

GVK(GV) GLOBE CONTROL VALVE

Total Engineering Solution Service



Mission

기초에 근거하여 원천 기술을 살리고 원천 기술을 극대화하여 세계 중심에 서는 것 To stand at the centre of the world by utilizing original technology based on the foundation and maximizing original technology



우리는 옳은 일과 가치 있는 일에 주저함이 없이 최선을 다하고 실천하여 세계의 중심에 서자 Let us put ourselves at the center of the world by doing our best and not hesitating to stand up for what is right and worthy



GLOBAL VISION KOREA







Valve Product Service



GVK Limited, founded in June 2020 by a leader with 38 years of experience, focuses on R&D while ensuring quality, price, and functionality through domestic production. The company offers Process Valves, Valve Equipment, and Total Engineering services for industries such as Gas, Refining, Petroleum, Power generation, Environment, and Water treatment. With a management team possessing 30-40 years of experience, GVK has developed numerous patents and adheres to quality standards like ISO 9001, 14001, 45001, and CE. Recognized for its advanced automatic control valves, GVK also supplies a range of Control Valves globally through OEM and ODM partnerships.

Although still in the early design and manufacturing stages, GVK has emerged as a leading company in Korea, equipped with skilled personnel and testing capabilities. The company aims to lower production costs, enhance efficiency, and improve quality while accumulating Hyper-Intelligence Valve Engineering (HIVE) technology. GVK Limited is committed to meeting customer needs with competitive pricing and high value-added services.

The Professional Provider of Automatic valve Actuastors





Mutually Beneficial Relationships



To Be Your Best Partner



Twenty years experience "one stop" goods and services





GV SERIES Globe Control Valve

Total Engineering Solution Service



GVK / GK Series GLOBE Control Valve

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Globe Control Valve

Company introduction

About us

GVK Co., Ltd. is a high-tech private enterprise specialized in producing various electric and pneumatic control valves, self-operated control valves, control devices and integrating industrial control systems. The products including various electric and pneumatic control valves, self- operated control valves, control devices, etc. produced by our company are mainly applied in such industries as petroleum, chemical industry, steel, metallurgy, light industry, electric power, environmental protection, urban heat supply, medicine, food, etc. The products are used in many national key projects and exported to Asia, Europe, etc. The product series include: high performance control valves, pressure regulating/pressure reducing valves, selfoperated control valves, gate valves, ball valves, butterfly valves, axial flow valves, actuator valves, etc., which provide all-round fluid control solutions according to various industrial demands. We took the lead among our peers in Korea in obtaining TS manufacturing license, IS09001 certification, CE certification, API certification and other certifications.

Taking the road of "canalizing advanced equipment and independently innovating technology" and aiming at"cultivating the most talented employees, producing the most excellent products and becoming the most outstanding enterprise", we are striving to build our company into a control valve supplier "first class in Korea and leading in the world" and making greater contributions to the continuous development of Korea's automatic control industry.



advanced manufacturing technology

The latest machining equipment, which is widely applied to manufacturing GVK valves, includes a large batch of CNC machining tools (such as machining centers, CNC horizontal lathes, vertical lathes and drilling lathes) and ERP manufacturing resources integration management systems. In addition, the data between all machining workshops in GVK are mutually shared in the Intranet through optical cables, which has facilitated us to effectively centralize manufacturing resources, enhance production efficiency and efficiently improve our machining quality and process control.

Advanced Manufacturin g Technology GVK



Globe Control Valve

Strong Research And Development GVK

Strong R&D Capabilities

The technical R&D center of GVK makes use of the most advanced computer technology to enhance the quality of the existing products and develop new valve products. The design concept of GVK is to develop a kind of safe valves with cost advantage. During the new product design period, we introduce the latest engineering software such as Auto CAD and Solidworks and adopt the advanced FEA technology to verify if the design of new products is feasible before they are put into batch production, so that their design and development time is greatly shortened and the safety of final products and their optimal cost structure are ensured.







Globe Control Valve

Forward

To further meet user requirements for different service conditions, the GVC1000 Series linear motion control valves are new generation high performance products independently developed by GVK Company on the basis of many years of experience in design, production and field use after incorporating internationally advanced design concept.

With its quality, performance, life, maintenance, appearance and cost being included into the core of design, the product is featured by precise control, fast response, tight shut-off, compact structure, simple maintenance, long service life, low cost, etc.



Easy disassembly structural design

The seat is fixed by the axial pressure of the bonnet and fixing cage, with such features as automatic alignment during installation, good concentricity, high precision, tight shut-off, low leakage, compact structure, simple maintenance, low use cost, etc.

Innovative packing design

Good sealing performance, low friction, high control precision, fast response, small dead band

Top guided structural design

The friction and blocking between the cage and plug can be effectively avoided so that the valve service life is long with good stability and reliability.

Standard part design

Good interchangeability of parts lowers inventory of users and reduces use cost.



GVK control valve Configuration





NOTE

•The above diagram is the configuration guide diagram for linear motion control valves. Please select the most suitable structure for control valves according to the options indicated by the arrow so as to meet the requirements of technological parameters.

•The catalog only covers some important contents in the above configuration guide diagram.

• Please check the relevant contents you are concerned with according to page.

• If you need any detailed parameters for the electric actuator, electro-hydraulic actuator and relevant accessories that are not elaborated in the catalog, please consult GVK engineers.

•The allowable maximum differential pressure when the control valve is equipped with the actuator, the CV value corresponding to the valve opening and other detailed control valve performance parameters are not listed in the catalog. If you need to know them, please consult GVK engineers or select the most suitable control valve after calculating technological parameters according to the model selection software of GvK Company.



Body type





1 Straight-through body

The straight-through body has an S streamlined flow channel and the inner wall is smooth with equal cross-sectional area. It has such features as low pressure loss, high flow rate, stable flow, etc.

2 Angular body

Except that its appearance is rectangular, the angular body is similar to the straight-through body in other aspects. It has such features as compact structure, simple flow channel, low resistance, etc. It is especially suitable for media that may easily be coked, blocked, media of high viscosity and other service conditions.

3 Three-way body

The three-way body includes converging type and diverging type. It is mainly used for proportional control or bypass control with small floor space and low cost.

4 Z type body

The Z type body is mainly used for high pressure service conditions. It is integrally forged. It has high pressure withstanding performance. The flow channel is simple and whirlpool or backflow does not easily occur. The possibility of flash evaporation and cavitation under high differential pressure service conditions is reduced.



Bonnet type



1 Standard Bonnet

The standard bonnet is normal temperature upper bonnet. The bonnet material is the same as that of the body, playing the function of sealing the body and linking the actuator. Working temperature : $-30^{\circ}C$ - $230^{\circ}C$

3 Cryogenic & Long Extended Bonnet

The cryogenic extended bonnet is suitable for media under low temperature status(such as liquid oxygen, liquid nitrogen). This kind of upper bonnet can effectively protect the packing and actuator. The standard material adopted is 304 or 316. Materials of different expansion coefficients can also be adopted according to different service conditions. Working temperature: -196°C - 230°C, +230 - 815 \degree C.

