KGS AA318 2019

Code for Facilities, Technology and Inspection for Manufacturing of Valves for Toxic Gas Piping

Deliberation/Resolution by Gas Technical Standards Committee : December 14, 2018

Approval by the Ministry of Trade, Industry & Energy : January 16, 2019

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History of Establishment and Revision of KGS Code	
Code Number	KGS AA318 2019
Code Title	Code for Facilities, Technology and Inspection for Manufacturing of Valves for Toxic Gas Piping

Date of Establishment/Revision	Description
December 30, 2008	Established (Notification of the Ministry of Knowledge Economy No. 2008-379)
May 15, 2009	Revised (Notification of the Ministry of Knowledge Economy No. 2009-193)
June 29, 2009	Revised (Notification of the Ministry of Knowledge Economy No. 2009-250)
April 5, 2011	Revised (Notification of the Ministry of Knowledge Economy No. 2011-173)
May 20, 2013	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2013-087)
November 17, 2014	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2014-589)
August 7, 2015	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2015-436)
December 10, 2015	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2015-641)
January 8, 2016	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2016-6)
March 9, 2016	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2016-94)
July 11, 2016	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2016-354)
November 23, 2016	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2016-603)
February 10, 2017	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2017-066)
June 2, 2017	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2017-298)
December 13, 2018	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2018-607)
January 16, 2019	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2019-026)

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Code for Facilities, Technology and Inspection for Manufacturing of Valves for Toxic Gas Piping

1. General

1.1 Scope

This Code applies to the facilities, technology and inspection for manufacturing of valves (ball valves, globe valves, gate valves, check valves and cocks in conformity to KS B 2304, hereinafter referred to as "valves") to be installed in toxic gas piping in the installations which shall be registered for and filed for manufacturing, storage, sales or importation of high-pressure gas among specially-designated facilities in conformity to the Enforcement Regulation of the High-Pressure Gas Safety Control Act (hereinafter referred to as "Act"), Article 3, Clause 5. However, valves to be installed in high-pressure gas specially-designated facilities and valves to be installed on refrigerators subject to refrigerator inspection shall be excluded in the application of this Code.

1.2 Validity of Code

1.2.1 This Code has passed the deliberation and resolution by Gas Technical Standards Committee (Bill No. 2018-10, December 14, 2018) in accordance with the Act, Article 22, Clause 2, has been approved by the Minister of Trade, Industry & Energy (Notification No. 2019-26 of the Ministry of Trade, Industry & Energy, January 16, 2019), and is valid and effective as the detailed standards in conformity to the Act, Article 22-2, Clause 1.

1.2.2 Conformity to this Code is deemed to conform to Table 12 of the Enforcement Regulation of the High-Pressure Gas Safety Control Act (hereinafter referred to as "Enforcement Regualtion") in accordance with the Act, Article 22-2, Clause 4.

1.3 Reference Codes and Standards

1.3.1 Inspection standard for new technology products

1.3.1.1 In case the Minister of Knowledge Economy accepts that valves developed through new technology development do not meet the inspection standard conforming to this Code in accordance with Table 1.3.1.2 but do not hinder safety control, the manufacturing and inspection methods of those valves may apply only to them.

1.3.1.2 Valves inspected by an authorized inspection agency in charge in accordance with an acceptable standard in Table 1.3.1.2 shall be deemed to have been approved by the Minister of Knowledge Economy and may be inspected in accordance with the relevant acceptable standard without the need of applying for exemption from the inspection in conformity to acceptable standards and undergoing subsequent review. <Revised on May 20, 2013>

Table 1.3.1.2 Acceptable Foreign Standards and Authorized Inspection Agencies for Foreign Valves <Revised on May 20, 2013, December 10, 2015>

Acceptable Standard	Authorized Inspection Agency
PED (Pressure Equipment Directive)	Notified Body registered in EC (European Commission)
API, ANSI, JIS, ASME	-
Other standards acceptable to the Minister of Knowledge Economy	Inspection agencies acceptable to the Minister of Knowledge Economy

1.3.2 Manufacturing registration of foreign valves <Revised on May 20, 2013>

1.3.2.1 The "manufacturing facility standards and manufacturing technology standards" specified in the Enforcement Regulation, Article 9-2, proviso of Clause 3 means acceptable standards for foreign valves in accordance with Table 1.3.1.2

1.4 Definitions

The terms used in this Code are defined as follows:

1.4.1 "Toxic gases" mean acrylonytrile, acrylaldehyde, sulfur dioxide, ammonia, carbon monoxide, carbon disulfide, fluorine, chlorine, methane bromide, methane chloride, chloroprene, ethylene oxide, hydrogen cyanide, hydrogen sulfide, monomethylamine, dimethylamine, trimethylamine, benzene, phosgene, hydrogen iodide, hydrogen bromide, hydrogen chloride, hydrogen fluoride, mustard gas, algin, monosilane, disilane, diborane, hydrogen selenide, phosphine, monogermane and other gases which have toxicity harmful to human bodies when they are present in air in a certain amount, and

of which permissible concentration (gas concentration in which not less than half of white rats will be dead within 14 days when a group of grownup white rats are continuously exposed to the gas for one hour every day) is not over 5,000 ppm.

