

LNG Cryogenic Valve



苏州安特威工业智能科技股份有限公司
Antiwear (Suzhou) Industrial Intelligent Technology Co.,Ltd.

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Leader in the design and manufacture of a full range of industrial valves

As a leader in the design and manufacture of a full range of industrial valves, Antiwear produces ball valves, butterfly valves, gate valves, globe valves, check valves, plug valves, piston valves, regulating valves, disc valves, labyrinth valves and other products for both common working conditions to harsh conditions. They have been widely used in oil refining, natural gas, petroleum, power, water, chemical industry, construction, papermaking, pipeline transportation and other applications, and are recognized by a large number of users and engineering companies.

Antiwear firmly believes that integrity is not only a virtue, but also a working attitude and lifestyle. With the rapid development, Antiwear gradually formed the cultural gene of "It's reliable", that is, reliable products, trustworthy people, and timely services. In this regard, Antiwear has completed the quality system certification and obtained a series of certificates, including ISO9001, ISO14000, ISO18000, TS, API6D, API607, ISO15848, PED, EPA, TA-LUFT, API6FA, etc.

With standardization, digitization, informatization and intelligence, Antiwear Group is establishing intelligent production lines in the super discrete field. Furthermore, it is creating interconnected factories through big data and cloud computing, digital delivery systems, lean production, global rapid response systems, supply chain integration and other means to realize zero distance between users and the manufacturer, redefine production cycles and quality management, and establish a C2M smart trading platform in the super discrete manufacturing field, truly achieving "HELP YOU ENJOY GOOD LIFE"!

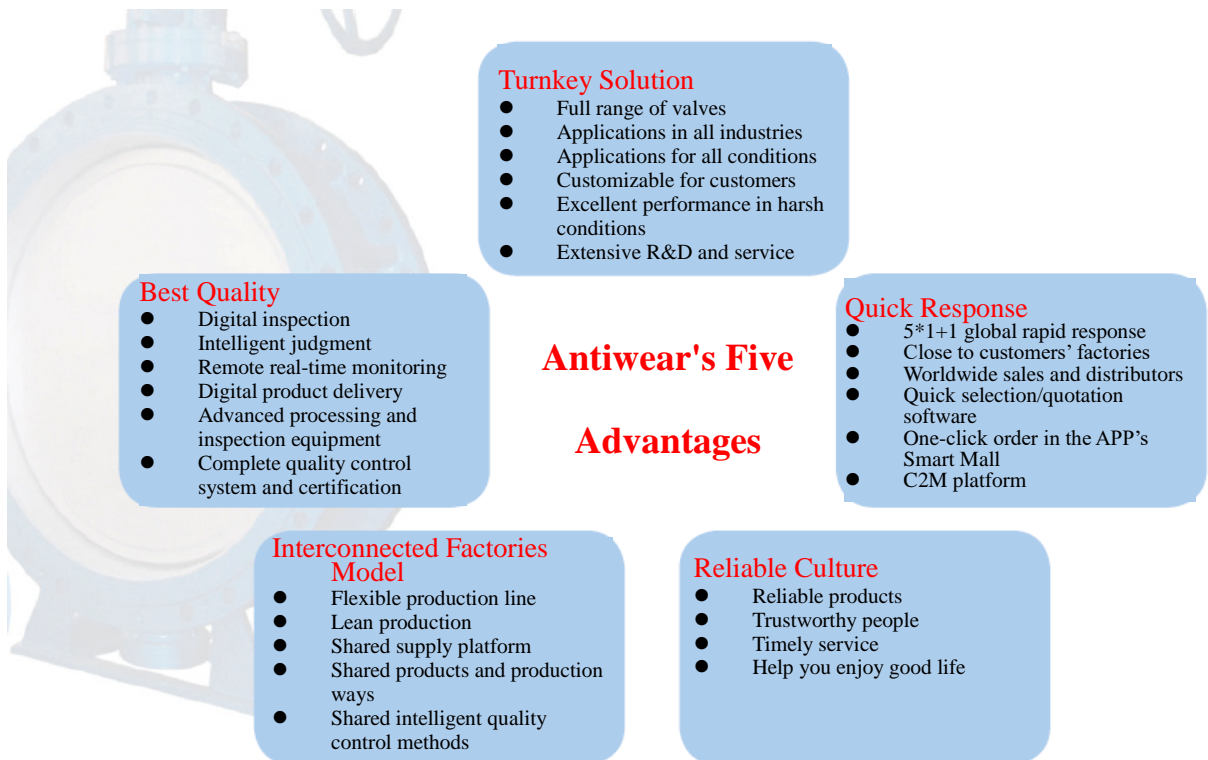
Best Solution

With the spirit of keeping improving, Antiwear has been continuously improving valve quality. In addition to common working conditions, Antiwear has conducted fruitful research on harsh working conditions such as high temperature, high pressure, multiphase media, strong corrosion, crystallization, high-frequency action, etc., which are common in the silicon chemical industry, coal chemical industry, petrochemical industry, hydrometallurgy and other fields, and has summarized effective solutions through extensive practices.

- High temperature and high pressure pure oxygen and hydrogen conditions - oxygen and hydrogen ball valve, globe valve, check valve
- Solid abrasive material conveying conditions - hard seal ball valve, disc valve, double disc valve
- Above 450°C high temperature conditions - High temperature ball valve, high temperature disc valve, double-wedge high temperature gate valve



- PP/PE/PSA devices opened/closed 1.6 million cycles/year - PDS high-frequency metal hard seal and soft seal ball valve
- High differential pressure venting and regulation of solid-containing materials - slide valve
- Corrosive conditions - plug valve, ball valve
- Fiber and pulp conditions - eccentric semi-ball valve
- Double-way sealing ball valves for high temperature solid containing materials - SZORB ball valve
- Scouring, flashing, cavitation conditions - angle regulating valve
- Zero leakage condition of large size gas media - triple eccentric butterfly valve
- Pulp condition - Y-shape globe valve
- Crystallization or slurry working conditions - plug valve, eccentric semi-ball valve
- Sedimentation condition - piston valve
- Multi-stage pressure reduction and flashing working conditions - labyrinth regulating valve



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Products for harsh conditions



Metal hard seal ball valve

It adopts quantitative compression with double bearings, disc spring and unique hard seal materials, with excellent performance, and can be widely used in various abrasive and high temperature conditions.