2 Cooling Bonnet

The high temperature bonnet is specially designed for high temperature service conditions. The heat sink enhances the contact area between the bonnet and the surrounding air so as to play the function of heat dissipation. It can effectively protect the packing and actuator. Working temperature: +230°C - 530°C

Metal Bellows Seal Bonnet

The metal bellows seal bonnet is installed with the stainless steel bellows assembly to isolate the media from the outside and ensure the stem will make upward and downward movement. In addition, the upper bonnet is also provided with the standard packing box to ensure the media will not leak and cause waste or produce pollution to the environment. Working temperature: -60°C - 530°C



Body meterials

High temperature materials

The issues such as high temperature strength, change of metallurgical structure under high temperature and anticorrosion must be taken into full consideration during the selection of high temperature materials. Generally, the alloy steel shall contain chrome, nickel, molybdenum, etc. In addition, under high temperature and high pressure, the steel will be eroded by hydrogen, which will cause decarburization and embrittlement. After being added into the steel, the elements such as chrome, nickel, molybdenum, etc. can enhance the hydrogen corrosion resistance of steel in combination with the element carbon.

Basic principles of selecting the materials



Range of application of carbon steel and alloy steel under high temperature and high pressure hydrogen



Cryogenic impact value of various materials (5mm U notch)

Cryogenic materials

The cryogenic impact value of materials and the problem of embrittlement of materials under low temperature must be taken into full consideration during the selection of cryogenic materials. Therefore, the materials that are used in cryogenic service conditions must have sufficient toughness under low temperature. The valve will be safe and reliable only when the steel used in the valve meets the impact energy stipulated in relevant standards under the applicable temperature. The austenitic stainless steel is often adopted as its cryogenic mechanical property is relatively stable.

Anti-cavitation materials

When the fluid is liquid, especially when the occurrence of flash evaporation and cavitation appears, the issue of anti- cavitation must be taken into full consideration. The anti-cavitation materials mainly include:

a. Materials of high hardness (the hardness is enhanced through heat treatment)

b. Materials with solid oxide layer and high toughness and fatigue strength (the hardness on the surface of the material is enhanced through surface heat treatment Materials with solid oxide layer and high toughness and fatigue strength (the hardness on the surface of the material is enhanced through surface heat treatment)

c. Materials of partial hardening treatment (overlay welding treatment)

Anti-corrosion materials

The corrosion of metal materials include general corrosion, crevice corrosion, intergranular corrosion, pitting corrosion, stress corrosion, etc. There is no material that can resist all the above corrosion. Actually, the corrosion of materials is related to the fluid type, concentration, temperature, flow velocity, and also depends on if the fluid contains oxidant. Thus, the selection of materials becomes more complex. The anti-corrosion materials commonly used in control valves mainly include PTFE, F46 and other lining materials or high-cost austenitic stainless steel, 20# alloy steel, Hastelloy B, Hastelloy C, titanium and other special metals.



Trim materials

The commonly used trim materials include 304 SS, 316 SS, 316L SS, 410 SS, 420 SS, etc. According to different fluids, the corresponding treatment is carried out. When the valve is used for controlling cavitation fluids and fluids containing solid granules or used in high temperature and high pressure applications, hardening treatment must be carried out to prolong the service life of the valve.

The main methods of hardening treatment include:

Heat treatment

a. 304/316 solid solution treatment

he series of materials is austenitic stainless steel which is mainly used in service conditions with corrosive media or low temperature applications. Solid solution treatment must be carried out when the media corrosion is relatively strong. The purpose of solid solution treatment is to enhance material hardness and anti-corrosion performance. Working temperature range -196 - 530°C

b. 410/420 thermal refining treatment (quenching + tempering)

The series of materials is martensitic stainless steel which is an excellent anti-cavitation material. It shall be subjected to thermal refining treatment when used in high temperature and high pressure applications. The purpose of thermal refining treatment is to enhance.

c. 17-4PH precipitation hardening treatment

Different types and quantities of reinforcing elements are added on the basis of the chemical components of stainless steel, and different types and quantities of carbides, nitrides, carbonitrides, intermetallic compounds are deposited through precipitation heat treatment. The process that forms high strength stainless steel with the steel strength being enhanced and sufficient toughness being maintained is called precipitation hardening.

Working temperature range -45 - 425°C material hardness and prolong the service life under severe service conditions. Working temperature range -45 - 425°C

2 Surface hardening treatment

Surface heat treatment includes two types: surface hardening, surface chemical heat treatment.

a. surface hardening by flame heating, surface hardening by contact heating, induced surface hardening, etc. b. carburizing, nitriding, carbonitriding, boronizing, chromizing, copperizing, etc

Overlay welding treatment

Stellite overlay welding (main elements Co, Cr, W) is the commonly used hardening treatment and excellent anticorrosive performance can be achieved. Stellite overlay welding includes two modes such as full overlay welding and partial overlay welding. The selection of the overlay welding modes is not specially stipulated in a standard. The mode shall be selected according to different pressures and temperatures of the fluids and depends on if the fluids contain granules.

The types of overlay welding include:



Full profile overlay welding Seat overlay welding types (Stellite overlay welding)

Sealing face



overlay welding

Full profile overlay welding

Guide face overlay welding



Trim materials

Materials for main parts

Part name	Material
Body bonnet	WCB, WC6, WC9, CF8, CF8M, CF3, CF3M
Plug, seat	304, 316, 316L, 410, 420, 17-4PH, alloy steel, Hastelloy, Monel
Cage	CF8, CF8M
Stem	304, 316, 316L, 420, 17-4PH

Note : Special materials can be offered according to customer requirements.

As the main pressure parts, the body and bonnet will release the media contained to the air once they fail. Therefore, the materials used in the body and bonnet must be able to meet the corresponding mechanical properties under the stipulated medium temperature and pressure.

ASME Working temperature and pressure range of body materials ASME

UNIT: MPa G

°C		150#			300#			600#	
Temperature	WCB	CF8	CF8M	WCB	CF8	CF8M	WCB	CF8	CF8M
-196-38	-	1.90	1.90	-	4.95	4.95	-	9.91	9.92
-45~38	-	1.90	1.90	-	4.95	4.95	-	9.91	9.92
-5-38	1.96	1.90	1.90	5.10	4.95	4.95	10.20	9.91	9.92
50	1.92	1.84	1.84	5.00	4.77	4.80	10.01	9.56	9.62
100	1.76	1.61	1.61	4.63	4.08	4.21	9.27	8.17	8.43
150	1.57	1.47	1.47	4.51	3.62	3.85	9.04	7.26	7.69
200	1.40	1.37	1.37	4.38	3.27	3.56	8.75	6.54	7.12
250	1.20	1.20	1.20	4.16	3.04	3.34	8.33	6.10	6.67
300	1.01	1.01	1.01	3.87	2.91	3.15	7.74	5.80	6.32
350	0.84	0.84	0.84	3.69	2.81	3.03	7.38	5.60	6.07
375	0.73	0.73	0.73	3.64	2.77	2.96	7.28	5.54	5.93
400	0.64	0.64	0.64	3.44	2.74	2.91	6.89	5.48	5.81
425	0.55	0.55	0.55	2.88	2.71	2.84	5.74	5.42	5.72
450	0.47	0.47	0.47	1.99	2.68	2.81	4.00	5.37	5.61
475	0.37	0.37	0.37	1.35	2.65	2.73	2.70	5.30	5.46
500	0.28	0.28	0.28	0.88	2.60	2.67	1.75	5.20	5.37
525	0.18	0.18	0.18	0.51	2.19	2.57	1.03	4.77	5.15
538	0.13	0.15	0.15	0.34	2.18	2.53	0.72	4.55	5.06

> PN Working temperature and pressure range of body materials PN

UNIT: MPa G

°C	PN1.6	PN4.0	PN6.3	PN10	*0	PN1.6	PN4.0	PN6.3	PN10
Temperature		W	СВ			CF8			
-5-200	1.60	4.00	6.30	10.00	-45-200	1.60	4.00	6.30	10.00
-250	1.40	3.50	5.40	9.00	-300	1.40	3.50	5.40	9.00
-300	1.20	3.00	4.00	7.50	-400	1.20	3.00	4.00	7.50
-350	1.10	2.60	4.00	6.60	-480	1.10	2.60	4.00	6.60
-400	0.90	2.30	3.70	5.80	-520	0.90	2.30	3.70	5.80
-425	0.80	2.00	3.20	5.00	-560	0.80	2.00	3.20	5.00
-435	0.70	1.80	2.80	4.50					
-445	0.62	1.60	2.50	4.20					
-455	0.57	1.40	2.30	3.60					



The GVC1 000 Series is a new generation high performance control valve. It adopts self aligning insertion type th read less seat, which is fixed axially by the bonnet and cage. metal-to-metal contact between the bonnet and body and between the seat and body is realized. The gap between them is filled by the packing gasket and sealing is realized.