1.4.2 "Design pressure" means the pressure which serves as the standard for design and is set to calculate the calculated thickness of each part or mechanical strength. <Revised on June 2, 2017>

1.4.3 "Nominal pressure" is for naming the pressure classification of valves, which is marked as "Class", "PN" and "K" : "Class" follows ASME B 16.34, EN 1333 for "PN(Pressure Nominal)", and KS B 2308 for "K". <Newly established on November 17, 2014>, <Revised on December 13, 2018>

1.4.4 "Nominal diameter" means the number to mark the size of valves: NPS (nominal pipe size) for the inch and DN (nominal size) for the meter. <Newly established on November 17, 2014>

Table 1.4.4 Relations between NPS and DN

NPS	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4
DN	8	10	15	20	25	32	40	50	65	80	100

※ DN not less than NPS 4 is calculated by multiplying NPS by 25.

2. Manufacturing Facility Standard

2.1 Manufacturing Facilities

The person who intends to manufacture valves shall be furnished with the following manufacturing facilities (restrictive to the facilities required for the valves to be manufactured) to manufacture the valves in accordance with this manufacturing technology standard. However, if the technical review conducted in accordance with the Enforcement Regulation, Article 5, Paragraphs 2-3 recognizes that quality control will not be hindered even if the facilities of specialist parts companies are utilized or valve parts are supplied from specialist parts companies, facilities required for such parts production may not be furnished.

(1) Machine tools such as drilling machine, outside diameter machining facility, inside diameter machining facility, threading machine, etc.,

(2) Forging facility,

(3) Assembly facility

(4) Ultrasonic cleaning facility or dedicated Cleaning facility for pneumatic, hydraulic. etc <Revised on December 13,2018>

(5) Other facilities and appliances necessary for manufacturing

2.2 Inspection Facilities

The person who intends to manufacture valves shall be furnished with the following inspection facilities (restrictive to the facilities required for the valves to be manufactured) required to inspect the valves in accordance with this inspection standard.

(1) Dimensions measuring devices,

(2) Pressure test facility,

(3) Leak test facility,

(4) Measuring devices for roundness of balls,

(5) Turning force measuring device, and

(6) Other facilities and appliances required for valve inspection.

3. Manufacturing Technology Standard

3.1 Design (currently not used)

3.2 Materials

The materials of valves shall conform to the following provisions to secure the safety of the valves.

3.2.1 The materials shall not cause erosion or chemical reaction in the presence of the relevant gas.

3.2.2 The materials shall be free of defects such as damages, struck dents and corrosion.

3.2.3 The materials of pressure parts shall be materials conforming to the following standards (hereinafter referred to as “standard materials”), materials conforming to officially-adopted international standards or materials with equivalent chemical composition and mechanical

properties (hereinafter referred to as "equivalent materials"). <Revised on November 23, 2016>

(1) KS D 3501 (Hot rolled mild steel plates, sheets and strip)

(2) KS D 3503 (Rolled steels for general structure)

(3) KS D 3507 (Carbon steel pipes for ordinary piping)

(4) KS D 3512 (Cold rolled mild steel plates, sheets and strip)

(5) KS D 3515 (Rolled steels for welded structure)

(6) KS D 3521 (Steel plates for valves)

(7) KS D 3531 (Corrosion-resistant and heat-resistant super alloy bars)

(8) KS D 3532 (Corrosion-resistant and heat-resistant super alloy plates and sheets)

(9) KS D 3533 (Steel sheets, plates and strips for gas cylinders)

(10) KS D 3538 (Manganese-molybdenum and manganese-molybdenum-nickel alloy steel plates for boilers and other valves)

(11) KS D 3539 (Manganese-molybdenum and manganese-molybdenum-nickel alloy steel plates quenched and tempered for valves)

(12) KS D 3540 (Carbon steel plates for valves for intermediate and moderate temperature services)

(13) KS D 3541 (Carbon steel plates for valves for low temperature service)

(14) KS D 3543 (Chrome-molybdenum alloy steel plates for boilers and valves)

(15) KS D 3560 (Carbon steel and molybdenum alloy steel plates for boilers and other valves)

(16) KS D 3562 (Carbon steel pipes for pressure service)

(17) KS D 3563 (Carbon steel tubes for boiler and heat exchanger)

(18) KS D 3564 (Carbon steel pipes for high pressure service)

(19) KS D 3569 (Carbon steel pipes for low temperature service)

(20) SPS-KOSA0013-D3570-5078 (Carbon steel pipes for high temperature service)* <Revised on January 8, 2016>

(21) SPS-KOSA0014-D3571-5079 (Steel heat exchanger tubes for low temperature service)* <Revised on January 8, 2016>

(22) KS D 3572 (Alloy steel for boiler and heat exchanger tubes)

(23) SPS-KOSA0015-D3573-5080 (Alloy steel pipes)* <Revised on January 8, 2016>

(24) KS D 3576 (Stainless steel pipes)

(25) KS D 3577 (Stainless steel for boiler and heat exchanger tubes)

(26) KS D 3583 (Arc welded carbon steel pipes)

(27) KS D 3586 (Nickel steel plates for pressure vessels for low temperature service)

