

Code for Facilities, Technology and Inspection for Manufacturing of Shut-off Devices for Gas Leakage

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[illegible]

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Code for Facilities, Technology and Inspection for Manufacturing of Automatic Shut-off Devices for Gas Leakage

1. General

1.1 Scope

This Code applies to the facilities, technology and inspection for manufacturing of automatic shut-off devices for LP gas or city gas (hereinafter referred to as "automatic shut-off devices") among gas leak automatic shut-off devices in conformity to the Enforcement Regulation of the Safety Control and Business of Liquefied Petroleum Gas Act (hereinafter referred to as "Enforcement Regulation"), Table 3, No.2 and Table 7, No.4, b. <Revised on December 10, 2015>

1.2 Validity of Code

1.2.1 This Code has passed the deliberation and resolution by Gas Technical Standards Committee (Bill No. 2018-9, November 23, 2018) in conformity to the High-pressure Gas Safety Control Act (hereinafter referred to as "High-pressure Act"), Article 33-2 in accordance with the Safety Control and Business of Liquefied Petroleum Gas Act (hereinafter referred to as "the Act"), Article 45, Clause 1, has been approved by the Minister of Trade, Industry & Energy (Notification No. 2018-607 of the Ministry of Trade, Industry & Energy, December 13, 2018), and is valid and effective as the detailed standards in conformity to the Act, Article 45, Clause 1.

1.2.2 Conformity to this Code is deemed to conform to Table 7 of the Enforcement Regulation in accordance with the Act, Article 45, Clause 4. <Revised on December 10, 2015>

1.3 Reference Codes and Standards

1.3.1 Inspection standard for new technology products

In case the Minister of Trade, Industry & Energy acknowledges that new manufacturing and inspection methods of automatic shut-off devices developed through technology development do not conform to the standards for facilities, technology and inspection in conformity to this Code

but do not hinder safety control in accordance with the Enforcement Regulation, Table 7, No. 5-a, such manufacturing and inspection methods of automatic shut-off devices may be restrictively applicable only to the automatic shut-off devices. <Revised on May 15, 2009, September 29, 2017>

1.3.2 Manufacturing registration standard for foreign products <Newly established on August, 13, 2012>

The "foreign manufacturing installation standards and manufacturing technology standards" specified in the Enforcement Regulation, Article 17, proviso of Clause 3 mean the detailed standards specified in the Act, Article 45. <Revised on December 10, 2015>

1.4 Definitions

The terms used in this Code are defined as follows:

1.4.1 "Regular quality inspection" means the performance inspection performed by taking samples from products manufactured in mass production to check whether the products which are to undergo production stage inspection are the same products manufactured as the products which have undergone design stage inspection.

1.4.2 "Routine sample inspection" means the inspection performed to check on the basic product performance by taking samples from the same products manufactured in the same production lot for the products to undergo product identification inspection.

1.4.3 "Occasional quality inspection" means the inspection performed by taking samples without any advance notice from products produced in mass production in order to check whether the products which have undergone production process inspection or comprehensive process inspection are being manufactured in the same way as the products which have undergone design stage inspection.

1.4.4 "Process identification audit" means the audit conducted to check on the conformity of quality system operation to the manufacturing and self-inspection processes required for manufacturing the products which have undergone design stage inspection.

1.4.5 "Comprehensive quality control system audit" means the audit conducted to check on the conformity of quality system operation for the whole automatic shut-off device manufacturing processes such as design, manufacturing and self-inspection.

1.4.6 "Type" means the unit of products distinguishable in their construction, material, capacity and performance.

1.4.7 "Process inspection" means production process inspection and comprehensive process inspection.

1.4.8 "Excess flow cut-off performance" means the performance which automatically cuts off gas flow when the gas passes through at a flow rate higher than the specified flow rate.

1.4.9 "Leakage check performance" means the performance which checks whether gas leaks.

2. Manufacturing Installation Standard

2.1 Manufacturing Facilities

A person who intends to manufacture automatic shut-off devices shall be furnished with manufacturing facilities in conformity to the following standard to manufacture the automatic shut-off devices in accordance with this manufacturing standard. However, In case the licensing authority acknowledges that it is necessary to utilize the manufacturing facilities of specialist parts companies or use the parts manufactured by them for quality improvement, their manufacturing facilities may be utilized or their products may be used.

- (1) Drilling machines, outside diameter machining facilities, inside diameter machining facilities, threading machines, 10-ton or more powerful presses and other fabrication facilities necessary for manufacturing,
- (2) Surface treatment facilities and painting facilities, and
- (3) Ultrasonic cleaning facilities.

2.2 Inspection Facilities

2.2.1 A person who intends to manufacture automatic shut-off devices shall be furnished with inspection facilities in conformity to the following standard to check and maintain the product performance.

2.2.1.1 In order to be able to perform self inspection in conformity to the safety control regulation, the kinds of inspection facilities shall be as follows:

2.2.1.1.1 Kinds of inspection facilities that must be furnished

- (1) Dimension measuring devices such as vernier calipers, micrometers, thread gages, etc.,
- (2) LPG or city gas immersion test facilities,
- (3) Durability test facilities, and
- (4) Insulation resistance testers and withstand voltage testers.