The compression degree of the bonnet sealing gasket is determined by the bolt pre-tightening force on the bonnet. Only after the concentrically between the bonnet and body is ensured, will it be ensured that the plug and seat are vertically aligned so as to meet the strict sealing requirement.

When the bonnet is completely installed, its force is transferred to the seat through the cage or sleeve. Only when the height tolerance of seat, cage or sleeve is very close, will the sealing gasket of the seat achieve proper compression, so that sealing is ensured and no leakage is caused due to over pressure on the sealing gasket oflhe seat. If the valve is correctly assembled, the self aligning seat with the top guided structure will fit well with the plug without the need of grinding.



► Various gasket materials and working temperature range

Туре	Material	Temperature range
Flat gasket (for general purpose)	PTFE	-130°C~150°C
Serrated gasket (for high temperature and high pressure)	304/316	-196°C~500°C
Spiral wound gasket (for high temperature and corrosion)	304/316 + flexible graphite	-196°C~500°C

The sealing gaskets made of special materials can be used under higher temperature.



Flow charateristic



Flow characteristic

The flow characteristic of the control valve is the relationship between the flow of the incompressible fluid that passes through the control valve and the opening of the control valve when the differential pressure at the two ends of the valve is invariable. This flow characteristic is called inherent flow characteristic. The typical inherent characteristics include linear characteristic and equal percentage characteristic. Actually, when the control valve controls the process media, the differential pressure on the valve will change according to the change of the opening. In this case, the characteristic curve between the opening of the control valve and the flow will deviates from the inherent flow characteristic curve. We call this kind of flow characteristic as actual flow characteristic.

Linear flow characteristic

It indicates that the flow and opening of the control valve are in the linear relationship. It is usually used for applications with small change of differential pressure, which is almost invariable. When the pressure drop on the valve becomes the main pressure drop in the system, the linear flow characteristic is often used.

Equal percentage flow characteristic

It indicates the flow change rate caused due to the change of travel is in direct proportion to the original flow at the point. It is usually used in applications that require relatively wide adjusting range, or when the system pressure loss is much higher than that of the valve, or when the opening change and differential pressure change on the valve is relatively high.

Quick open

It is mainly used for on-off control system. It is required that the flow should be high when the opening is small, and with the increase of the opening, the flow will reach the highest value very soon. After that, if the opening increases again, the change of flow is very little.



Equal percentage characteristic



Linear characteristic



Quick open characteristic



Packing structure

Packing

As a seal at the stem, the packing plays the sealing function for the upward and downward movement at the stem. The traditional solution is the pressing board type packing box structure. Although this structure can play the sealing function, the problem that high friction at the stem will cause big dead band, no response and small signal still exists. To solve the above problem, As a seal at the stem, the packing plays the sealing function for the upward and downward movement at the stem. The traditional solution is the pressing board type packing box structure. Although this structure can play the sealing function for the upward and downward movement at the stem. The traditional solution is the pressing board type packing box structure. Although this structure can play the sealing function, the problem that high friction at the stem will cause big dead band, no response and small signal still exists. To solve the above problem,

Standard packing box structure

Standard packing The integral packing box is the standard packing structure. It is easy to replace and repair with the modular design. Working temperature -30°C -260°C The packing is composed of many U type seal rings with sealing compensation function.





High temparature packing box structure

High temperature packing The V type flexible graphite serves as the high temperature packing. Working temperature -45°C -530°



The high temperature packing is composed of three V type graphites of different tapers.



Bellows packing box structure

The bellows stem sealing structure often adopts the bellows. The standard packing box with dual sealing will absolutely seal toxic and cryogenic media. Working temperature -60°C -530°C The metal bellows isolates the media from the outside, and ensures the stem makes upward and downward movement.





Working pressure and temperature range of sealing matedals

Туре	Material	Temperature range
Standard	PPL PTFE	-30°C -260°C -30°C -230°C
High temperature	V type flexible graphite RTFE	-30°C -540°C -50°C -250°C
Bellows seal	304/316 Hastelloy C/MOENEL	-196°C -400°C -250°C -530°C



Flg. 1-3 Sus316 pressed bellows







Flg. 1-4 SUS WELDED BELLOWS





Seal ring solutions in the balanced trim

Seal ring solutions in the balanced trim

The balanced seal ring is mainly used in the balanced trim to play the sealing function. It is a core technological part in the sleeve type control valve. The balanced trim type control valve produced by our company provides three kinds of seal rings for users.

Seal ring solutions in the balanced trim



Balanced seal ring

Sealing type: pressure self-sealing Shut-off class: ASME B16. 104 Class V Temperature range: -30°C -260°C



Metal Cring

Sealing type: extruding sealing/ pressure self-sealing Shut-offclass: ASME B16. 104 Class IV Temperature range: -196°C -650°C



Compound graphite seal ring

Sealing type: extruding sealing Shut-off class: ASME B16. 104 Class V Temperature range: -196°C -560°C





Introduction to the balanced seal ring

Introduction to the balanced seal ring

- The spring actuated PTFE seal is a high performance seal that is assembled with special spring in the U PTFE.
- The proper spring force and the fluid pressure in the system will eject the seal lip and slightly press the sealed face so as to achieve excellent sealing effect.
- The seal lip is short and thick, which is the best feature, so as to reduce friction and prolong the service life.

Features of the balanced seal ring

- Used for reciprocating and rotating movements
- Suitable for most fluids and chemical products
- Low friction coefficient
- Without the occurrence of crawling during precision control, the dead band of the valve is reduced.
- Good anti-wear performance and size stability
- Adapting to sharp temperature change No pollution
- No pollution



selection of sealing materials

Temperat	ure range -19	6°C -196°C ⊘	-	-196°C ▽	-196°C	-196°C
Number	Seal ring type		М	aterial		
1	Balanced seal ring		PPL			
2	Graphite seal ring	F	exible graphite			
3	Metal seal ring		INC	ONEL 718		



Valve Actuator Product Service

The end connection types of the control valves produced by our company mainly include flange connection and butt welding connection, and socket welding connection and thread connection are also available for valves of small sizes. Designs can also be made according to customer requirements.

► Flange connection end



Note

When used on valves with PN4.0MPa, the integral flanges generally have female face, and the pipe flanges generally have raised face.

Butt welding connection end

Unless otherwise specified by customers, the butt welding end of the control valves produced by our company is machined according to the slope size stipulated in GB/T12224, ASME B16. 25.

Socket welding connection end

Unless otherwise specified by customers, the socked welding end of the control valves produced by our company is machined according to the size stipulated in JB/T1 751, ASME B16.11.