Bore size: DN15 - DN600, 1/2" - 24"
Working temperature: -196°C - 850°C
Nominal pressure: PN10 - PN670, CLASS150 - CLASS4000



Ball valve for oxygen

It has thoroughly overcome the technical difficulties of cemented carbide bonding in high-pressure, high-temperature and ultra-pure gas applications. It opens/closes smoothly with no jamming. It is deoiled and degreased, waterproof and anti-static, with the sealing performance reaching or exceeding Level 6 leakage protection for a long time.

Bore size: DN15 - DN500, 1/2" - 20"
Working temperature: -196°C - 500°C
Nominal pressure: PN10 - PN260, CLASS150 - CLASS1500



Triple eccentric butterfly valve

During the opening/closing process, the butterfly plate sealing pair has no contact friction, and the actuator provides torque to the valve stem to make the valve tightly closed. The greater the torque, the greater the closing pressure, achieving "zero leakage" in single-way or even double-way sealing.

Bore size: DN50 - DN4000, 2" - 160"
Working temperature: -196°C - 600°C
Nominal pressure: PN10 - PN420, CLASS150 - CLASS2500



S Zorb hard seal ball valve

It adopts a quantitative floating design with a pressure relief groove, a disc spring and unique hard seal materials. Featuring good sealing, good wear resistance and no jamming under high temperature conditions, it is an ideal choice for the ball valve used in S Zorb devices.

Bore size: DN15 - DN300, 1/2" - 12"
Working temperature: ≤ 650°C
Nominal pressure: PN10 - PN260, CLASS150 - CLASS1500



Disc valve

Mainly used in the coal chemical industry and polysilicon industry, for material conveying and cutting under abrasive conditions, with excellent performance and long service life.

Bore size: DN25 - DN1200, 1" - 48"
Working temperature: -196°C - 850°C
Nominal pressure: PN10 - PN260, CLASS150 - CLASS1500



Double-wedge high temperature gate valve

The unique double-gate structure allows the gate to quickly leave the sealing surface when opening, avoiding the gate being wedged due to deformation of the sealing surface under high temperature conditions, which would cause the valve to be unable to open.

Bore size: DN200 - DN1400, 8" - 56"
Working temperature: ≤ 816°C
Nominal pressure: PN10 - PN420, CLASS150 - CLASS2500



High frequency ball valve

Featuring fast switching, high frequency action, and adaptability to various complex media, it can be widely used in various applications that require frequent switching. It is the best choice for PDS systems in PP, PE, and PSA devices.

Bore size: DN15 - DN1200, 1/2" - 48"
Working temperature: -46°C - 450°C
Nominal pressure: PN10 - PN260, CLASS150 - CLASS1500



Double disc valve

Featuring self-rotating, self-grinding and self-pressure release, no pressure building, no jamming and long service life, it is the best choice for coal lock hoppers, slag lock hopper and ash lock hopper valves.

Bore size: DN40 - DN160, 1-1/2" - 24"
Working temperature: -196°C - 850°C
Nominal pressure: PN10 - PN260, CLASS150 - CLASS1500



Labyrinth regulating valve

The maximum pressure reduction capacity up to Level 24 can effectively avoid damage to the valve caused by flashing and cavitation under high differential pressure conditions, while greatly reducing the operating noise of the valve, with excellent performance and long service life.

Bore size: DN25 - DN600, 1" - 24"
Working temperature: ≤ 700°C
Nominal pressure: PN10 - PN760, CLASS150 - CLASS4500

Patent certificates



Qualifications and Honors



ISO9001



API607



API6FA



PED



ISO14001



OHSAS18001



ISO15848



API6D

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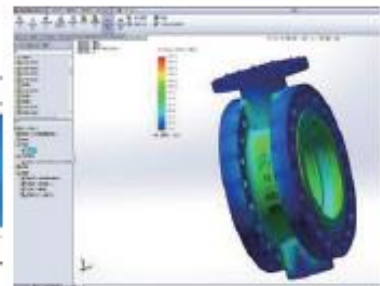
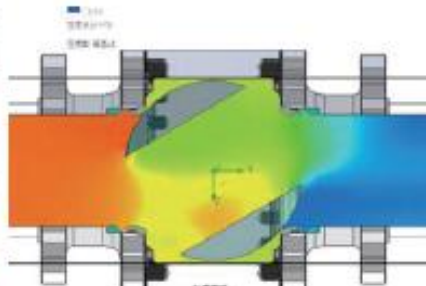
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Design and R&D System

Since its inception, Antiwear has been committed to the R&D and application of new products. To this end, the Group's annual investment in research and development exceeds 10% of its sales. It not only has a powerful R&D team, but also has established a world-class intelligent R&D test platform. It has developed various general and targeted products for both common and harsh working conditions. These products have won praise for Antiwear time and time again.

The design center adopts a standardized and modular design to achieve interchangeability between parts. When designing new products, Antiwear uses technical means such as 3D simulation and finite element analysis to simulate and verify the rationality of product design before new products are put into mass production to ensure the reliability and stability of final products.

Our employees are committed to continuous development and innovation, improving production and technical capabilities. Antiwear has a team of professional engineers, technical salespersons and certified service technicians. Antiwear firmly believes that innovation is the source of the Company's development, and the foundation of becoming an excellent enterprise.





Production Management System

Antiwear adopts flexible production and a real-time visible and controllable production management system, taking the lead in realizing the transformation and upgrading from valve manufacturing to intelligent manufacturing. All factories of the Group implement paperless operations, eliminating all interference of human factors and ensuring the accuracy and visualization of data at every step from blank to finished products.

The central database summarizes and records data from raw material procurement, and parts processing to product assembly and testing in real time. In addition, through data interpretation and analysis, automatic ordering, automatic scheduling, automatic procurement, and optimization of the entire production system can be achieved with ERP/MRP/PLM/APS/MES/MOS/SRM/ODP/VSM/DDS/SQS, etc., achieving rapid response to users and excellent product quality.

All interconnected factories, including those of outsourced suppliers, can share standardized, digital, information-based and intelligent production systems and quality control systems.



Quality Management System

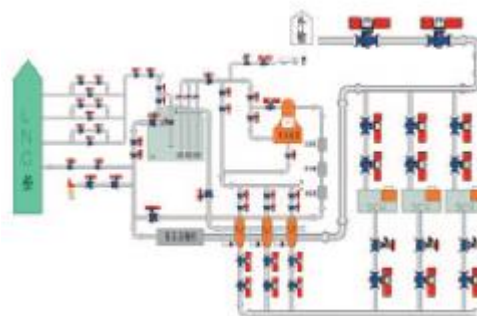
Antiwear creatively adopts an intelligent quality control system. Through digital production, intelligent judgment, fully automatic transmission and digital delivery, it not only achieves retrospective traceability, but also realizes remote and real-time quality control without any human intervention throughout the process.

