance costs.



API 美标三段式固定球阀结构图

API Standard Three-Piece Trunnion Mounted Ball Valve Structure Diagram

零部件名称材料表

Parts Name Material List

序号 NO.	名称 Name	材料 Material
1	阀体 body	A105,A350-LF2,F304,F316
2	球体 ball	A105+ENP,A350-LF2,,F304,F316
3	密封垫 seal gasket	25%carbon+TFM1600
4	填料 packing	柔性石墨 Flexible Graphite

5	阀杆 stem	F6A,F304,F316
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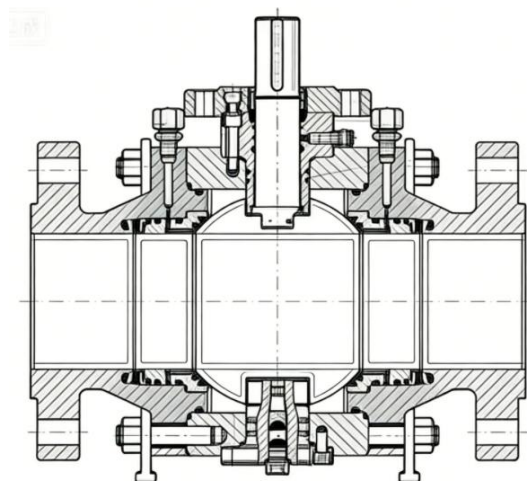
性能规范表 Performance Specification		
公称压力 Nominal Pressure	2-42	Mpa
强度试验压力 Shell Test	3-63	
密封试验压力 Seal Test	2.2-46.2	
适用温度 Suitable Temp.	450	℃

外形尺寸标准要求

- 1、阀门的结构长度按 ASME B16.10 的标准
- 2、连接法兰按 ASME B16.50 的标准

Dimensions Standard Requirements

1. The structural length of the valve shall conform to the standard ASME16.10.
2. The connecting flange shall conform to the standard ASME16.50.



API 美标三段式固定球阀外形图

API Standard Three-Piece Trunnion Mounted Ball Valve View Drawing

API 美标三段式固定球阀外形尺寸表

API Standard Three-Piece Trunnion Mounted Ball Valve Dimensions Table

Class300

公称通径		外形尺寸		法兰尺寸					
DN	NPS	L	H	D	T		R	C	N- φ h
50	2	216	125	165	20.7	2	92.1	127.0	8- φ 19
80	3	282	156	210	27.0	2	127	168.3	e- φ 22

Class600

公称通径		外形尺寸		法兰尺寸					
DN	NPS	L	H	D	T	f	R	C	N- φ h
50	2	292	125	165	25.4	7	92.1	127.0	8- φ 19
80	3	356	156	210	31.8	7	127	168.3	8- φ 22

100	4	305	195	255	30.2	2	157.2	200.0	8- Φ 22
150	6	403	245	320	35.0	2	215.9	269.9	12- Φ 22
200	8	502	290	380	39.7	2	269.9	330.2	12- Φ 26
250	10	568	340	445	46.1	2	323.8	387.4	16- Φ 29
300	12	648	380	520	49.3	2	381.0	450.8	6- Φ 32
350	14	762	420	585	52.4	2	412.8	514.4	20- Φ 32
400	16	838	470	650	55.6	2	469.9	571.5	20- Φ 35
500	20	991	550	775	62.0	2	584.2	685.8	24- Φ 35

100	4	432	195	275	38.1	7	157.2	215.9	8- Φ 26
150	6	559	245	355	47.7	7	215.9	292.1	2- Φ 29
200	8	660	290	420	55.6	7	269.9	349.2	12- Φ 32
250	10	787	340	510	63.5	7	323.8	431.8	16- Φ 35
300	12	838	380	560	66.7	7	381.0	489.0	20- Φ 35
350	14	889	420	605	69.9	7	412.8	527.0k	20- Φ 38
400	16	991	470	685	76.2	7	469.9	603.2k	20- Φ4
500	20	1194	550	815	88.9	7	584.2	723.9	24- Φ 45