GL1000 Series control valve



Outline

The GL1000 Series single-seat control valve adopts the top guided unbalanced structure, featured by high strength, heavy load, S type flow channel, low pressure drop loss, high flow coefficient, wide adjustable range, high flow characteristic precision, etc.

This kind of control valve is suitable for applications with relatively low differential pressure with tight shut-off. It is suitable for controlling medium flow or pressure. The cage adopts the press-in type seat design, which solves the problems of difficult disassembly and high leakage of the traditional thread screw-in type seat and prolongs the service life.

The flow to open design is adopted, and the medium flow direction tends to the opening direction of the valve with good controllability of small opening and low flow characteristic distortion. Special cages with noise reduction and anticavitation functions can be offered according to the requirements in different service conditions.

Trim features	Top guided, unbalanced trim, quick disassembly cage structure
Body type	Straight-through type, angle type
Bonnet type	Standard type, heat dissipation type, cryogenic type, bellows
Flow characteristic	Equal percentage, linear, quick open
Shut-off class	SME B16. 104 IV (standard metal seat) ASME B16. 104 VI (shut-off soft seat)
Pipe connection type	Flange type, butt welding type
Applicable temperature range	-196°C -570°C
Actuator type	Pneumatic diaphragm actuator Pneumatic piston actuator Electric actuator





GL2000 Series control valve



Outline

The GL2000 Series cage single-seat control valve adopts the cage guided structure and pressure balanced plug. It is suitable for applications with relatively high differential pressure. The balanced seal ring replaces the upper seat to change the traditional cage double-seat valve structure into the cage single-seat structure. This improvement has greatly enhanced the shut-off class of the cage valve. The plug makes use of the pressure balanced structure, the opening and closing force is low and the media under service conditions with high differential pressure can be controlled through relatively low actuator thrust. It is widely used for fluid control on pipelines of middle and low temperature and middle and low pressure that require good dynamic stability. With such features as good sealing performance, high allowable differential pressure, cage guiding, large guiding area, good stability and compact structure, it can realize fast replacement of trims on the line with high maintenance efficiency, saving manpower and time. The balanced plug structure makes sure that the actuator thrust required is the lowest.

Trim features	Cage guided type, balanced trim structure, with balanced seal ring structure
Body type	Straight-through type, angle type
Bonnet type	Standard type, heat dissipation type, cryogenic type, bellows
Flow characteristic	Equal percentage, linear, quick open
Shut-off class	ASME B16. 104 IV (standard metal seat) ASME B16. 104 VI (shut-off soft seat)
Pipe connection type	Flange type, butt welding type
Applicable temperature range	-30°C -260°C
Actuator type	Pneumatic diaphragm actuator Pneumatic piston actuator Electric actuator





GL2020M Series control vlave



Outline

The GL3000 Series multi-hole low noise control valve adopts the sleeve guided structure and pressure balanced plug. It is a high performance control valve with good dynamic stability that is suitable for severe service conditions. As the differential pressure in the service conditions is relatively high and the flow velocity of media is high, the trims will be severely eroded and damaged and high noise will be produced. Therefore, we change the standard window-type sleeve into the multi-hole sleeve. For liquids, the flow direction is generally high-in and lowout, and multi-hole throttling makes the media carry out collision inside the sleeve, so as to consume internal energy and reduce flow velocity. For gas media, the flow direction is generally low-in and highout, so that the gas media achieve volume expansion at the back of the seat after throttling by the multi-hole sleeve and the pressure of media is reduced to lower the flow velocity. The parts of the G3000 Series are interchangeable with those of the G3000 Series control valve except that the sleeve is changed into the multi-hole type .

Trim features	Sleeve guided type, balanced trim structure, with balanced seal ring structure
Body type	Straight-through type, angle type
Bonnet type	standard type, heat dissipation type, cryogenic type, bellows
Flow characteristic	Equal percentage, linear, quick open
Shut-off class	ASME B16. 104 IV (standard metal seat) ASME B16. 104 VI (shut-off soft seat)
Pipe connection type	Flange type, butt welding type
Applicable temperature range	-30°C -260°G (single-seat structure) -196°C -570°G (double-seat structure)
Actuator type	Pneumatic diaphragm actuator Pneumatic piston actuator Electric actuator





G4000 Series control valve (unbalanced trim)



Outline

The G4000 Series unbalanced multi-stage pressure drop control valve is suitable for applications with high differential pressure and applications that produce flash evaporation and cavitation.

According to the requirements in different service conditions, it is designed with various multi-hole cages that form a multi-stage pressure drop trim, so that the internal energy of high speed media is consumed and flow velocity is reduced from the time when the fluids contact the first cage. As it is composed of various cages, the pressure is gradually reduced so that the medium pressure is always above the saturated vapor pressure, and the occurrence of flash evaporation and cavitation is eliminated.

The standard configuration is the unbalanced singleseat plug and the plug and seat are subjected to hardening treatment to prolong the service life of the trim. The valves of large sizes can be designed with the balanced-single-seat plug structure.

Trim features	Sleeve guided unbalanced trim structure, combination of multi-hole cages
Body type	Straight-through type, angle type
Bonnet type	Standard type, heat dissipation type, cryogenic type, bellows
Flow characteristic	Equal percentage, linear, quick open
Shut-off class	ASME B16. 104 IV (standard metal seat) ASME B16. 104 VI (shut-off soft seat)
Pipe connection type	Flange type, butt welding type
Applicable temperature range	-196°C -570°C
Actuator type	Pneumatic diaphragm actuator Pneumatic piston actuator Electric actuator





GL5000 Series control valve



Outline

The GL5000 Series three-way converging / diverging control valve adopts the top guided pressure unbalanced plug. It is mainly used for converging or diverging media of several flow channels.

Entering from two channels and exiting from one channel is called three-way converging, and conversely, entering from one channel and exiting from two channels is called diverging.

The three-way valve can also play the pipe shut-off and opening function. The standard converging/diverging design is the unbalanced doubleseat trim structure.

In addition, special cages with noise reduction and anticavitation functions can also be designed according to the service conditions .

Trim features	Double-seat sleeve guided
Body type	Three-way type
Bonnet type	Standard type, heat dissipation type, cryogenic type, bellows
Flow characteristic	Equal percentage, linear, quick open
Shut-off class	ASME B16. 104 IV (standard metal seat)
Pipe connection type	Flange type, butt welding type
Applicable temperature range	-196°C -560°C
Actuator type	Pneumatic diaphragm actuator Pneumatic piston actuator Electric actuator





GL6000 Series control valve



Outline

The GL6000 Series balanced labyrinth control valve adopts the labyrinth cage and balanced plug design. The labyrinth sleeve is composed of cylindrical discs with many coaxially distributed labyrinths.

According to different technological parameters of the media, different labyrinth specifications and piling layers are designed to form the cage and the cage divides the whole flow channel into several tiny circuitous or step flow channels, forcing the fluids to continuously change the flow direction and flowing area and gradually reducing the pressure of fluids, so as to prevent the occurrence of flash evaporation and cavitation and prolong the service life of the trim.

The balanced sleeve plug is adopted. The closely fit plug and seat ensure ven/ low leakage. The trim is suitable for service conditions under which blocked flow will easily be produced and cavitation will be caused.