(28) SPS-KOSA0017-D3587-5082 (Steel tubes for fired heaters)* <Revised on January 8, 2016>

(29) KS D 3588 (Large diameter welded stainless steel pipes)

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* Alternative standard in accordance with the policy of national standard transfer to group

standard of Korea Agency for Technology and Standards (KATS)

(30) KS D 3693 (Stainless-clad steels)

(31) KS D 3698 (Cold press)

(32) KS D 3705 (Hot rolled stainless steel plates, sheets and strip)

(33) KS D 3706 (Stainless steel bars)

(34) KS D 3710 (Carbon steel forgings for general use)

(35) KS D 3731 (Heat resisting steel bars)

(36) KS D 3732 (Heat resisting steel plates and sheets)

(37) KS D 3752 (Carbon steels for machine structural use)

(38) KS D 3756 (Aluminum chromium molybdenum steels)

(39) KS D 3757 (Seamless nickel-chromium-iron alloy exchanger tubes)

(40) KS D 3758 (Seamless nickel-chromium-iron alloy pipes)

(41) KS D 3867 (Low-alloyed steels for machine structural use)

(42) SPS-KFCA-D4101-5004 (Carbon steel castings)* <Revised on January 8, 2016>

(43) SPS-KFCA-D4103-5006 (Stainless steel castings)* <Revised on January 8, 2016>

(44) SPS-KFCA-D4105-5008 (Heat resisting steel castings)* <Revised on January 8, 2016>

(45) SPS-KFCA-D4106-5009 (Steel castings for welded structure)* <Revised on January 8, 2016>

(46) SPS-KFCA-D4107-5010 (Steel castings for high temperature and high pressure services)* <Revised on January 8, 2016>

(47) SPS-KFCA-D4111-5012 (Steel castings for low temperature and high pressure services) SCPL1* <Revised on January 8, 2016>

(48) KS D 4115 (Stainless steel forgings for pressure vessels)

(49) KS D 4125 (Carbon and alloy steel forgings for pressure vessels for low temperature service)

(50) KS D 4301 (Grey iron castings)

(51) KS D 4302 (Spheroidal graphite iron castings)

(52) KS D 5101 (Copper and copper alloy rods and bars)

(53) KS D 5201 (Copper and copper alloy sheets, plates and strips)

(54) KS D 5301 (Copper and copper alloy seamless pipes and tubes)

(55) KS D 5539 (Nickel-copper alloy seamless pipes and tubes)

(56) KS D 5545 (Copper and copper alloy welded pipes and tubes)

(57) KS D 5546 (Nickel and nickel alloy sheet and strip)

(58) KS D 5574 (Titanium and titanium alloy seamless pipes)

(59) KS D 5575 (Titanium and titanium alloy tubes for heat exchangers)

(60) KS D 5604 (Titanium and titanium alloys – rods and bars)

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* Alternative standard in accordance with the policy of national standard transfer to group

standard of Korea Agency for Technology and Standards (KATS)

(61) SPS-KOSA0179-ISO5922-5244 (Malleable iron castings)* <Revised on January 8, 2016>

(62) KS D 6000 (Titanium and titanium alloys – sheets, plates and strips)

(63) KS D 6008 (Aluminum alloy castings)

(64) KS D 6024 (Copper and copper alloy castings)

(65) KS D 6701 (Aluminum and aluminum alloy sheets and plates, strips and coiled sheets)

(66) KS D 6713 (Aluminum and aluminum alloy welded pipes and tubes)

(67) KS D 6726 (Titanium and palladium alloy pipes and tubes for ordinary piping)

(68) KGS AC111 (Ductile iron castings) specified in Appendix J <Revised on August 7, 2015>

(69) KGS AC111 (Malleable iron castings) specified in Appendix J <Revised on August 7, 2015>

(70) KS D 6759 (Aluminum and aluminum alloy extruded shapes)

(71) KS D 6761 (Aluminum and aluminum alloy seamless pipes and tubes)

(72) KS D 6763 (Aluminum and aluminum alloy bars and wires)

(73) SPS-KFCA-D6770-5022 (Aluminum and aluminum alloy forgings)* <Revised on January 8, 2016>

3.2.4 Standard materials shall be used within the temperature range specified in the relevant standard.

3.2.5 Materials conforming to foreign standards shall conform to (1) or (2) above or be accepted by the president of Korea Gas Safety Corporation to be equivalent to them.

(1) The American Society of Mechanical Engineers (hereinafter referred to as "ASME")

Ferrous or nonferrous metals specified in Tables 1A, 1B and 3 of Boiler and Valve Code, Section II, Part D and meeting the following conditions: <Revised on March 9, 2016>

(1-1) The allowable stress value of a material to be used shall be the allowable tensile stress value specified in the applicable table. If the design temperature is colder than -29℃, the allowable tensile stress value shall be the value specified in the minimum temperature column of the same table. However, if the design temperature is colder than 0 ℃ and there are specific requirements, the requirements shall be met.

(1-2) The materials shall not be the restricted-use materials specified in the relevant specification.