Class900

公称通径		外形尺寸		法兰尺寸						RJ 法兰(可选)	
DN	NPS	L	H	D	T	f	R	C	N-Φh	L	槽号
50	2	368	160	215	38.1	7	921	166.1	8-Φ26	371	
80	3	381	185	240	38.1	7	127	190.5	8-Φ26	384	R31
100	4	457	220	290	44.5	7	1572	2350	8-Φ32	460	R37
150	6	610	280	380	55.6	7	2159	3175	12-中 3	613	R45
200	8	737	335	470	63.5	7	2699	393.7	12-中 38	740	
250	10	838	380	545	69.9	7	238	4699	16-中 38	841	R53
300	12	965	420	610	79.4	7	381.0	533.4	20-Φ38		
350	14	1029	450	640	85.8	7	4128	5588	20-Φ41	1039	R62
400	16	1130	500	705	88.9	7	4699	616.0	20-中 45		
500	20	1321	590	855	108.0	7	5B42	749.3	20-Φ54	1334	R74

Class1500

公称通径		外形尺寸		法兰尺寸						RJ 法兰(可选)	
DN	NPS	L	H	D	T	f	R	C	N-Φh	L	槽号
50	2	368	160	215	38.1	7	92.1	165.1	8-Φ26	371	R24
80	3	470	200	265	47.7	7	127	2032	8-Φ32	473	R35
100	4	546	240	310	54.0	7	157.2	241.3	8-Φ35	549	R39

150	6	705	290	395	82.6	7	215.9	3175	12-φ38	711	R46
200	8	832	350	485	92.1	7	269.9	393.7	12-φ45	842	R50
250	10	991	410	585	108.0	7	323.8	4826	12-中 51	1001	R54
300	12	1130	450	675	123.9	7	381.0	571.5	16-φ54	1146	R58
350	14	1257	500	750	133.4	7	412.8	6350	16-φ61	1276	R63
400	16	1384	530	825	146.1	7	469.9	7048	16-φ67	1406	R67

API 美标三段式固定球阀安装、使用与维护说明

安装指南

- 1. 安装前准备：**核对阀门型号、压力等级（Class）、连接标准及阀体材质是否符合 API 6D 和管道设计要求。清洁阀门内腔及管道密封面，检查三段阀体连接螺栓的紧固状态。
- 2. 法兰连接与紧固：**使用符合 ASME 标准的垫片及高强度合金钢螺栓。将阀门整体置于管道法兰之间，确保阀体流向箭头与介质流向一致。按 API 规范采用十字对称顺序分步、均匀拧紧管道法兰螺栓至规定扭矩。
- 3. 三段式结构注意事项：**安装时无需拆卸阀门的三段式连接螺栓。在吊装和紧固管道法兰过程中，应避免对阀门施加扭曲力或不当外力，防止内部组件错位。
- 4. 焊接端连接（如适用）：**若为对焊端阀门，需由合格焊工按评定合格的焊接工艺规程施焊。焊接时阀门应处于全开位置，并采取有效的分段冷却措施。
- 5. 系统压力测试：**阀门安装后参与管道系统的压力试验。试验压力需符合 ASME B16.34 等规范，试验过程中检查所有连接处有无泄漏。

使用操作

- 1. 启闭操作：**通过手柄、齿轮箱或执行器进行 90 度旋转操作。固定球结构操作扭矩通常较低且平稳，操作时应达到全开或全关的机械限位。
- 2. 状态确认：**通过执行器位置反馈、阀杆指示器或机械限位标志明确判断阀门开关状态。关键管线建议设置永久性状态标牌。
- 3. 常规运行：**本阀门适用于全开或全关闭断工况，也可用于有限度的调节控制（需确认设计允许）。长期全开运行时，建议定期进行全行程开关操作。
- 4. 注意事项：**带压操作时若扭矩异常持续增大，应立即停止并检查系统压力是否超标或阀门内部是否出现异常。

维护保养

- 1. 定期检查：**定期检查管道法兰连接处有无泄漏，阀体表面有无异常腐蚀或损伤。检查三段式阀体连接螺栓及外部紧固件是否保持规定扭矩。
- 2. 在线维护（利用三段式结构）：**若需检查或更换阀座、密封件，可在系统完全泄压后，仅拆卸中段阀体两端的连接螺栓，将中段阀体移开进行维护，无需拆卸阀门与管道的连接。
- 3. 密封系统维护：**阀门通常配备阀座注脂系统。可根据运行情况定期通过注脂阀注入专用密封脂，以维护