Antiwear has established a physical and chemical laboratory that is equipped with advanced instruments such as a roundness tester, metal chromatograph, multifunctional metal mechanical tester, carbon and sulfur analyzer, three-coordinate measuring instrument, Rockwell and Vickers hardness tester, ultrasonic flaw detector, ultrasonic thickness gauge, automatic pressure testing device and torque tester.

Antiwear has made full use of cloud platforms and intelligent means to establish a world-class quality control system. Our products not only comply with relevant international standards such as ASME/API/ISO/PED, but have also obtained relevant strict certifications. Additionally, through establishing a digital product delivery platform, users can access all the product information with the "identity card" of each product, including the production progress, and even manufacturing drawings, processes and processing procedures. Our goal is to make our customers completely satisfied and "ENJOY GOOD LIFE".



Antiwear has conducted in-depth research and exploration on LNG ultra-low temperature conditions. Aiming at the technical difficulties that exist in such working conditions and combining the advanced design concepts of leading foreign manufacturers, it has successfully developed LNG cryogenic valves with stable and reliable quality. A large number of test results show that Antiwear LNG cryogenic valves have the advantages of excellent sealing performance, online maintenance, low maintenance cost, and long service life, so they are suitable for harsh working conditions of -196°C to 200°C and sufficient to replace similar imported products.



LNG Cryogenic Ball Valve

LNG cryogenic ball valve series

With different actuators, this series includes manual, pneumatic, hydraulic, electric and other types.

Technical parameters of LNG cryogenic ball valve

- Pressure rating: CLASS150-1500 (PN20 - PN250)
- Bore size: 1/2" - 16" (DN15 - DN400)
- Standard for internal leakage: BS6364/SPE77-200
- Applicable medium: LNG (liquefied natural gas)
- Working temperature: -196°C to 200°C
- Fireproof and anti-static
- Operating mode: handle, turbine, pneumatic actuator, electric actuator, hydraulic actuator, etc.
- Applicable medium: ultra-low temperature fluid

Technical difficulties of LNG cryogenic ball valve

◆ The accumulator ring will move and get worn during the ultra-low temperature self-pressure release of the valve, resulting in failure of the accumulator ring and internal leakage (as shown at Pos. 1 in the figure);

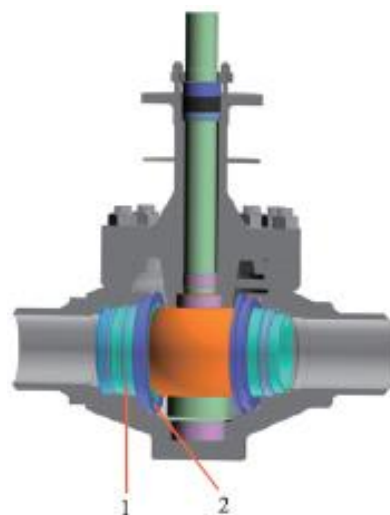
◆ The soft seal valve seat is prone to wear and deformation, and repeated switching will cause wear and internal leakage on the sealing surface (as shown in Pos. 2 in the figure).

◆ The ball of a large-diameter ball valve has a large deadweight, which causes uneven wear on the sealing surface. Repeated switching will cause severe wear on the lower end of the sealing surface, affecting the service life of the valve.

◆ With current technology, disassembling the valve seat requires a large torque, and on-site online maintenance operations are extremely difficult. Furthermore, the disc spring force caused by online replacement is difficult to control.

◆ Improper design of the gap between the valve stem and bonnet and the additional height of the valve stem and bonnet will cause ice to form at the packing, resulting in packing failure, valve stem lock etc.

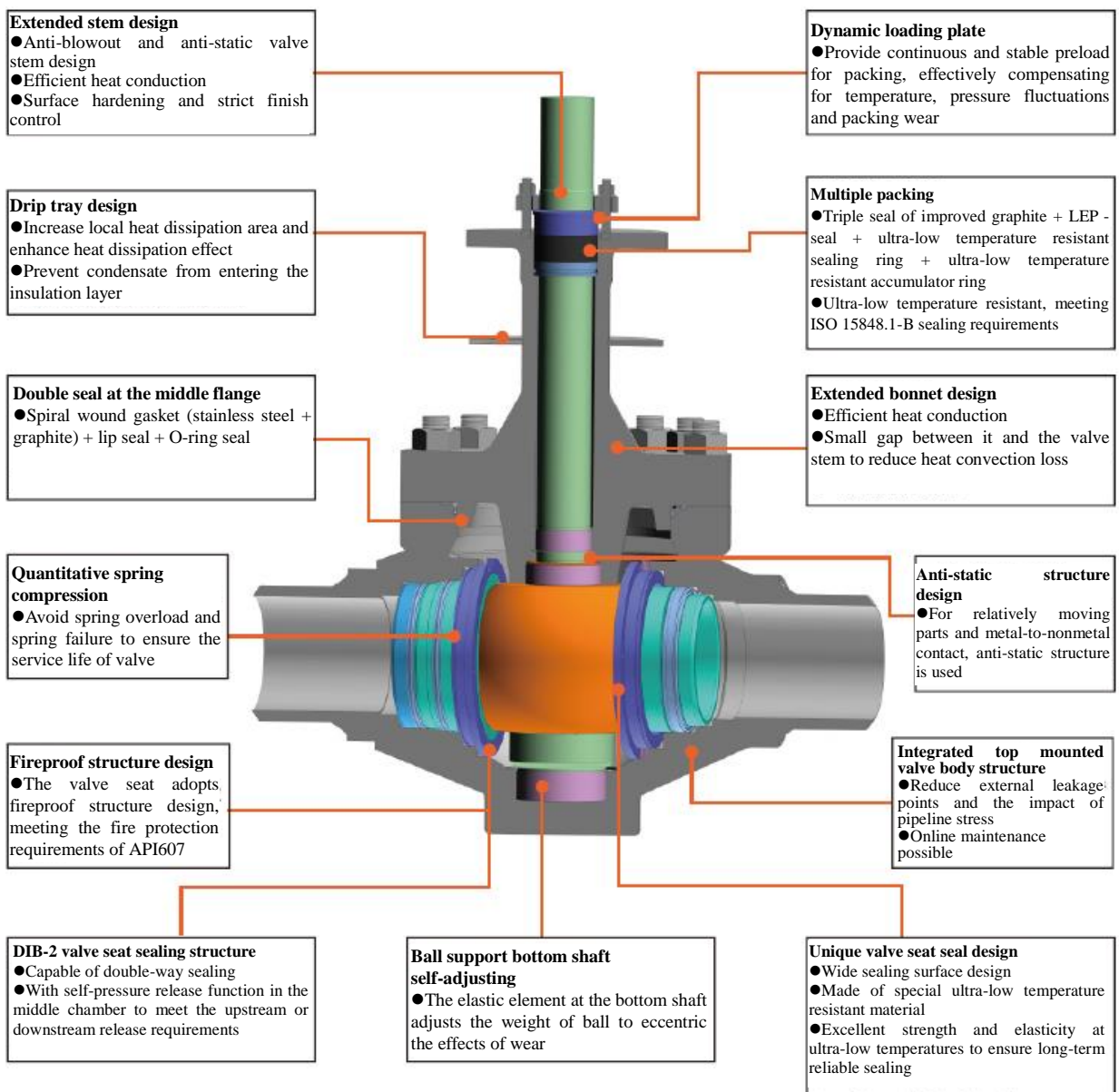
◆ When LNG is gasified into BOG, the volume will expand 625 times when the liquid is converted into gas. Should the material in the middle chamber is not discharged in time, it will not only cause damage to the equipment but also pose a great hidden danger to the on-site safety.