(2) Flange materials specified in the standards of American National Standards Institute (hereinafter referred to as "ANSI") shall conform to the specifications of American Society for Testing and Materials (hereinafter referred to as "ASTM") specified in Table 1A of ANSI B 16.5 (Pipe and Flanged Fittings). The materials shall not be restricted-use materials specified in ANSI B16.5, Table 1A, Note and ASME Section VIII, Division I, Appendix 2-2.

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* Alternative standard in accordance with the policy of national standard transfer to group

standard of Korea Agency for Technology and Standards (KATS)

(2) Flange materials specified in the standards of American National Standards Institute (hereinafter referred to as "ANSI") shall conform to the specifications of American Society for Testing and Materials (hereinafter referred to as "ASTM") specified in Table 1A of ANSI B 16.5 (Pipe and Flanged Fittings). The materials shall not be restricted-use materials specified in ANSI B16.5, Table 1A, Note and ASME Section VIII, Division I, Appendix 2-2.

3.2.6 Equivalent materials which have failed the impact test performed at the design temperature by the method specified in KGC AC 111(exclusive of austenitic stainless steel and non-ferrous metal), Appendix B shall not be used in valves to be used below 0 ¡É. <Revised on December 13, 2018>

3.2.7 Notwithstanding 3.2.3, the prohibited materials specified in Table 3.2.7 or the materials of which chemical composition and mechanical properties are similar to them shall not be used for pressure parts in valves or valve parts listed in Table 3.2.7.

Table 3.2.7 Materials Prohibited from Use <Revised on August 7, 2015 and June 2, 2017>

No.	Valves or Valve Parts	Prohibited Materials
1	Welds in valves	Carbon steel or low alloy steel of which carbon content is not less than 0.35%
2	○ Valves of which design pressure is over 3 MPa.	○ KS D 3515 (Rolled steels for welded structure)
3	○ All valves for toxic gases	○ KS D 3503 (Rolled steels for general structure) ○ SM400A, SM490A or SM490YA among materials coming under KS D 3515 (Rolled steels for welded structure) ○ KS D 3583 (Arc welded carbon steel pipes) ○ KS D 3507 (Carbon steel pipes for ordinary piping) ○ SPS-KFCA-D4302-5016 (Spheroidal graphite iron castings) ○ SPS-KOSA0179-ISO5922-5244 (Malleable iron castings) Black heart malleable castings ○ SPS-KOSA0179-ISO5922-5244 ((Malleable iron castings) Pearlitic malleable castings ○ SPS-KOSA0179-ISO5922-5244 (Malleable iron castings) White heart malleable castings
4	○ Valves for phosgene and hydrogen cyanide	○ Ductile iron castings specified in Appendix J

	○ Valves of which design temperature is less than -5℃ or over 350℃ and valves of which design pressure exceeds 1.8 MPa	of KGS AC111 ○ Malleable iron castings specified in Appendix J of KGS AC111

3.2.8 In the case of valves of which contents are liquefied gases or compressed gases including hydrogen, there is the danger of hydrogen attack at high temperature operating conditions and the materials shall be selected in accordance of the Recommended Practice 941 of American Petroleum Institute (API).

3.3 Thickness (currently not used)

3.4 Construction and Dimensions

Valves shall be of constructions and dimensions conforming to the following standards to secure the safety, convenience and exchangeability of the valves.

3.4.1 Construction <Revised on Nov 17, 2014>

3.4.1.1 Valves shall conform to KS standards or officially-accepted international standards by types.

3.4.1.2 O-rings and packing of valves, etc. shall be free of abnormalities such as abrasion, etc.

3.4.1.3 The opening direction of levers and handle wheels for opening and shutting the valves shall be counterclockwise. <Newly established on November 17, 2014>

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* Alternative standard in accordance with the policy of national standard transfer to group standard of Korea Agency for Technology and Standards (KATS)

3.4.1.4 The external surface of valves shall be smooth and free of any defects such as corrosion, cracks, wrinkles, flaws, forging defects, and slag inclusion, etc. detrimental to use. <Newly established on November 17, 2014>

3.4.1.5 A metal seat or a seat ring shall be threaded or welded in case of its attachment to the body of a valve, and shall not be loosened or separated in use. In case of a nonmetal seat, it shall

not be loosened in use as well. <Newly established on November 17, 2014>

3.4.1.6 Ball valve, cock <Newly established on November 17, 2014>

3.4.1.6.1 The body part with which the O-ring of a ball valve is contacted shall be smooth and shiny.

3.4.1.6.2 For the ball of a ball valve, the edge of holes in both ends shall not be rough.

3.4.1.6.3 The stem of a valve shall not be dislocated from the valve by disassembly of gland flange bolts or external parts of the valve with its internal part under pressure.

3.4.1.6.4 When the valve is fully open, the lever or the opening direction shall be parallel with the direction of gas passage.

3.4.1.7 Glove valve, gate valve <Newly established on November 17, 2014>

3.4.1.7.1 The bonnet and stem of a valve shall have a back seat. Valves using bellows, etc. in their stems and valves of which packing is not exchangeable may not have back seats.