密封性能。若出现内漏，可尝试注脂进行临时处理。

4. 内部检修：进行内部检修时，应确保系统已完全泄压。重点检查球体与阀座的密封面磨损情况，检查轴承及阀座弹簧状态。磨损严重的密封组件应及时更换。

5. 长期停用：阀门长期存放应处于全开或全关位置，对阀杆及外露金属表面采取防锈措施。若配备注脂系统，应注入适量保养脂保护密封面。重新启用前需进行压力测试和操作灵活性检查。

Installation, Operation, and Maintenance Instructions for API Standard Three-Piece Trunnion Mounted Ball Valve

Installation Guide

1. Pre-Installation Preparation

Verify that the valve model, pressure class (Class), connection standards, and body material comply with API 6D and pipeline design requirements. Clean the internal cavity of the valve and the pipeline sealing surfaces. Check the tightening status of the bolts connecting the three-piece valve body.

2. Flange Connection and Tightening

Use gaskets and high-strength alloy steel bolts that comply with ASME standards. Position the fully assembled valve between the pipeline flanges, ensuring the flow direction arrow on the valve body aligns with the medium flow direction. Gradually and evenly tighten the pipeline flange bolts to the specified torque in a crosswise symmetrical sequence as per API standards.

3. Precautions for Three-Piece Structure

Do not disassemble the bolts connecting the three-piece valve body during installation. During hoisting and tightening of pipeline flanges, avoid applying torsional forces or improper external loads to the valve to prevent misalignment of internal components.

4. Welded-End Connection (If Applicable)

For butt-weld end valves, welding must be performed by a qualified welder following approved welding procedures. The valve should be fully open during welding, and effective sectional cooling measures must be applied.

5. System Pressure Testing

After installation, the valve must participate in the pipeline system's pressure test. The test pressure must comply with standards such as ASME B16.34. During the test, inspect all connections for leaks.

Operation Instructions

1. Opening and Closing Operations

Operate the valve by rotating it 90 degrees using a handle, gearbox, or actuator. The trunnion-mounted design typically provides low and stable operating torque. The operation should be performed until the mechanical limit for fully open or fully closed positions is reached.

2. Status Confirmation

Confirm the valve's open or closed status using the actuator position feedback, stem indicator, or mechanical limit markers. For critical pipelines, it is recommended to install permanent status placards.

3. Normal Operation

This valve is suitable for isolation in fully open or fully closed positions and may also be used for limited flow regulation (if the design permits). If the valve remains fully open for extended periods, periodic full-stroke opening and closing operations are recommended.

4. Precautions

If abnormal and persistent torque increase is observed during pressurized operation, stop immediately and check whether system pressure exceeds allowable limits or if internal valve abnormalities exist.

Maintenance

1. Regular Inspections

Periodically inspect pipeline flange connections for leaks and check the valve body surface for abnormal corrosion or damage. Ensure that the bolts connecting the three-piece valve body and external fasteners maintain the specified torque.

2. Online Maintenance (Utilizing Three-Piece Structure)

To inspect or replace seats or seals, fully depressurize the system, then remove only the connecting bolts at both ends of the center valve body section. The center section can be removed for maintenance without disconnecting the valve from the pipeline.

3. Seal System Maintenance

The valve is typically equipped with a seat injection system. Based on operating conditions, periodically inject specialized sealant through the injection valve to maintain sealing performance. If internal leakage occurs, injecting sealant can serve as a temporary solution.

4. Internal Maintenance

Before performing internal maintenance, ensure the system is fully depressurized. Focus on inspecting the wear condition of the ball and seat sealing surfaces, as well as the condition of the bearings and seat springs. Severely worn sealing components should be replaced promptly.

5. Long-Term Storage

For long-term storage, the valve should be in the fully open or fully closed position. Apply anti-rust measures to the stem and other exposed metal surfaces. If equipped with an injection system, inject an appropriate amount of preservative grease to protect the sealing surfaces. Before returning the valve to service, perform pressure testing and operational flexibility checks.

非常感谢您的阅读！

Thank you very much for reading!

开维喜阀门集团

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