Features of Antiwear LNG Cryogenic Ball Valve

Design Features

Antiwear's LNG cryogenic ball valve adopts advanced technology and cutting-edge design concepts. Compared with similar products, it features excellent sealing performance, high sealing reliability, good wear resistance and long service life under ultra-low temperature and temperature alternation conditions. In particular, Antiwear's cryogenic valves are based on a large number of tests and research, which completely solves the problems of LNG leakage, sealing surface leakage and valve jamming, and thus has strong stability and safety.



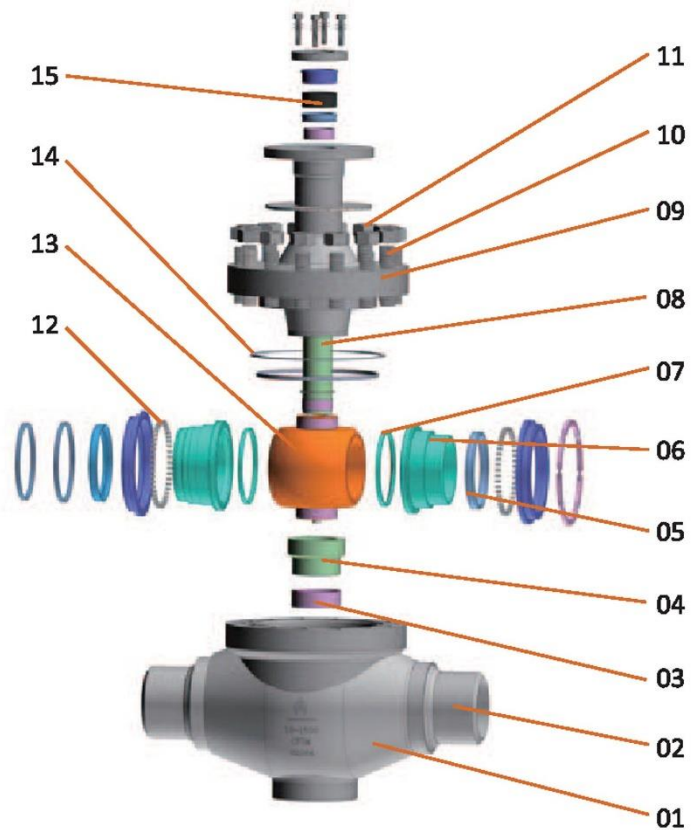
Antiwear reserves the right to make technical progress and structural changes

Structural Diagram of LNG Cryogenic Ball Valve

Technical specifications

Design standards	API 6D/ASME B16.34
Structural length	API 6D, ASME B16.10
Connection size	ASME B16.5 / ASME B16.25
Inspection and test	API 598/BS6364

01. Valve body	06. Backup washer	11. Nut
02. Sleeve	07. Valve seat seal	12. Spring
03. Composite bearing	08. Valve stem	13. Ball
04. Bottom shaft	09. Bonnet	14. Sealing gasket
05. LIP-seal	10. Stud	15. Packing



Material of main parts:

Part name	Valve body	Valve stem	Ball	Valve seat	Packing	Bolt
Material category	Austenitic stainless steel	Austenitic stainless steel	Austenitic stainless steel	Engineering plastics	Braided packing	Stainless steel
Common materials	F316/F316L	F316/F316L	F316 +	PCTFE	Flexible graphite	A320 B8-2/B8M-2
	CF8/CF8M	CF8/CF8M	F8/CF8M	CF8/CF8M		
	F304/F304L	F304/F304L	F304/F304L	F304ZF304L		
	CF3/CF3M	CF3/CF3M	CF3/CF3M	CF3/CF3M		
	CF8M/CF3M	F304/F304L	F316L +	SP-21		
	F304/F304L	FXM-19	F304 +	SP-211		
	CF8/CF3		F3C4L +			
		FSLLOY10				

Note: (1) Other materials are available. Please refer to the ordering instructions;

(2) Antiwear reserves the right to make technical progress and structural changes.

Test Data of LNG Cryogenic Ball Valve

Ultra-low temperature performance test					
Test item	SP200021-01	Caliber	NPS10	Pressure	CLASS 1500
Ultra-low temperature life test (life test is carried out after every 50 ultra-low temperature operation tests, 4 cycles)					
Test medium	Nitrogen	Pressure holding time	300 s	Switching cycle	200
Switching cycles (room temperature - ultra-low temperature cycles)	Jamming		Valve seat leakage		Requirements for leakage
50 cycles (1 cycle)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input checked="" type="checkbox"/> Satisfied <input type="checkbox"/> Not satisfied		Less than 495 mL/min
100 cycles (2 cycles)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input checked="" type="checkbox"/> Satisfied <input type="checkbox"/> Not satisfied		Less than 495 mL/min
150 cycles (3 cycles)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input checked="" type="checkbox"/> Satisfied <input type="checkbox"/> Not satisfied		Less than 495 mL/min
200 cycles (4 cycles)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input checked="" type="checkbox"/> Satisfied <input type="checkbox"/> Not satisfied		Less than 495 mL/min



