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Cryogenic Ball Valve Series

Pressure Class:Class 150~1500
Size Range : 1/2"~24"
API Standards:6D
ASME B 16.34

ZHEJIANG CHENGGAO VALVE CO.,LTD.
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Purpose

Cryogenic ball valves are mainly used in the chemical equipment of ethylene and LNG etc. to handle cryogenic liquid medium like ethylene. Liquid oxygen, liquid hydrogen and so on. These types of inflammable and explosive medium can be volumetrically expanded by several hundred times when being gasified under temperature rise, and are difficult to manufacture due to their highly penetrative and leaky Properties.

Structure Characteristics

1. The materials of compression parts can endure the expansion and shrinkage resulted from the temperature variation of medium, and seal structure is away from permanent deformation under temperature changes. To work under the conditions below−100℃, the parts of valve shall be subject to sub−zero treatment before finish machining Namely, have the parts cooled in liquid nitrogen box, when the temperature of parts reaches−196℃, keep the temperature for 1−2h,then take them out to have them to the normal temperature naturally, and do in this way twice.
2. Bonnet is shaped long−necked for the purpose to protect the function of packing box, making packing box somewhat away from low temperature to ensure good seal of packing. Besides, it can be wound with cold insulating materials to prevent loss of cold energy. The length of neck (H, see the drawing on the left) depends on service temperature and the thickness of cold insulating material. When the seal effect of packing turns lower, fill in grease to form up oil seal layer in the middle of packing box (see combined packing structure)to lower the differential pressure of packing box and enhance the dependability of seal.
3. To serve a temperature below−100℃, the material of valve stem shall be treated with chrome plating or nit riding to enhance the surface hardness of valve stem and the dependability of packing.
4. Cryogenic ball valve takes a structure to avoid abnormal pressure rise, As the medium in cryogenic valve is gasified and rapidly expanded in volume, the pressure will go extremely high. When the pressure in the middle cavity of valve rises, the middle cavity and the inlet side can be communicated, or a relief can be mounted at the inlet side of valve. thus to ensure the safe use of valves.
5. The gaskets used on cryogenic ball valves may function dependable seal and restoration under normal and cryogenic or under the conditions of temperature changes.

Main Parts and Materials

Part Name	Material
Body	Cast steel, Cast stainless steel
Bonnet	Cast steel, Cast stainless steel
Stem	Martensitic stainless steel, Austenitic stainless steel
Ball	Martensitic stainless steel, Austenitic stainless steel
Seal ring	Reintorced PTFE, Carbon tibre, PEEK

Technical Standard

Standard	GB	API
Design codes	GB/T12237	ASME B16.34
Applications of cryogenic technology	JB/T 7794	BS 6364
Pressure−temperature rating	GB/T12224	ANSI B16.34
Face to face dimension	GB/T12221	ANSI B16.10
Flange	GB/T9113/HG 20596	ANSI B16.5
Test and Inspection	JB/T 9092	API 598*

Cryogenic ball valves shall be subject to pressure test under low temperature after under normal temperature, with its principle is shown at the diaphragm of cryogenic ball valves.

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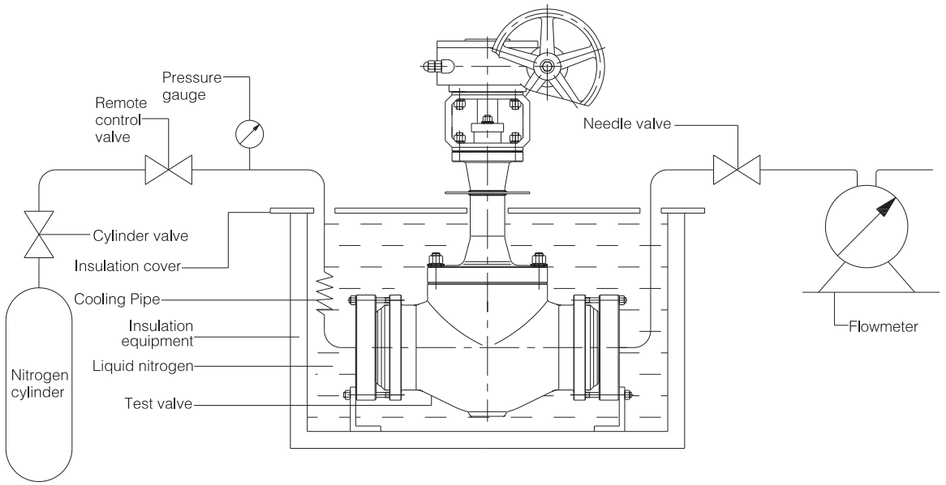
Pressure Test of Ball Valve Under Cryogenic

According to the requiements of certain standards, the test of cryogenic ball valves shall be carried out under both normal and cryogenic. With its principle as following.



Cryogenic test device type

Dimensions of Bonnet Extension Stem of Cryogenic Ball Valve

Table 1 – Minimum vapour space and lagging length (bonnet extension)

Minimum design temperature Min °C (°F)	Max °C (°F)		15 (½) 25 (1)	40 (1½) 50 (2)	80 (3) 100 (4)	150 (6) 200 (8)	250 (10) 300 (12)	350 (14) 400 (16)	450 (18) 600 (24)	700 (28) 800 (32)	900 (36) 1200 (48)
−196 (−321)	<−110 (<−166)	Minimum vapour space length mm(in)	200 (7.9)	250 (9.8)	300 (11.8)	350 (13.8)	400 (15.8)	450 (17.7)	500 (19.7)	550 (21.7)	600 (23.6)
−110 (−166)	<−50 (<−58)		100 (3.9)	125 (4.9)	150 (5.9)	175 (6.9)	200 (7.9)	250 (9.8)	300 (11.8)	350 (13.8)	400 (15.8)
−50 (−58)	<−20 (<−4)	Lagging extension −length mm(in)	60 (2.4)	80 (3.1)	90 (3.5)	100 (3.9)	100 (3.9)	110 (4.3)	110 (4.3)	110 (4.3)	120 (4.7)

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Other Valve Series

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