2.2.1.1.2 Kinds of inspection facilities to be furnished when necessary

- (1) Salt water spray test facilities,
- (2) Pressure-proof test facilities,
- (3) Gas tightness test facilities,
- (4) Outlet pressure measuring test facilities,
- (5) Flow meters,
- (6) Excess flow cut-off and leakage check performance test facilities, and
- (7) Other necessary facilities and appliances.

2.2.1.2 The capacity of inspection facilities shall match the product production capacity of the relevant manufacturing plant.

2.2.2 Notwithstanding 2.2.1, in case the test and inspection of design stage inspection items are ordered to one of the following authorized agencies to be performed or a lease contract for test and inspection facilities required for design stage inspection items is awarded to one of the following authorized agencies, the relevant test and inspection facilities among the inspection facilities in 2.2.1 shall be deemed to have been furnished.

- (1) Korea Gas Safety Corporation in conformity to the High-pressure Act, Article 28 (hereinafter referred to as "Korea Gas Safety Corporation")
- (2) Test and inspection agencies designated in accordance the High-pressure Act, Article 35 (hereinafter referred to as "test and inspection agencies")
- (3) Relevant authorized test and inspection agencies designated in accordance with the Framework Act on National Standards

3. Manufacturing Technology Standard

3.1 Design (currently not used)

3.2 Materials

The materials of automatic shut-off devices shall conform to the following standard to secure their safety:

3.2.1 The material of the high-pressure part body shall be forging brass bars in conformity to KS D 5101 (Copper and Copper Alloy Rods and Bars).

3.2.2 The material of the low-pressure part body shall be a material in conformity to KS D 6005 (Zinc Alloy Die Castings) or KS D6006 (Aluminum Alloy Die Castings). Materials for other parts shall be corrosion-resistant materials or materials of which surface is treated for corrosion protection.

3.2.3 The material of springs shall be a material in conformity to KS D 3556 (Piano Wires) or KS D 3510 (Hard Drawn Steel Wires) of which surface is treated for corrosion protection or a corrosion-resistant material.

3.3 Thickness (currently not used)

3.4 Construction and Dimensions

An automatic shut-off device shall be of a construction and dimensions in conformity to the following standard to secure their safety, serviceability and exchangeability:

3.4.1 An automatic shut-off device shall be of a construction incorporated with excess flow cut-off performance and leakage check performance.

3.4.2 An automatic shut-off device shall be of a construction which can be reset after excess flow has been cut off and is safe for its use.

3.4.3 The appearance of an automatic shut-off device shall be finished smooth and be free of corrosion, cracks or wrinkles detrimental to the service.

3.4.4 The threads of the handle connected to a cylinder valve shall be left-hand threads, W22.5 x 14T, the threaded length shall not be less than 12 mm and the handle diameter shall not be less than 50 mm.

3.4.5 The threads for piping connection shall conform to KS B 0222 (Taper Pipe Threads) and the size of the hose connector shall conform to KS B 6029 (Gas Valves).

3.5 Fabrication (currently not used)

3.6 Welding (not applicable)

3.7 Heat treatment (not applicable)

3.8 Performances

Automatic shut-off devices shall have performances in conformity to the following standard to secure their safety and serviceability:

3.8.1 Product performance

3.8.1.1 Pressure-proof performance

An automatic shut-off device shall be free of any abnormality when pressure-proof test is performed at a pressure not less than 3 MPa for the high-pressure part and at a pressure not less than 0.3 MPa for the low-pressure part.

3.8.1.2 Gas tightness test

An automatic shut-off device shall be free of any leakage when gas tightness test is performed at a pressure not less than 1.8 MPa for the high-pressure part and at a pressure of 8.4 kPa to 10 kPa inclusive for the low-pressure part.

3.8.1.3 Durability performance

An automatic shut-off device electrically opened and shut shall be free of any abnormality in their gas tightness performance, excess flow cut-off performance and leakage check performance after 6,000 cycles of open-and-shut operation.

3.8.1.4 Vibration resistance performance

The controller and shut-off device shall be free of any abnormality in their operating test and gas tightness test after undergoing a vibration test performed at a rate of 600 cycle/min, with an amplitude of 5 mm and in three directions of up-and-down, back-and-forth and right-and-left for 20 minutes respectively.

3.8.1.5 Insulation resistance performance

The insulation resistance between the charged part and uncharged part of an automatic shut-off device electrically opened and shut shall not be less than 1 MΩ.

3.8.1.6 Withstand voltage performance

An automatic shut-off device electrically opened and shut shall be free of any abnormality when impressed with a voltage of 500 V for one minute.

3.8.1.7 Heat resistance performance

The controller shall be free of any abnormality in its operating test performed within 10 minutes after being left alone at a temperature of 40 °C and a relative humidity not less than 90 % for no less than one hour.

3.8.2 Material performance

3.8.2.1 Gas resistance performance

The rubber or synthetic resin parts such as diaphragms, valve seats, O rings and parts in contact with gas shall be left in liquefied petroleum gas at -20 °C, in liquefied petroleum gas at 40 °C and in air at -25 °C for 24 hours respectively and there shall not be any abnormality.