Inspection Record of LNG Cryogenic Ball Valve							
Product name	Cryogenic top mounted ball valve	Model	10SL15B	Item No.	SP20021	Caliber	NPS10
Valve type	Top mounted ball valve	Interior material	F316	Valve body material	CF3M	Pressure rating	Class 1500
No.	Item	Test content and standards			Measured value	Standard value	Result
1	Housing test	The test pressure is 1.5 times the pound class pressure, the test time is 300 S, and no visible leakage is allowed through the pressure boundary wall and any fixed valve body connection			No visible leakage	No visible leakage	Meet API598 requirements
2	Packing air pressure test	The valve is half open, and the valve body is subjected to a pressure 1.1 times the nominal pressure. There is no leakage in the packing and spiral wound gasket in 300 S.			No visible leakage	No visible leakage	Meet API598 requirements
3	Nitrogen leakage test	The valve is half open, and 0.6 MPa nitrogen is applied to the valve, according to ISO15848 (Class B) requirements			Valve stem: 1.5×10^{-6} pa.m ³ /S Gasket: 5.6×10^{-6} pa.m ³ /S	At valve stem: $\leq 1.78 \times 10^{-5}$ pa.m ³ /S At gasket: $\leq 2.68 \times 10^{-5}$ pa.m ³ /S	Meet ISO15848-B leakage requirements
4	Room temperature performance test	The valve is closed and 27.5 MPa nitrogen is applied to the valve, according to API598 requirements			0 bubble	Zero leakage	Meet API598 sealing leakage requirements
5	Ultra-low temperature performance test	The valve is closed and 25 MPa helium is applied to the valve, according to BS6364 requirements			Max. leakage 18 mL/min	Leakage: ≤ 495 mL/min	Meet BS6364 sealing leakage requirements
6	Cyclic action life test	The test needs to be carried out for 200 cycles, and a life test is carried out after every 50 ultra-low temperature action tests, according to the national test outline requirements			Max. leakage 165 mL/min	After each cyclic test, the sealing leakage is ≤ 495 mL/min	Meet the national test outline requirements

A large number of tests have shown that the Antiwear LNG cryogenic ball valve can achieve self-pressure release in the middle chamber, the valve will not get stuck at ultra-low temperatures, it is stable and reliable, and can still meet the leakage requirements of the national test outline after 200 cycles of switching life tests at an ultra-low temperature of -196 °C.

LNG Cryogenic Butterfly Valve

LNG cryogenic butterfly valve series

With different actuators, this series includes manual, pneumatic, hydraulic, electric and other types.

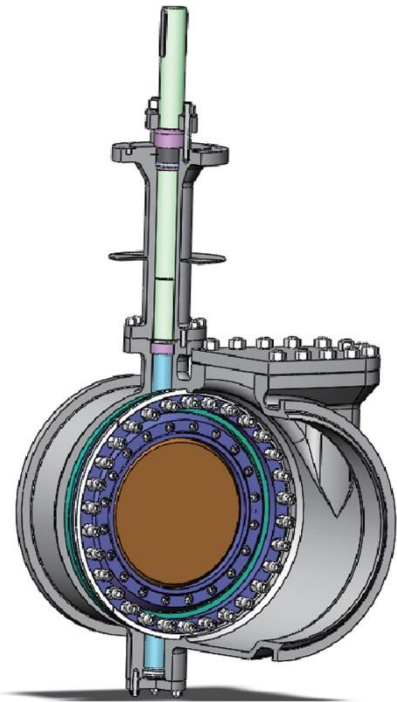
Technical parameters of LNG cryogenic butterfly valve

- Pressure rating: CLASS150-300 (PN6 - PN40)
- Bore size: 6" - 48" (DN150 - DN1200)
- Standard for internal leakage: BS6364/SPE 77-200
- Applicable medium: LNG (liquified natural gas)
- Working temperature: -196 °C - 300 °C
- Fireproof and anti-static
- Operating mode: handle, turbine, pneumatic actuator, electric actuator, hydraulic actuator, etc.

Technical difficulties of LNG cryogenic butterfly valve

◆ The valve material selection and size design are unreasonable. The sizes of the valve body, valve stem, valve seat, valve element and other parts are inconsistent due to chilling shrink at ultra-low temperatures, which causes the valve shaft system components to lock and the valve element sealing surface to not close tightly at ultra-low temperatures, resulting in difficulty in valve operation and internal leakage.

◆ Improper design of the gap between valve stem and bonnet and the additional height of valve stem and bonnet will cause ice to form at the packing, resulting in packing failure, valve stem lock etc.



Features of Antiwear LNG Cryogenic Butterfly Valve

Design Features

Antiwear LNG cryogenic butterfly valve adopts a triple eccentric structure design, which is inherently fireproof. It has the advantages of ultra-long service life, and can be maintained online. A large number of tests have shown that compared with similar products, Antiwear LNG cryogenic butterfly valve has excellent sealing performance, high sealing reliability and good wear resistance under ultra-low temperature and temperature alternation conditions. It can completely solve problems such as LNG leakage, sealing surface leakage and valve jamming, with very strong stability and safety.

Extended stem design

- Anti-blowout and anti-static valve stem design
- Efficient heat conduction
- Surface hardening and strict finish control

Drip tray design

- Increase local heat dissipation area and enhance heat dissipation effect
- Prevent condensate from entering the insulation layer

Extended sleeve design

- Extend the support section to improve the valve stem stability
- Reduce friction torque and protect valve stem

Modular and replaceable design of valve seat sealing ring and butterfly plate sealing ring

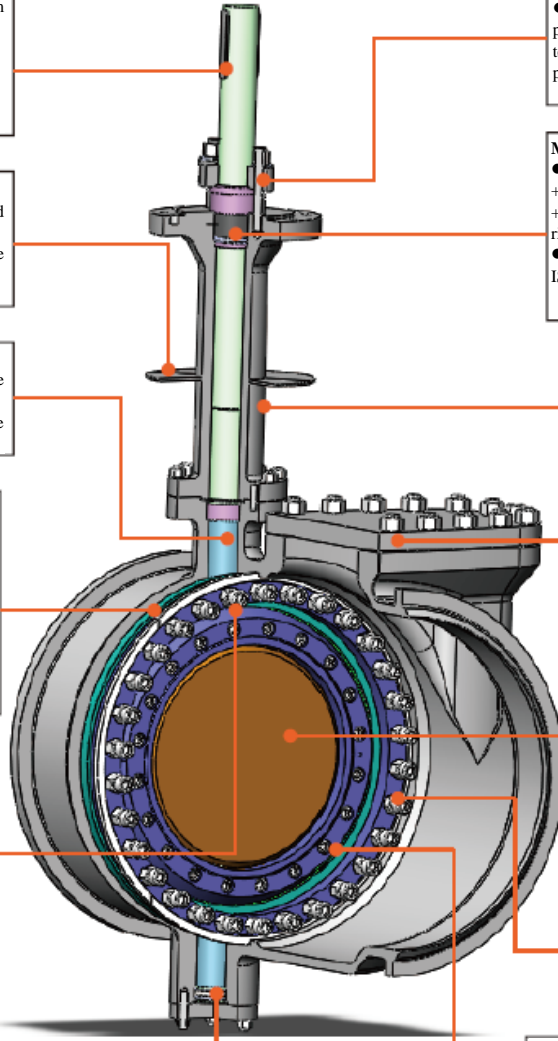
- Improve the compatibility of valve sealing pairs, and make on-site valve maintenance and repair possible
- Replaceable valve seat structure
- Unconditional double-way sealing