3.4.1.8 Check valve <Newly established on November 17, 2014>

3.4.1.8.1 Check valves shall easily shut down in backflow.

3.4.2 Dimensions

Valves shall have dimensions in conformity to KS B 2304 (General Rules for Inspection of Valves) or officially-accepted international standards. However, distance between faces may not be limited for welded type valves. <Revised on November 17, 2014>

3.4.2.1 In case of a threaded type, valves shall conform to taper pipe threads. However, in case of valves to be connected to tubes, the valves shall conform to manufacturer's specification. <Newly established on November 17, 2014>

3.4.2.2 In case of a flanged type, valves shall conform to KS B 1511 (Basic Dimensions of Ferrous Material Pipe Flanges). <Newly established on November 17, 2014>

3.4.2.3 In case parts to be connected to piping are a welded type, the parts shall conform to KS B

1543 (Steel butt-welding pipe fittings) and KS B 1542 (Steel socket-welding pipe fittings). <Revised on January 16, 2019>

3.5 Fabrication (currently not used)

3.6 Welding (currently not used)

3.7 Heat treatment (currently not used)

3.8 Performance

The performance of a valve shall conform to the following provisions to secure its safety.

3.8.1 Product performance

3.8.1.1 Pressure-proof performance

Valves shall be free of abnormalities such as leakage when being pressurized at a hydrostatic pressure of 1.5 times their design pressure and pressure shall be held for no less than the time specified in table 3.8.1.1 with the valves half-open. However, volatile fluid such as kerosene which is less viscous than water and without corrosiveness may be used for cryogenic valves. <Revised on November 17, 2014 & Revised on June 2, 2017>

Table 3.8.1.1 Maintaining Time <Newly established on Nov 17, 2014>

Nominal Diameter	Pressure-proof Performance (Min)	High-pressure Seat Leak Performance Low-pressure Seat Leak Performance (Min)	Back Seat Leak Performance (Sec)
≦50A	1(1)	1(1)	15
65A - 150A	1(1)	1(1)	60
200A - 300A	2(1)	2(1)	60
≧350A	5(2)	2(2)	60

※ The time within parenthesis shall be applied for check valves

3.8.1.2 Gas tightness performance

3.8.1.2.1 High-pressure seat leak performance

Valves shall be free of abnormalities when being pressurized at a hydrostatic pressure of 1.5 times their design pressure and the pressure shall be held for no less than the time specified in Table 3.8.1.1 after the valves have been filled up with water and closed. In case of metal seats, a leakage shall follow Table 3.8.1.2.1. However, valves may be tested with air or nitrogen in case a water test is inappropriate. (For check valves, pressure shall be added in the direction that the seat is able to be closed. <Revised on November 17, 2014 & June 2, 2017>

Table 3.8.1.2.1 Leakage for Metal Seat <Newly established on November 17, 2014>

<table>
<tr><td rowspan="2">Nominal Diameter</td><td colspan="2">Leakage in Case of Hydrostatic Pressure Test (mL/min)</td><td colspan="2">Leakage in Case of Atmospheric Pressure Test (mL/min)</td></tr>
<tr><td>Other Than Check Valve</td><td>Check Valve</td><td>Other Than Check Valve</td><td>Check Valve</td></tr>
<tr><td>≦50 A</td><td>0</td><td rowspan="4">≦0.2mL×[nominal diameter(㎜)/25㎜] (0.2mL for the check valves of which nominal diameter is no more than 25mm)</td><td>0</td><td rowspan="4">≦50mL×[nominal diameter(㎜)/25㎜] (330mL when exceeding 330mL)</td></tr>
<tr><td>65A ~ 150A</td><td>0.75</td><td>1.5</td></tr>
<tr><td>200A ~ 300A</td><td>1.25</td><td>2.5</td></tr>
<tr><td>≧350A</td><td>1.75</td><td>3.5</td></tr>
</table>

3.8.1.2.2 Back seat leak performance

Glove and gate valves shall be free of leakage through stem parts when being pressurized at a hydrostatic pressure of 1.1 times their design pressure and the pressure shall be held for the time specified in Table 3.8.1.1 in a state that the grand nuts or yokes is open and the valves are open. However, the valves shall be tested with air or nitrogen in case a water test is inappropriate. <Revised on November 17, 2014 & June 2, 2017>

3.8.1.2.3 Low-pressure seat leak performance

There shall be no leakage from the outlet side of a valve when air or nitrogen is pressurized upon the inlet of the valve at a pressure of no more than (0.4 – 0.7) MPa, and the pressure is held for no less than the time specified in Table 3.8.1.1. However, the standards in Table 3.8.1.2.1 shall be followed in case the seat is metal. <Newly established on November 17, 2014>

3.8.1.2.4 Cryogenic valve gas tightness performance

The leakage shall be (100㎜³/s)×DN—no more than (200㎜³/s)×DN for a check valve—when the inlet of a valve is pressurized at an incremental pressure by stage in accordance with Table 3.8.1.2.4 up to the test pressure of high-pressure seat leak performance in a state that every parts of the valve body is at (-196~-192)℃ with the valve immersed in liquefied nitrogen of which temperature is -196℃. <Newly established on November 17, 2014>

Table 3.8.1.2.4 Gas Tightness Test Pressure in Accordance with Nominal Pressure

Nominal Pressure (PN)		The normal pressurized by stages (MPa)	Maintaining Time (Min)
PN	Class		
10	150	0.35	5
16	300	0.75	5
40	600	1.0	5
63	≧800	2.0	5