Trim features	Sleeve guided type, balanced trim structure
Body type	Straight-through type, angle type
Bonnet type	Standard type, heat dissipation type, cryogenic type
Flow characteristic	Equal percentage, linear, quick open
Shut-off class	ASME B16. 104 IV (standard metal seat) ASME B16. 104 VI (shut-off soft seat)
Pipe connection type	Flange type, Butt welding type
Applicable temperature range	-30°C -260°C (single-seat structure) -196°C -570°C (double-seat structure)
Actuator type	Pneumatic diaphragm actuator Pneumatic piston actuator Electric actuator





Control principle of labyrinth control valve

Speed control principle of labyrinth control valve

The valve that is damaged by cavitation, flash evaporation, vibration and noise produced by the media that passes through the valve at a high flow velocity is the main cause that leads to failure of control in the system. Even if the valve is not damaged, bad process control caused by too high noise and severe vibration will lower product performance and influence the running capacity of the equipment. Based on the principle of fluid mechanics, the labyrinth control valve adopts speed control principle and technology and makes use of multi-stage pressure drop to eliminate cavitation, flash evaporation, vibration, noise, etc., providing overall system control solutions for many different

application fields. Under severe service conditions, bad performance of valves is caused by too high flow velocity. The maximum flow velocity of the fluids in the valve always occurs at the throttling face (figure 1) which is at the downstream side of the restriction orifice of the plug. Even if materials of relatively high hardness are used in the valve to control the damage caused by cavitation, only a small amount of faults in the valve caused by too high flow velocity of the media can be eliminated. The flow velocity of media in all valves must be controlled so as to maintain the performance and reliability of the valves.



A The labyrinth flow channel can realize control of flow velocity

The labyrinth control valve can prevent the plug from producing high flow velocity and ensure the final control effect: The medium pressure and flow velocity can be effectively controlled during the whole travel of the valve. The labyrinth cage scatters the fluids into several split flow to reduce the flow velocity as much as possible (figure 2). Each fluid channel is composed of specific quantities of right-angled bends that form the labyrinth flow channels (figure 3). right-angled bends that form the labyrinth flow channels (figure 3). During the process, each bend will reduce the flow velocity of the flowing media to a certain extent. The bend number N is the number that is required for scattering the maximum differential pressure in the plug (figure 4). See the following formulas

V2(Hole) = $\sqrt{2gh}$ A new fonnula is obtained. V2(10M) = $\sqrt{2gh/N}$



Cavitation cause and solution

Cause of cavitation

When the fluid pressure is reduced to the saturated vapor pressure or lower, flash evaporation or bubbles will occur. In most control valves (figure 5), the inlet pressure is P1, velocity is V1. When the fluid passes through the plug necking area, the velocity is increased to Vvc.

According to the principle of conservation of energy, the fluid pressure suddenly drops to Pvc. When Pvc is equal to or less than the liquid saturated vapor pressure Pv, the liquid will be gasified and bubbles will be produced, so that flash evaporation occurs. After the fluid passes through the plug, the pressure starts to be restored and the kinetic energy is transferred into potential energy again. When the pressure is restored to the downstream pressure, which is expressed as P2 and the velocity is V2. When the restored pressure exceeds the saturated vapor pressure Pv, the bubbles formed will be broken and cavitation will occur. This kind of energy release will increase the partial stress to be above 200000PSI (1400MPa) and the stress will rapidly destroy the solid plug.



Solution to cavitation

The labyrinth control valve can effectively eliminate the damage caused by failure of control of fluid velocity.

First, the fluids are scattered into many small flow channels. Thus, even the bubbles are formed, their volume is very small and the energy is not sufficient to produce stress that can damage materials. Secondly, the flow velocity is maintained at the lowest level. Thus, the partial pressure will not be reduced to be lower than the fluid vaporizing pressure. Therefore, cavitation will not occur. The damage caused by cavitation is a typical signal that indicates failure of control of flow velocity. As is mentioned above, the adoption of materials of high hardness, insulating sleeve or downward orifice will only eliminate a small amount of faults in the valve caused by cavitation. The high flow velocity will cause cavitation and damage the plug, and the solution to cavitation is to adopt the labyrinth cage as shown in figure 6. According to the fluid evaporation pressure, the flow velocity can be achieved through the following formulas:

$$V = \sqrt{4637(P_2-P_v)/P} \qquad V = \sqrt{1000(P_2-P_v)/P}$$

Metric Or English



Control principle of labyrinth control valve

Design of labyrinth

Design of labyrinth disc of labyrinth control valve

Determine the bend number N and select the number to ensure the flow velocity when the fluid flows out of the flow passage. Each cage forms multi-layer labyrinth groups (figure 7) by adopting special technology. The labyrinth discs are processed into several flow channels similar to the labyrinth through special forming technology (figure 8). According to different service conditions, after precise calculation and in combination with CFD flow filed analysis (figure 9), each flow channel is designed with a series of right-angled bends of specific quantity to provide resistance for media and reduce the velocity stably. The technology can fully control the velocity of media in all channels of labyrinth discs, so that the media can flow at the controllable velocity within the whole range. To achieve the flow characteristic required by the system, a labyrinth group shall be composed of 3 kinds of labyrinth discs. To meet the requirements of high differential pressure and small flow, the discs at the bottom shall have few flow channels and many bends. The middle labyrinth discs shall have medium flow channels. To meet the requirements of low differential pressure and large flow, the discs at the top shall have many flow channels and few bends. The resistance, quantity and area of all flow channels in the labyrinth control valve can be customized according to the specific applications so as to control flow velocity, eliminate cavitation, flash evaporation, vibration, noise and etc. that occur during the use of fluids.



A Selection of flow direction of labyrinth control valve

For liquid media, the flow direction is side-in and bottomout. For gas and steam media, the flow direction is bottomin and side-out. This is because that the liquid is an incompressible fluid. By adopting side-in and bottom-out, the high speed liquids at the exits of all flow channels of labyrinth discs will carry out mutual collision on the central axis of the labyrinth sleeve, counteract their energy and form buffer cushion, so as to further lower flow velocity



Liquid flow direction: Side-in and bottom-out and reduce the erosion of the valve and trim by high speed liquids. The high differential pressure gas and steam are compressible fluids. After pressure drop by the labyrinth discs, the volume expands sharply. This requires that the flow crosssectional area at the exit should be higher than that at the inlet. Therefore, the flow direction shall be bottom-in and side-out. Otherwise, the pressure drop effect will be influenced.

В



Gas and steam flow direction: bottom-in and side-out



GL1000 series rated CV and stroke

Valve Size	Rated		Rated Cv (Trim size)										
(inch)	Travel (mm)	1/4"	3/8"	1/2"	1"	1-1/2"	2"	3"	4"	6"			
1/2	20	1.7	3.8	6.5									
3/4	20	1.7	3.8	6.5	12								
1	20	1.7	3.8	6.5	13								
1-1/2	20	1.7	3.8	6.5	13	28							
2	20		3.8	7.0	14	28	46						
2-1/2	40				14	28	48						
3	40					31	48	110					
4	40						50	113	195				
6	50							126	204	380			

Flow Coefficients - Rated Cv for unbalanced Trim

Flow Coefficients - Rated Cv for balanced Trim

	Valve Si	ze (inch)			Rated Cv (Trim size)							
	ANSI	Class		Rated	Standard Cage Trim 1-Stage Multi Hole Trim							
150	600	900	2500	(mm)	Lin	ear	EC	۹%		Linear		
300	000	1,500	2500		Full	Reduced	Full	Reduced	Standard	Reduced	High Capacity	
1-1/2	1-1/2	2	2	20	28	13	26	12	20	9		
2	2	3	3	40	74	38	68	34	52	27	65	
2-1/2	2	3	3	40	80	42	72	36	56	30	72	
3	3	3	4	50	154	76	140	70	98	46	122	
4	4	4	6	50	230	145	210	104	146	72	180	
6	6	6	8	60	400	230	360	180	220	110	300	
8	8	8	8	70	650	410	610	308	360	170	450	
10	10	10	10	80	1,020	510	910	470	560	280	710	
12	12	12	-	100	1,410	760	1,320	660	740	370	925	
14	14	-	-	140	1,940	1,200	1,900	950	990	525	1,260	
16	16	-	-	160	2,420	1,460	2,340	1,220	1,220	670	1,660	
18	18	-	-	180	3,200	1,700	3,050	1,550	1,800	960	2,250	
20	20	-	-	200	4,100	2,050	3,780	1,890	2,200	1,100	2,750	
24	-	-	-	240	6,100	3,400	6,040	3,100	3,200	1,600	4,100	