Full metal sealing ring

- Extend valve life and reduce maintenance
- More targeted for working conditions
- Unique FSLLOY series ultra-low temperature cemented carbide

Integrated valve stem anti-blowout structure design

- Ensure valve safety
- Double blowout structure design



Dynamic loading plate

- Provide continuous and stable preload for packing, effectively compensating for temperature, pressure fluctuations and packing wear

Multiple packing

- Triple seal of improved graphite + LIP-seal + ultra-low temperature resistant sealing ring + ultra-low temperature resistant accumulator ring
- Ultra-low temperature resistant, meeting ISO15848.1-B sealing requirements

Extended bonnet structure design

- Efficient heat conduction
- Small gap between it and the valve stem to reduce heat convection loss
- Prevent the packing from frosting due to ultra-low temperature of the medium and protect the valve stem from abrasion

Side-top-mounted valve body structure design

- The valve element and valve seat can be removed from the hole for online maintenance

Smooth butterfly plate appearance

- Smooth streamlines, reducing flow disturbances, and lowering valve flow resistance

Anti-loose design for seat screws

- The self-locking structure design is adopted for nuts to prevent screws from loosening

Junk ring screw structure design

- Effectively avoid the fastener loosening caused by valve switching and medium fluctuations
- Make the compression force distribution of the butterfly plate sealing surface more uniform and enhance the sealing effect

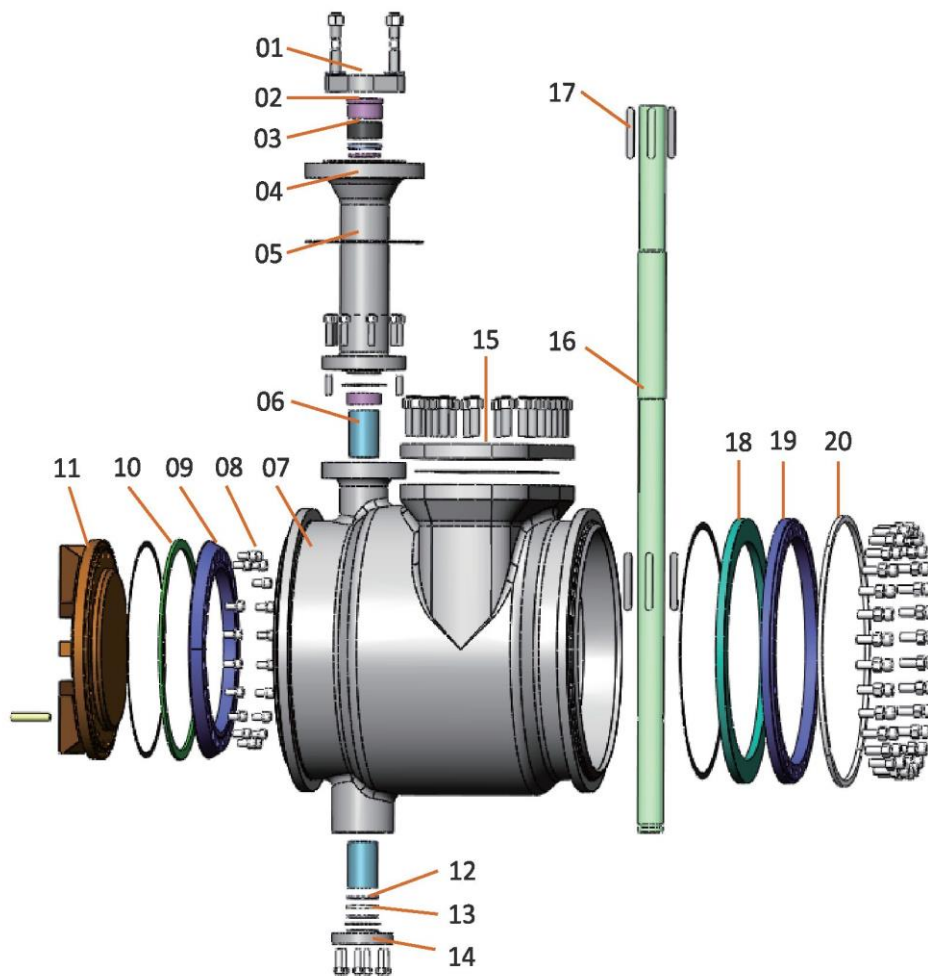
Antiwear reserves the right to make technical progress and structural changes

Structural Diagram of LNG Cryogenic Butterfly Valve

Technical specifications

Design standards	API 609/ASME B16.34
Structural length	Company standard
Connection size	ASME B16. 5 / ASME B16. 25/ASME B16. 47
Inspection and test	API 598/BS6364

01. Pressing plate	06. Bearing	11. Butterfly plate	16. Valve stem
02. Pressing sleeve	07. Valve body	12. Thrust bearing	17. Key
03. Packing	08. Screw	13. Split collar	18. Valve seat
04. Bonnet	09. Butterfly plate junk ring	14. Lower cover	19. Seat junk ring
05. Dripping plate	10. Sealing ring	15. Cover	20. Pendant collet



Material of main parts:

Part name	Material			
Valve body	ASTM A351-CF8 ASTM A182-F304	ASTM A351-CF8M ASTM A182-F316	ASTM A351-CF3 ASTM A182-F304L	ASTM A351-CF3M ASTM A182-F316L
Bonnet	ASTM A351-CF8 ASTM A182-F304	ASTM A351-CF8M ASTM A182-F316	ASTM A351-CF3 ASTM A182-F304L	ASTM A351-CF3M ASTM A182-F316L
Valve seat	ASTM-A182-F304 + FSLLOY40	ASTM-A182-F316 + FSLLOY40	ASTM-A182-F304L + FSLLOY40	ASTM-A182-F316L + FSLLOY40
Butterfly plate	ASTM A351-CF8	ASTM A351-CF8M	ASTM A351-CF3	ASTM A351-CF3M
Sealing ring	FSLLOY40	FSLLOY40	FSLLOY40	FSLLOY40
Cover	304	316	304L	316L
Valve stem	ASTM-A182-FXM-19/INCONEL718			
Junk ring	316/316L			
Bearing	316/316L + FSLLOY			
Accumulator ring	Elgiloy + A02			
Sealing gasket	316/316L + flexible graphite			
Packing	Flexible graphite			
Stud	ASTM-A320-B8M-2			
Nut	ASTM-A194-8M			