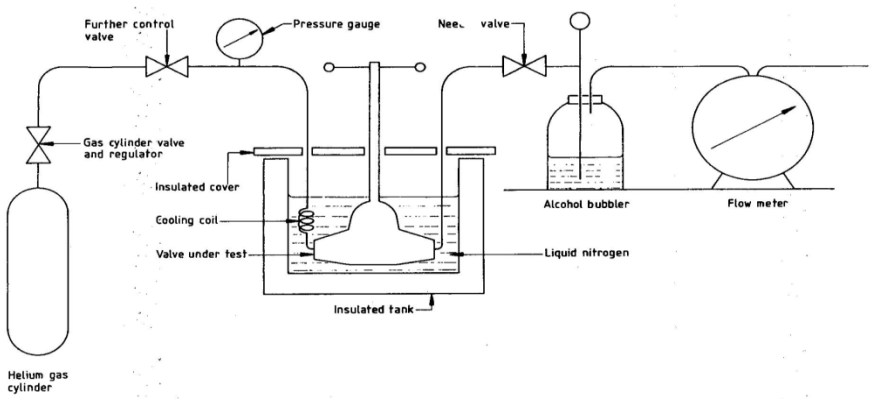


Figure 3.8.1.2.4 Cryogenic Valve Gas Tightness Test (Example)

3.8.1.2.5 Gas tightness performance after a cryogenic valve returns to ambient temperature

When the body of a valve returns to ambient temperature after the valve has been pulled out to ambient temperature and thawed in a natural state after a cryogenic gas tightness test, high-pressure and low-pressure seat leak performance tests in accordance with 3.8.1.2.1 and 3.8.1.2.3 shall be carried out and the test results shall conform to the standards. However, test medium for high-pressure seat leak performance tests shall be deemed as air. <Newly established on November 17, 2014>

3.8.2 Material performance

3.8.2.1 Welding performance

3.8.2.1.1 Valve welds shall be free of faults, cracks, undercut and strikes harmful to use. The reinforcement buildup height of a weld shall not be lower than the surface of the base metal.

3.8.2.1.2 The tensile strength of the valve butt-weld shall not be less than the minimum tensile strength of the base metal. <Revised on December 13, 2018>

3.8.2.1.3 The welds of valves shall be classified as class3 or better as a result of a radiographic testing in accordance with KS B 0845 (Methods of radiographic examination for welded joints in steel). In case the radiographic examination is difficult to be performed, magnetic particle testing in accordance with KS D 0213 (Method for magnetic particle testing of ferromagnetic materials and classification of magnetic particle indication) or liquid penetrant testing in accordance with KS B 0816 (Method for liquid penetrant testing and classification of the penetrant indication) shall be carried out, and the welds of valves shall conform to the followings <Revised on November 17, 2014>

(1) The surfaces shall be free of defect indications of cracks.

(2) This applies only to linear defect indications (insufficient fusion, slag inclusion and overlap; the same shall apply in 3.8.2.1.3), and the maximum length or diameter of rounded defect indication shall not be over 4 mm.

(3) In the case of many linear or rounded indications of which maximum length or diameter is not over 4 mm in a test range of which one side length is not over 150 mm maximum and area is 2500 mm^2 (hereinafter referred to as "scattered indications"), the total point depending on the types of indications and the maximum length or maximum diameter of indications shall not be over 12.

Table 3.8.2.1.3(3) Points of Scattered Indications

Defect Indications	Maximum length or maximum diameter is not over 2 mm	Maximum length or maximum diameter is over 2 mm to 4 mm inclusive.
Linear Defect Indication	3	6
Rounded Defect Indication	1	2

3.8.2.2 The body of a cast steel valve shall be classified as class3 or better as a result of a radiographic examination in accordance with KS D 0227 (Methods of radiographic examination for steel castings). <Revised on November 17, 2014>

3.8.2.3 Impact resistant performance <Newly established on November 17, 2014>

For cryogenic valves, three test specimens shall undergo impact tests in accordance with KS B 0810 or ASME Ⅷ Div1 Paragraphs UHA51, UG84 at a temperature of -196℃. The length of lateral expansion of each specimen shall be no less than 0.381mm, and the average of impact values shall be no less than 60J.

3.8.3 Functioning performance

The open-shut operation of valves shall be certain.

3.8.4 Other performances

Valves may apply to the inspection items and KS standards by types specified in KS B 2304 (General Rules for Inspection of Valves) in addition to the performances in 3.8.1 to 3.8.3. <Revised on Nov 17, 2014>

3.9 Marking

3.9.1 Product marking

The manufacturers or importers of valves shall die-stamp the following items in a conspicuous place of the valve or on a metal sheet and attach it in a conspicuous place in accordance with the Enforcement Regulation, Table 24, No.4.