Flow Coefficients

- Rated Cv for Double Seat Trim

Valve Size(inch)	Rated	Rate	d Cv	
ANSI Class	Travel	Contoured	V-Port	
150~600	(mm)	Plug	Plug	
2	20	48	48	
3	40	110	110	
4	40	195	195	
6	50	450	450	
8	60	750	750	
10	70	1,160	1,160	
12	90	1,620	1,620	
14	100	-	2,000	
16	120	-	2,560	

► Flow Coefficients - Rated Cv for 3-Way Trim

Valve Size(inch) ANSI Class 150~600	Rated Travel (mm)	Rated Cv
1	20	9
2	25	36
3	40	75
4	40	124
6	50	270
8	70	480
10	70	750

NOTE

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All data shown above are subject to change without notice.



Dimension table







ANSI Class 150~600

ANSI Class **ANSI Class** ANSI Class Valve Size (inch) 150-600 150~ Thrd SW, Standard Extension Standard Extension RF RF RTJ RF RTJ RTJ BW Bonnet Bonnet Bonnet Bonnet 1/2 _ 1/2 _ 3/4 _ 1-1/2 2-1/2

ANSI Class 900~2500

	Α									3		ŀ	1			
Valve				ANSI CI	ass				ANSI	Class	ANSI Class					
Size	900,1500	2500	90	00	15	00	25	00	900~		000		900~	·1500	25	00
(incn)	SW, BW	SW,BW	RF	RTJ	RF	RTJ	RF	RTJ	1500 2500 s	Standard Bonnet	Extension Bonnet	Standard Bonnet	Extension Bonnet			
3/4	248	292	242	242	242	242	286	286	67	73	192	296	233	334		
1	292	318	292	292	292	292	318	318	73	73	176	293	176	293		
1-1/2	333	359	333	333	333	333	359	362	73	73	176	293	176	293		
2	311	393	311	314	311	314	393	397	96	111	227	327	290	394		
2-1/2	406	527	330	334	330	334	397	397	96	111	289	393	361	469		
3	406	527	387	390	406	409	527	533	124	140	289	393	361	469		
4	483	635	464	467	483	486	635	645	154	165	351	459	441	555		
6	610	762	556	559	610	616	762	775	206	219	430	573	517	668		

NOTE

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(unit : mm)

(unit : mm)



Dimension table

Model MSD, Spring-Diaphragm Actuators



Direct Action







Top-Side Handwheel

(unit : mm)

								,	
		Without H	landwheel	With Handwheel					
Actuator Size	ØD	DA	RA	Handwheel	DA	RA	6		
0120		Hd	Hr	Туре	Hd	Hr		L	
MSD250	254	347	372	Тор	454	488	-	-	
MSD290	294	407	432	Тор	514	548	-	-	
MSD370	375	454	488	Тор	619	648	-	-	
MSD480	486	655	679	Top side	1,075	1,075	870	335	
MSD550	565	702	728	Top side	1,148	1,148	917	335	
MSD550H	565	728	778	Top side	1,148	1,148	917	335	

Model HPL Cylinder Actuators



without Volume Chamber



with Volume Chamber



with Optional Handwheel

NOTE

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Model HPL Actuator

		Н								
Actuator Size	ØD					Travel(mm)				
0120		40	50	70	80	100	130	150	200	300
With out Vol	ume Chamb	er								
HPL30	375	510	520	540	550	570	600	-	-	-
HPL40	465	585	595	615	625	645	675	695	745	845
HPL50	575	605	615	635	645	665	695	715	765	865
With out Vol	ume Chamb	er (Chambe	er Capacity)							
HPL30(10)		635	645	665	675	695	725	-	-	-
(20)	375	735	745	765	775	795	825	-	-	-
(30)		785	795	815	825	845	875	-	-	-
HPL40(10)		715	725	745	755	775	805	825	875	975
(20)	465	815	825	845	855	875	905	925	975	1,075
(30)		860	870	890	900	920	950	970	1,020	1,120
HPL50(10)		730	740	760	770	790	820	840	890	990
(20)	575	825	835	855	865	885	915	935	985	1,085
(30)		860	870	890	900	920	950	970	1,020	1,120
With Handw	heel - Whito	out Volume (Chamber							
HPL30	375	770	780	800	810	830	860			
HPL40	465	965	975	995	1,005	1,025	1,055	1,075	1,125	1,225
HPL50	575	985	995	1,015	1,025	1,045	1,075	1,095	1,145	1,245
With Handw	heel and Vo	lume Chaml	ber (Chambe	er Capacity)						
HPL30(10)		895	905	925	935	955	965	-	-	-
(20)	375	995	1,005	1,025	1,035	1,055	1,085	-	-	-
(30)		1,045	1,055	1,075	1,085	1,105	1,135	-	-	-
HPL40(10)		1,095	1,105	1,125	1,135	1,155	1,185	1,205	1,255	1,355
(20)	465	1,195	1,205	1,225	1,235	1,255	1,285	1,305	1,355	1,455
(30)		1,240	1,250	1,270	1,280	1,300	1,330	1,350	1,400	1,500
HPL50(10)		1,110	1,120	1,140	1,150	1,170	1,200	1,200	1,270	1,370
(20)	575	1,205	1,215	1,235	1,245	1,265	1,295	1,315	1,365	1,465
(30)		1,240	1,250	1,270	1,280	1,300	1,330	1,350	1,400	1,500

(unit : mm)

(unit : kgs)

Weights & Instruments for GL1000 Series

Body Sub-Assembly, Weights

		ANSI Class										
Valve Size	150~300	600	900	1500	2500	600	900~1500	2500				
	Flanged	Flanged	Flanged	Flanged	Flanged	Welding	Welding	Welding				
3/4~1(20, 25)	20	25	44	54	64	18	40	42				
1-1/2(40)	27	30	56	68	78	25	53	55				
2(50)	34	38	62	85	98	30	78	91				
2-1/2(65)	60	60	140	140	182	58	120	153				
3(80)	64	68	140	158	182	58	128	169				
4(100)	94	106	238	250	298	94	209	274				
6(150)	164	210	512	528	614	202	387	465				
8(200)	360	415	686	818	996	382	745	918				
10(250)	542	620	1,050	1,260	1,410	564	1,146	1,284				
12(300)	940	980	1,460	1,720	-	910	1,582	-				
14(350)	1,280	1,320	1,860	-	-	1,190	1,710	-				
16(400)	1,420	1,490	2,180	-	-	1,360	-	-				

NOTE

1. All data shown in this product specification are currently standard specifications of ACE and can be customized by order specification.

2. All data shown above are subject to change without notice.



Pneumatic actuator

The MSD Series pneumatic actuator is a multi-spring diaphragm actuator with such features as light weight, small volume, stable output force, etc. Through acting on the diaphragm inside the actuator, the air supply conquers the reverse action force of the spring and makes upward and downward linear movement. When there is no air pressure, the compression spring releases pressure and pushes the push shaft of the actuator to move upwards or downwards. The actuators of this series can be classified into direct action type and reverse action type. According to different diaphragm effective areas and travels, the actuators include the following 5 specifications.