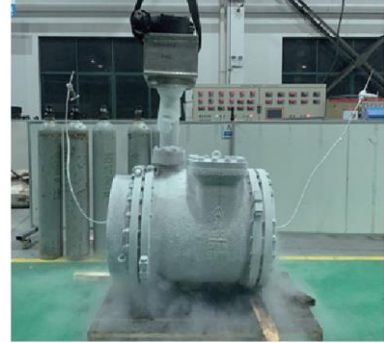
Note: Other materials can be customized according to the customer's requirements;

Note: (1) Other materials are available. Please refer to the ordering instructions;

(2) Antiwear reserves the right to make technical progress and structural changes.

Test Data of LNG Cryogenic Butterfly Valve

Ultra-low temperature performance test					
Test item	ATV-SP200011-01	Caliber	NPS24	Pressure	CLASS150
Ultra-low temperature life test (life test is carried out after every 50 ultra-low temperature operation tests, 4 cycles)					
Test medium	Nitrogen	Pressure holding time	300 s	Switching cycle	200
Switching cycles (room temperature - ultra-low temperature cycles)	Jamming		Valve seat leakage	Requirements for leakage	
50 cycles (1 cycle)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input checked="" type="checkbox"/> Satisfied <input type="checkbox"/> Not satisfied	Less than 3,600 mL/min	
100 cycles (2 cycles)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input checked="" type="checkbox"/> Satisfied <input type="checkbox"/> Not satisfied	Less than 3,600 mL/mm	
150 cycles (3 cycles)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input checked="" type="checkbox"/> Satisfied <input type="checkbox"/> Not satisfied	Less than 3,600 mL/min	
200 cycles (4 cycles)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input checked="" type="checkbox"/> Satisfied <input type="checkbox"/> Not satisfied	Less than 3,600 mL/min	



Cryogenic triple eccentric butterfly valve	Model	AD-24TEB150BW	Item No.	ATW-SP2000U-01	Caliber	NPS24
Triple eccentric butterfly valve	Interior material	CF3M	Valve body material	CF3M	Pound class	Class150
Item	Test content and standards		Measured value	Standard value	Result	
Housing test	The test pressure is 1.5 times the pound class pressure, the test time is 1800S, and no visible leakage is allowed through the pressure boundary wall and any fixed valve body connection		No visible leakage	No visible leakage	Meet the national test outline requirements	
Packing seal test	The valve is half open, and the valve body is subjected to a pressure 1.1 times the nominal pressure. There is no leakage in the packing and spiral wound gasket in 300 S.		No visible leakage	No visible leakage	Meet API598 requirements	
Fugitive emission test	The valve is half open, and 2 MPa helium is applied to the valve, according to ISO15848 (Class B) requirements		At valve stem: 1.4×10^{-6} pa.m ³ /S At gasket: 8.9×10^{-7} pa.m ³ /S	At valve stem: $\leq 1.25 \times 10^{-5}$ pa.m ³ /S At gasket: $\leq 3.35 \times 10^{-5}$ pa.m ³ /S	Meet ISO15848-B leakage requirements	
Room temperature performance test	The valve is closed and 2.2 MPa helium is applied to the valve, according to API598 requirements		21 bubbles/min	Less than 96 bubbles/min	Meet API598 requirements	
Ultra-low temperature performance test	The valve is closed and 2.0 MPa helium is applied to the valve, according to BS6364 requirements		693 mL/min	Less than 3,600 mL/min	Meet the national test outline requirements	
Cyclic action life test	The test needs to be carried out for 500 cycles, and a life test is carried out after every 100 ultra-low temperature action tests, according to the national test outline requirements		987 mL/min	Less than 3,600 mL/min	Meet the national test outline requirements	

A large number of tests have shown that the Antiwear LNG cryogenic butterfly valve can achieve self-pressure release in the middle chamber, the valve will not get stuck at ultra-low temperatures, it is stable and reliable, and can still meet the leakage requirements of the national test outline after 200 cycles of switching life tests at an ultra-low temperature of -196 °C.

Cleaning and Assembly

Cryogenic Valve Cleaning and Assembly

Cryogenic valves must be degreased, and dust-free assembly workshops and degreasing equipment are essential. The parts cleaning, whole valve assembly and packaging of our cryogenic valves are all carried out in clean rooms (not less than Class 100,000) inspected and approved by national professional qualification institutions. Clean rooms should be designed to meet GB50073-2001 *Code for Design of Clean Room*.



Reliable packages for cryogenic butterfly valves. The whole valve is packed into an oil-free bag and filled with nitrogen for protection, eliminating any pollutions



Antiwear has provided systematic training for relevant personnel and clarified the assembly requirements and operating specifications for cryogenic butterfly valves

Dedicated inspection of degreased parts, targeted cleaning of difficult-to-clean structures

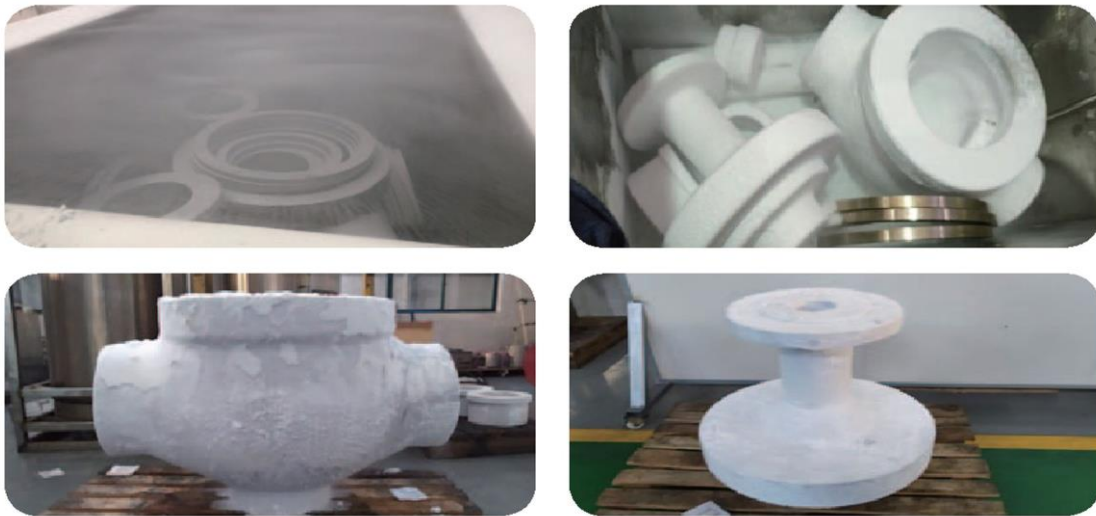


Antiwear's cryogenic butterfly valves are degreased strictly following the cleaning standard 4WPI-SW70003