(1) The Name or abbreviation of manufacturer
(2) Nominal diameter
(3) Manufacturing number or lot number
(4) Use (name of gas to be able to be used)
(5) Open-shut directions <Revised on May 20, 2013>
(6) Gas flow direction (outlet on the bonnet side, exclusive of a bidirectional valve) <Revised on May 20, 2013>
(7) Nominal pressure <Revised on May 20, 2013>

3.9.2 Acceptance marking

The valves which have passed inspections shall be die-stamped in the form of " " as shown in Figure 3.9.2. <Revised on May 15, 2009>

Size: 4 ㎜×7 ㎜ (valves of which inside diameter is over 25 mm)

Size: 3 ㎜×5 ㎜ (valves of which inside diameter is not over 25 mm)

Figure 3.9.2 Acceptance Marking

4. Inspection Standard

4.1 Kinds of Inspections

Valve inspections are classified into manufacturing facility inspection and product inspection.

4.1.1 Manufacturing facility inspection

The manufacturing facilities of a person who intends to manufacture valves shall undergo inspection when the installation or modification of the valve manufacturing facilities has been completed.

4.1.2 Product inspection

Product inspection for valves shall be performed in design stage inspection and production stage inspection to check whether the valves conform to the manufacturing technology standard and inspection standard conforming to this Code.

4.1.2.1 Design stage inspection

In case valves come under one of the following cases, design stage inspection shall be performed:

(1) The manufacturer manufactures valves of a certain type for the first time. <Revised on June 29, 2009>

(2) The importer imports valves of a certain type for the first time. <Revised on June 29, 2009>

(3) The construction, shape or material of major part which have undergone design stage inspection is changed. <Revised on June 29, 2009>

4.1.2.2 Production stage inspection

Valves which have passed design stage inspection shall undergo production stage inspection.

4.2 Object Audit of Process Inspection (not applicable)

4.3 Inspection Items

4.3.1 Manufacturing facility inspection

The inspection items of manufacturing facility inspection shall be as follows to check whether the manufacturer is furnished with manufacturing facilities and inspection facilities:

(1) Whether manufacturing facilities conforming to 2.1 are furnished, and

(2) Whether inspection facilities conforming to 2.2 are furnished.

4.3.2 Product inspection

The inspection items shall be as follows to check whether the valves are manufactured in conformity to the manufacturing technology standards:

4.3.2.1 Design stage inspection

The inspection items of design stage inspection shall be as follows to check whether the valves are manufactured in conformity to the manufacturing technology standards:

(1) Material inspection in accordance with 4.4.2.1(1)

(2) Construction and dimension inspection in accordance with 4.4.2.1(2)

(3) Performance inspection in accordance with 4.4.2.1(3)

(4) Marking inspection in accordance with 4.4.2.1(4)

4.3.2.2 Production stage inspection

The inspection items of production stage inspection shall be as follows to check whether the valves conform to the manufacturing standards:

(1) Material inspection in accordance with 4.4.2.2(2-1)

(2) Construction and dimension inspection in accordance with 4.4.2.2(2-2)

(3) Performance inspection in accordance with 4.4.2.2(2-3)

(4) Marking inspection in accordance with 4.4.2.2(2-4)

4.4 Inspection Method

4.4.1 Manufacturing facility inspection

Whether manufacturing facilities conforming to 2.1 and inspection facilities conforming to 2.2 are

fully furnished is checked on. In case all required facilities are fully furnished, the inspection results shall be deemed acceptable.

4.4.2 Product inspection

4.4.2.1 Design stage inspection

The method of design stage inspection to judge whether each inspection item of valves conform to the manufacturing technology standard shall be as follows:

(1) Material inspection

Material inspection shall be performed to check whether appropriate materials are used in accordance with 3.2.

(2) Construction and dimension inspection

Construction and dimension inspection shall be performed to check whether the construction and dimension of valves conform to the standard in conformity to 3.4.

(3) Performance inspection

Product performance inspection and material performance inspection shall be performed in accordance with 3.8 to check whether there is any abnormality.

(4) Marking inspection

Product marking and acceptance marking shall be checked whether they are appropriately performed in accordance with 3.9.

(5) Judgment of acceptance or rejection

In case the valves conform to all the inspection requirements of (1) to (4), the valves shall be deemed acceptable.

4.4.2.2 Production stage inspection (product identification inspection)

The method of production stage inspection to judge whether each inspection item of valves conform to the manufacturing technology standard shall be as follows. The inspection of this case shall be performed within a range in which valves are not disassembled, broken or deformed.

(1) Sampling

Product inspection shall be performed with test specimens randomly taken from the lot of which the products are manufactured in the same production unit at the same production plant on the same day and of which number of products is determined in Table 4.4.2.2(1).

Table 4.4.2.2(1) Number of Test Specimens for Number of Products forming One Lot

Number of Products Forming	10 and less	11 to 100 inclusive	101 to 300 inclusive	301 to 700 inclusive	701 and over

1 Lot					
Number of Test Specimens	All	10	15	20	25
[Remark] Notwithstanding number of test specimens in the above table, test specimens of welds for nondestructive test may be not less than two specimens.					

(2) Inspection methods <Revised on May 15, 2009>

(2-1) Material inspection

Material inspection shall be performed to check whether the valve materials conform to 3.2.

(2-2) Construction and dimension inspection

Construction and dimension inspection shall be performed to check whether the valves conform to 3.4..