Creation	Specification				r	Actuat	or Size				
Specification	1	250RA	250DA	290RA	290DA	370RA	370DA	480RA	480DA	550RA	550DA
Nominal Effective	Area	See tables									
Maximum	BarG		4								
Operating Pressure ta Diaphragm	PsiG		58								
Maximum Stroka	mm	2	0	30		4	0	7	70		0
Maximum Stroke	inch	0.	79	1.1	1.18		57	2.	75	3.	54
Valve Stem Connector Thread	mm			M14 :	× 1.5P				M24 × 1.5P		
Temperature	°C	diaphragm and steel studs and nuts : -30 to +80									
Range	°F			diaphrag	gm and s	steel stu	ds and n	uts : -20) to +180)	
Pressure Connections	inch	ch 1/4" NPT 3,					3/8"	NPT			







The action principle of the HPL linear motion multi-spring piston pneumatic actuator is the same as that of the multi-spring diaphragm actuator. But the HPL Series actuator replaces the diaphragm by piston, which has solved the problems of the diaphragm actuator being unable to bear relatively high air pressure and easy aging of the diaphragm, and the actuator can bear higher air pressure. The increase of the air pressure has enhanced the output force of the actuator. The standard configuration is single acting type. Double acting type actuator can also be designed according to the need. According to different piston diameters and travels, the actuators include the following 4 specifications:

► GA20 Cylinder Actuator

Cylinder Series		DOUBLE		SPRING			
Spring Quantity	N/A			1~2			
Size	12"	16	6"	20"			
Maximum Operating Processo	BarG		4	~7			
Maximum Operating Fressure	PsiG		58~101				
Maximum Traval	mm	120	15	50	200		
	inch	4.72 5.9		7.87			
Valve Stem Connector Thread	mm	M30>	×2.5P		M36×2.5P		
Pressure Connections	inch	PT 1/2" inch					

Connection dimensions of pneumatic actuators

Actuator Siza	А	н	H1	H2	D	Т	С			
ACTUATOR SIZE	Millimeters(mm)									
250 DA	255	352	-	135						
250 RA	200	332	114	-						
290 DA	205	389	-	145	56	20	200			
290 RA	295	369	114	-		20	200			
370 DA	275	430	-	155						
370 RA	375	410	114	-						
480 DA	400	649	-	206						
480 RA	482	629	134	-	00	20	200			
550 DA	FGO	698	-	223	60	30	300			
550 RA	560	678	134	-						



Direct Acting (DA)

Reverse Acting (RA)



Commonly used accessories of VMV





Intelligent





Name	Model	Manufacturer	Remark
	G551H401MO	4500	(220v) Explosion-proof
Solenoid	G551AOO1MS	ASCO	(24v) Non-Explosion-proof
valve	SY7210-4G-02-220	SMC	(220v) 20on-Explosion-proof
	SY7210-4G-02-24	SIVIC	(24v) Non-Explosion-proof



tissin SMC.

Name	Model	Manufacturer	Remark
	AW30-03BG	SMC	Rc3/8
Airoot	AW30-04BG	Rc1/2	
Allset	T50	Homomodo	Rc3/8
	AW2000-02	Homemade	Rc3/8









Commonly used accessories of GVK

The purpose of selecting valve accessories is to accomplish overall functions and control features of control valves. The commonly used accessories of reowo include positioner, Airset, solenoid valve, air valve, valve position transducer, limit switch, speed booster(amplifier), lock valve, air storage cylinder, etc. Different accessories have different purposes, so suitable accessories shall be selected according to different control purposes.

Limit switch (AZBIL, TYC)

azbil



Name	Model	Manufacturer	Remark					
	1LS19JB1		Non-explosion-proof (SPDT)					
	1LX5001	AZBIL	Explosion-proof dllBT4 d ll CT6(H2)					
Limit switch	1LX5700		d II CT6(H2)					
	LSB-1	D.C.	Non-explosion-proof/ rotary motion					
	LSB-3	P.G	Explosion-proof/ rotary motion					

Air valve (SMC), Speed booster^ Lock valve



Name	Model	Manufacturer	Remark							
	VPA342-02		Rc1/2 two-position three-way							
Air valve	VPA542-03	SMC	Rc1/2 two-position three-way							
	VPA742-04		Rc1/2 two-position three-way							
Speed	IL100-02	CMO	Rc1/4							
booster	IL100-03	SIVIC	Rc3/8							
	IL201	CMO	Single acting (maintaining position)							
Lock valve	IL211	SIVIC	Double acting (maintaining position)							
	CL420H	KOSO	For air bag air supply							

	GB/T4213-2008 "pneumatic control valve"														
Shut-off class	Testing medium	Testing pressure	Maximum seat leakage												
I	А	greed by the user a	nd manufacturer												
II			5×10 ³ x valve rated capacity												
III	Water, air or nitrogen	A	10" ³ x valve rated capacity												
N/	Water	A or B	104 v value rated consoity												
IV	Air or nitrogen	A	IO * X valve fated capacity												
11/-61	Water	A or B	5 x 10 ¹⁶ x valve rated capacity												
10-31	Air or nitrogen	A													
IV-S2	Air or nitrogen	A	20 × 1CT⁴ x AP x D												
V	Water	В	1.8 × 10' ⁷ x AP x D												
VI	Air or nitrogen	A	3×10^{13} x AP x (leakage in the continued table)												

	Continued table														
Seat	size	20	25	40	50	65	80	100	150	200	250	300	350	400	
Lookogo	Ml/min	0.1	0.15	0.3	0.45	0.6	0.9	1.7	4.0	6.75	11.1	16.0	21.6	26.4	
Leakage	Bubbles/Min														

NOTE

A: Testing pressure=0.35MPa. When the allowable differential pressure of the valve is lower than 0.35MPa, use the allowable differential pressure stipulated in the design.

B: Testing pressure is the maximum working differential pressure of the valve.

			04-1976									
Shut-off class	١	Maximum allo	wable leakaa	e	Testina Medium	Testina oressure						
II		0.5%	%Cv			Maximum working differential pressure A						
III		0.1 %	%Cv		Air or water	P or 50lb/in2(3.5bar) differentialpressure,						
IV		0.01	%Cv		at 10-52°C	whichever is lower						
V	0.0005ml/m diameter	nin of water lea per psi differe	akage per inch ntial pressure	n of nominal is allowed		Maximum working differential pressure A P						
		Valve	e size									
	ln	mm	MI/min	In								
	1	25	0.15	1								
	11/2	38	0.30	2								
	2	51	0.45	3								
	21/2	64	0.60	4								
	3	76	0.90	6	Air or water	Maximum working differential pressure A						
	4	102	1.70	11	at 10-52°C	whichever is lower						
	6	152	4.00	27								
	8	203	6.75	45								
	10	250	11.1									
	12	300	16.0]							
	14	350	21.6]							
	16	400	28.4									



Attachment 2 Commonly used materials of control valves

Attachment 2 steel grade contrast table of commonly used materials of control valves