Cryogenic Treatment and Ultra-low Temperature Test

Cryogenic Treatment of Parts

Austenitic stainless steel, as the material of the main pressure-bearing parts of cryogenic valves, is in a metastable state at room temperature. In order to ensure that the material has sufficient structural stability under ultra-low temperature conditions, the material will undergo multiple cryogenic treatments to eliminate the effects of material phase change and plastic deformation, thereby ensuring the sealing performance of cryogenic valves.



Low Temperature Test

During the design and development stage, Antiwear configured a complete set of ultra-low temperature test equipment and digital detection methods, including ultra-low temperature test tanks, sprinkler systems, ultra-low temperature test control cabinets, temperature control systems, ammonia mass spectrometer leak detectors, etc., to ensure the accuracy of test results and provide a basic guarantee for developing safe and reliable products with excellent sealing performance.



Actuators and Accessories

All valves can be actuated by a handle, handwheel, worm gear, pneumatic, electric or hydraulic actuators.

Commonly used pneumatic actuators include pinion and rack pneumatic actuators, and shift fork pneumatic actuators. We can provide matching and selection services for actuators, solenoid valves, positioning valves and other accessories.

Manual Actuator

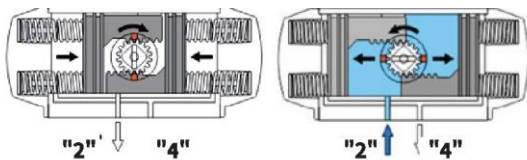
Common actuators include handle, handwheel and worm gear actuators.



Pinion and Rack Pneumatic Actuator

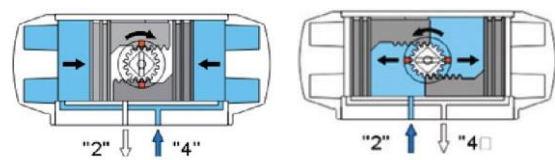


Single acting principle



The air supply pressure from Pos. 2 forces the piston to separate and move toward the end cover, compressing the spring at the same time, and the air is discharged from Pos. 4, thereby achieving counterclockwise rotation. When the air supply is lost, the spring closes the piston and the air is discharged from Pos. 2, thereby achieving counterclockwise rotation.

Double acting principle



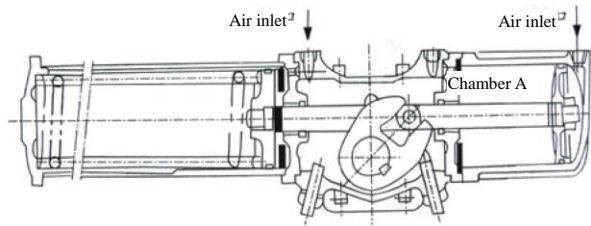
The air supply pressure from Pos. 2 forces the piston to separate and move toward the end cover, and the air is discharged from Pos. 4, thereby achieving counterclockwise rotation. The air supply pressure from Pos. 4 forces the piston to close, compressing the spring at the same time, and the air is discharged from Pos. 2, thereby achieving clockwise rotation.

Shift Fork Pneumatic Actuator



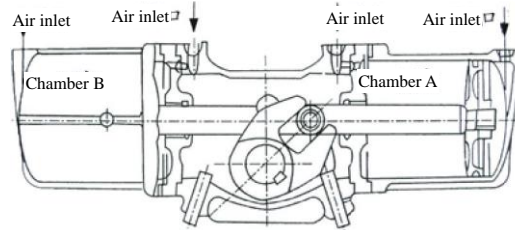
Single acting

When compressed air enters Chamber A, it pushes the piston and piston rod to move linearly. The piston and piston rod drive the rotating arm to rotate, causing the output shaft to rotate. The output end of the output shaft is connected to the output shaft of the valve, thereby completing the valve opening operation. When the air supply is cut off, the valve completes the closing operation with the spring.



Double acting

When compressed air enters Chamber A, it pushes the piston and piston rod to move linearly. The piston and piston rod drive the rotating arm to rotate, causing the output shaft to rotate. The output end of the output shaft is connected to the output shaft of the valve, thereby completing the valve opening operation. On the contrary, compressed air enters Chamber B to complete the closing operation.



Electric Actuator

An optional quarter-turn electric actuator can drive the valve.



Common Accessories

Common accessories include solenoid valves, air control valves, travel limit switches, air filter pressure reducing valves



Ordering Instructions

Model Composition



1. Company product code

TEB	Triple eccentric butterfly valve	CEB	Centerline Butterfly Valve	SEB	Single eccentric butterfly valve	DEB	Double eccentric butterfly valve	SL	Cryogenic top mounted ball valve
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2. Butterfly valve series:

SC	Replaceable single-way seal of valve seat	DC	Replaceable double-way seal of valve seat
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Ball valve series:

F2	Floating two-piece valve	F3	Floating three-piece valve	T1	Fixed one-piece valve	T2	Fixed two-piece valve	T3	Fixed three-piece valve
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3. Pressure rating

Class 150	Class 300	Class 600	Class 900	Class 1500	Class 2500
150	300	600	900	1500	2500

PN6	PN10	PN16	PN20	PN25	PN40
006	010	016	020	025	040

4. Bore size

NPS	1/2	1	2	2 1/2	3	4	5	6	8	10	12	14	16	18
DN	15	25	50	65	80	100	125	150	200	250	300	350	400	450

NPS	20	24	28	30	32	36	40	42	48	56	60			
DN	500	600	700	750	800	900	1000	1050	1200	1400	1500			

5. Flange sealing type

Raised face	Ring joint face	Full face	Female face	Male face	Tongue face	Groove face	Wafer flange	Butt welding	Socket welding	Threaded
RF	RJ	FF	FM	M	T	G	WAF	BW	SW	TH

6. Special options

Reduced bore (RB)	Thermal jacket	Extended stem	None
AN	BN	EN	NN



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