(2-3) Performance inspection

Performance inspection shall be performed in accordance with 3.8 to check whether there is any abnormality.

(2-4) Marking inspection

Product marking and acceptance marking shall be checked whether they are appropriately performed in accordance with 3.9.

(3) Judgment of acceptance or rejection

(3-1) In case the valves conform to all the inspection requirements of (2), the valves shall be deemed acceptable.

(3-2) In case the product inspection results conform to the requirements, all the products belonging to the lot shall be deemed acceptable. In case the product inspection results do not conform to the requirements, all the products belonging to the lot shall be deemed rejected.

4.5 Other Inspection Standards

4.5.1 Inspection of imported goods (currently not used)

4.5.2 Partial exception from inspection <Revised on April 5, 2011>

4.5.2.1 Products registered for manufacturing such as foreign cylinders

In case the acceptance evidence documents (however, inspection reports by manufacturers in accordance with registration standards may substitute the acceptance evidence documents in case the valves are manufactured by API, ANSI, JIS and ASME.) issued by the authorized inspection agencies in accordance with Table 1.3.1.2 are submitted for valves manufactured by persons who have registered

for manufacturing foreign cylinders in accordance with the Act, Article 5-2, Clause 1, the following inspection items may be omitted in accordance with the Enforcement Regulation, Article 38, Clause 4 No. 1: <Revised on May 20, 2013, December 10, 2015, December 13, 2018>

(1) Material inspection,
(2) Non-destructive inspection,
(3) Durability performance inspection,
(4) Pressure-proof performance inspection, <Revised on July 11, 2016>
(5) Gas tightness performance inspection. <Revised on July 11, 2016>

4.5.3 Disposal of rejected products

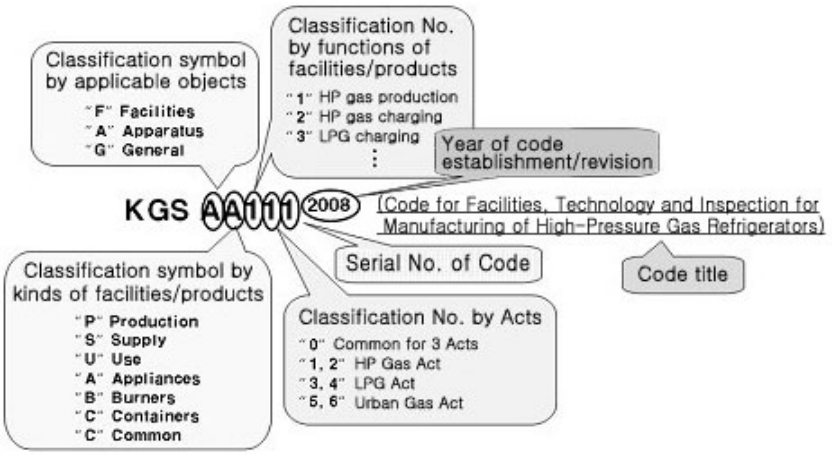
Valves rejected in accordance with the Enforcement Regulation, Table 23, No.1 shall be disposed as follows:

4.5.3.1 Rejected valves shall be disposed by cutting them in such a manner as not to be restored to their original forms.

4.5.3.2 The valve manufacturer shall dispose rejected valves in the inspection place in the presence of the inspector.

Symbol and Serial Number System of KGS Codes

Korea Gas Safety Codes (KGS Codes) are the codes of detailed standards for technical matters such as facilities, technology and inspection stipulated in gas-related laws and regulations and are the technical standards in gas safety areas deliberated and resolved to be adopted by the gas technical standards committee, and approved by the Ministry of Knowledge Economy.



Classification		Symbol	Facility
Apparatus **(A)**	**A**ppliances **(A)**	AA1xx	Refrigerators
		AA2xx	Piping
		AA3xx	Valves
		AA4xx	Pressure regulators
		AA5xx	Hoses
		AA6xx	Alarm & shutoff devices
		AA9xx	Other appliances
	Burners **(B)**	AB1xx	Boilers
		AB2xx	Heaters
		AB3xx	Ranges
		AB9xx	Other burners
	Containers **(C)**	AC1xx	Tanks
		AC2xx	Cylinders
		AC3xx	Cans
		AC4xx	Composite containers
		AC9xx	Other containers

Classification		Symbol	Facility
Facilities **(F)**	**P**roduction **(P)**	FP1xx	High-pressure gas manufacturing facilities
		FP2xx	High-pressure gas filling facilities
		FP3xx	LP gas filling facilities
		FP4xx	City gas wholesales manufacturing facilities
		FP5xx	City gas general manufacturing facilities
	Supply **(S)**	FS1xx	High-pressure gas sales facilities
		FS2xx	LP gas sales facilities
		FS3xx	LP gas complex supply facilities
		FS4xx	City gas wholesales supply facilities
		FS5xx	City gas general supply facilities
	Use **(U)**	FU1xx	High-pressure gas storage facilities
		FU2xx	High-pressure gas burning facilities
		FU3xx	LP gas storage facilities
		FU4xx	LP gas burning facilities
		FU5xx	City gas burning facilities
General **(G)**	**C**ommon **(C)**	GC1xx	Basic matters
		GC2xx	Common matters

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