Material Name	(ASTM) ASTM	(JIS) JIS	(DIN) DIN	(GB) GB	Main Chemical Component
Carbon steel (cast)	WCA, WCB, WCC	SCPH2	1.0501	WCA, WCB, WCC	C: 5=3.0
Cr: Mo steel (cast)	WC6 WC9	SCPH21 SCPH32	1.7335	15CrMo 15C2MoV	C: 5=0.20 C: 5=0.18
	Cf8	SCS13 SCS13A	1.4308	CF8 (GB 12230)	C: 5=0.08 Cr: 18.0-21.0
Stainless	CF8M	SCS14 SCS14A	1.4580 1.4581	CF8M (GB 12230)	C: 55.0=0.08 Cr: 18.0-21.0 Mo: 2.0-3.0
steel (cast)	Cf3	-	1.4306	CF3 (GB 12230)	C: 5=0.03 C: 17.2-21.0
	CF3M	-	1.4435	CF3M (GB 12230)	C: 5=0.03 C: 17.2-21.0
	304	SUS304	1.4301	0Cr18Ni9	C: 5=0.08 Cr: 17.0-20.0
	316	SUS316	1.4401 1.4436	0Cr17Ni12M02	C: 5=0.08 Cr: 16.0-18.0 Mo: 2.0-3.0
	304L	SUS304L	1.4036	OOCrI9NI10	C: 5=0.03 Cr: 18.0-20.0
	316L	SUS316L	1.4435 1.4404	00Cr17Ni14Mo2	C: s=0.03 Cr: 2.0-3.0
Stainless	410	SUS410	1.4006	1Cr13	C: 5=0.15 Cr: 11.5-13.0
steel (rod)	416	SUS416	1.4005	YICr13	C: 5=0.15 Cr: 12.0-14.0
	420	SUS420	1.4021	2Cr13	C: 16.0-0.25 C: 16.0-18.0
	440B	SUS440B	1.4112	9Cr18Mov	C: 0.75-0.95 C: 16.0-18.0
	440C	SUS440C	1.4125	9Cr18	C: 0.75-0.95 C: 16.0-18.0
	630	SUS630 SUS24 (cast)	1.4542	0Cr17Ni4Cu4Nb (17-4PH)	Cr: 16.5 Ni: 4.0 Cu: 3.5

Attachment 3 Anticorrosive materials of valves

Selection table of acticorrosive material of control valves

					1		Mat	erial			1			
Fluid	Carbon steel	Cast iron	320 or 304SS	316 or 316SS	Bronze	Monel	Haste Hoy B	Haste Hoy C	SS #20	Titani um	Co-Cr alloy #6	416 SS	440C SS	17-4PH SS
Acetaldehyde	A	А	A	A	A	A	I.L	A	А	I.L	I.L	А	А	A
Acetal acid (air free)	С	С	В	В	В	В	A	A	А	A	A	С	С	В
Acetal acid (aerated)	С	С	A	А	Α	A	A	A	А	A	A	С	С	В
Acetal acid vapor	С	С	A	A	В	В	I.L	A	А	A	A	С	С	В
Acetone	A	Α	A	A	Α	A	A	A	А	A	A	А	А	A
Acetylene	A	A	A	A	I.L	A	A	A	А	I.L	A	А	А	A
Alcohols	A	A	A	A	A	A	A	A	A	A	A	А	А	A
Aluminum sulfate	С	С	A	A	A	A	A	A	А	A	I.L	С	С	I.L
Ammonia	A	A	A	A	A	A	A	A	А	A	A	А	A	I.L
Ammonium chloride	С	С	В	В	A	A	A	A	А	A	A	С	С	I.L
Ammonia nitrate	A	А	A	A	С	С	A	A	А	A	Α	С	С	I.L
Ammonium phosphate (univalent)	С	С	А	А	В	В	A	А	А	А	А	В	В	I.L
Ammonium sulfate	С	С	В	А	В	В	A	A	А	A	A	С	С	I.L
Ammonium sulfite	С	С	A	А	С	С	I.L	A	А	A	A	С	С	I.L
Aniline	Α	А	A	А	Α	A	A	A	А	A	A	С	С	I.L
Asphalt	A	A	A	A	С	С	A	A	A	I.L	A	А	A	A
Beer	В	В	A	A	В	В	A	A	А	A	A	В	В	A
Benzene	A	A	A	A	A	A	В	A	А	A	A	А	A	A
Benzoic acid	С	С	A	A	A	A	I.L	A	А	A	I.L	А	А	A
Boric acid	С	С	A	A	A	A	В	A	А	A	A	В	В	I.L
Butane	A	А	A	A	A	A	A	A	А	I.L	A	А	А	A
Calcium chloride (alkaline)	В	В	С	В	С	A	A	A	А	A	I.L	С	С	I.L
Calcium hypochlorite	С	С	В	В	В	В	С	A	А	A	I.L	С	С	I.L
Carbolic acid	В	В	A	А	A	A	A	A	А	A	A	I.L	I.L	I.L
Carbon dioxide (dry)	A	A	A	A	A	A	A	A	А	A	A	А	A	A
Carbon dioxide (wet)	С	С	A	A	A	A	A	A	А	A	A	А	А	I.L
Carbon disulfide	A	A	A	A	С	В	A	A	A	A	A	В	В	A
Carbon tetrachloride	В	В	В	В	A	A	В	A	A	A	I.L	С	С	С
Carbonic acid	С	С	В	В	В	A	A	A	А	I.L	I.L	А	А	I.L
Chlorine, gas (dry)	A	A	В	В	В	A	A	A	А	С	В	С	С	A
Chlorine, gas (wet)	С	С	С	С	С	С	С	В	С	A	В	С	С	С
Liquid chlorine	С	С	С	С	В	С	A	A	В	С	В	С	С	С
Chromic acid	С	С	С	С	С	A	С	A	С	A	В	С	С	С
Citric acid	I.L	С	В	В	A	В	A	A	А	A	I.L	В	В	В
Coke oven gas	A	A	A	A	В	В	A	A	А	A	A	А	A	A
Copper sulfate	С	С	В	В	В	С	I.L	A	А	A	I.L	А	А	A
Cottonseed oil	A	A	A	A	A	A	A	A	А	A	A	А	А	A
Creosote	A	A	A	A	Α	A	A	A	А	I.L	A	А	A	A
Ethane	A	A	A	A	A	В	A	A	А	A	A	А	А	A
Ether	В	В	A	A	В	A	A	A	A	I.L	A	А	A	A
Ethyl chloride	С	С	A	A	Α	A	A	A	А	A	A	В	В	I.L
Ethylene	A	А	A	A	Α	A	A	A	А	A	A	А	А	A
Ethylene glycol	A	A	A	A	Α	A	I.L	I.L	А	I.L	A	А	A	A
Ferric chloride	С	С	С	С	С	С	С	В	А	A	В	С	С	A
Formaldehyde	В	В	A	A	A	A	A	A	С	A	A	А	А	I.L
Formic acid	I.L	С	В	В	A	A	A	A	А	С	В	С	С	В
Freon (wet)	В	В	В	В	A	A	A	A	А	A	A	I.L	I.L	I.L
Freon (dry)	В	В	A	А	A	A	A	A	А	A	A	I.L	I.L	I.L
Furfural	A	А	A	A	A	A	A	A	А	A	A	В	В	I.L
Gasoline (refined)	А	А	A	А	А	A	A	A	А	A	А	А	А	A
Glucose	А	А	А	А	А	А	А	А	А	А	А	А	А	А



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Product Service Qualified Certificate

ISO 9001:2015

ISO 14001:2015

ISO 45001:2018



CE: Globe Control Valve

CE : Ball Valve

Research Institute





ASME U, PP Stemp

EAC : RUSSIA TRCU

API 6D / 600 By KSM







GVK(GV) GLOBE CONTROL VALVE

Total Engineering Solution Service

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