3.8.3 Operating performance

3.8.3.1 Excess flow cut-off performance

The excess flow cut-off device shall be capable of cutting off the excess flow within 1.1 times as much as the indicated flow rate when connected to the test facility. When the valve at the outlet side of the gas meter is fully opened at once for 10 times, the leakage of every time shall not be

over 200 mL.

3.8.3.2 Leakage check performance

When the shut-off device is connected to the test facility and is shut off and the valve on the outlet side of the gas meter is opened to discharge gas in an amount not over 10 mL, whether there is any leakage shall be able to be known.

3.8.3.3. Other performances

Performances other than excess flow cut-off performance and leakage check performance shall be tested 10 times or more for each performance in accordance with the test condition proposed by the manufacturer and shall be free of any abnormality.

3.9 Marking

An automatic shut-off device shall be marked in accordance with the following standard for its safe use:

3.9.1 Product marking

Items to be marked on an automatic shut-off device are as follows:

- (1) Name or symbol of manufacturer,
- (2) Maximum working pressure,
- (3) Flow rate
- (4) Gas flow direction,
- (5) Manufacturing number or lot number
- (6) date of manufacturing <Revised on December 13, 2018>
- (7) Warrantee period, and
- (8) Use.

3.9.2 Acceptance marking

An automatic shut-off device shall be marked with an acceptance mark as follows to be easily identified as an automatic shut-off device accepted in the inspection in conformity to the Act, Article 39, Clause 2 <Revised on December 10, 2015>:

3.9.2.1 The acceptance mark shall be as shown in Figure 3.9.2.1.



Figure 3.9.2.1 Acceptance Mark <Revised on November 17, 2014>

3.9.2.1.1 The size of the acceptance mark shall be 15 mm (width) by 15 mm (height).

3.9.2.1.2 The colors of the acceptance mark shall be silver white on its background and black in its letters.

3.9.2.2 In case the automatic shut-off devices are manufactured by a continuous production process, the acceptance marks may be marked in their production process.

4. Inspection Standard

4.1 Kinds of Inspections

Gas appliance inspections are classified into manufacturing installation inspection and product inspection.

4.1.1 Manufacturing installation inspection

A person who intends to manufacture automatic shut-off devices in accordance with the Act, Article 36, Clause 2 shall undergo manufacturing installation inspection when the installation or modification of the automatic shut-off device manufacturing installation has been completed.
<Revised on December 10, 2015>

4.1.2 Product inspection

A person who manufactures or imports automatic shut-off devices in accordance with the Act, Article 39, Clause 1 shall undergo the following inspections in accordance with the followings to check and maintain their performances. However, in the case of gas appliances specified by the Enforcement Decree of the Act, the inspections may be omitted in whole or in part. <Revised on December 10, 2015>

4.1.2.1 Design stage inspection

In case a product comes under one of the following cases in accordance with the Enforcement Regulation, Table 7, the product shall undergo design stage inspection. However, in case the test

report certified by Korea Gas Safety Corporation or an authorized test and inspection agency is submitted, the design stage inspection of that part may be exempted.

- (1) A gas appliance manufacturer manufactures products of a specific type for the first time.
- (2) A gas appliance importer imports products of a specific type for the first time.
- (3) The material or construction of a product of which type has undergone design stage inspection is changed and the performance (inclusive of the classification of the outlet pressure range) of the product is changed.
- (4) The type of a product has undergone design stage inspection but five years have elapsed from the date of its last design stage inspection.

4.1.2.2 Production stage inspection

An automatic shut-off device of which type has passed design stage inspection in accordance with the Enforcement Regulation, Table 7 shall undergo production stage inspection in accordance with the following provisions. In this case, one of product identification inspection, production process inspection or comprehensive process inspection in conformity to Table 4.1.2.2 may be selected as the production stage inspection and be performed depending on self inspection capability and quality control capability.

Table 4.1.2.2 Kinds, Units and Intervals of Production Stage Inspections

Kind of Inspection	Object	Composition Item	Inspection Unit	Interval
Product Identification Inspection	Items other than the objects of production process inspection or comprehensive process inspection	Regular quality inspection	Type	Once every two months
		Routine sample inspection	Type	At every application
Production Process Inspection	Items satisfying the conformity requirements of quality system for production process/self inspection process	Regular quality inspection	Type	Once every three months
		Process identification audit	Item	Once every three months
		Occasional quality inspection	Representative type	Twice a year or more often
Comprehensive Process Inspection	Items satisfying the conformity requirements of quality system for total process (design, manufacturing and self inspection)	Comprehensive quality control system audit	Item	Once every six months
		Occasional quality inspection	Representative type	Once a year or more often

4.1.2.2.1 Product identification inspection shall be performed as follows:

- (1) Product identification inspections are classified into regular quality inspection and routine sample inspection and each inspection shall be separately performed. In this case, routine sample

inspection is performed when the product has passed regular quality inspection.

(2) Products of which type has passed the inspection in accordance with (1) above shall undergo regular quality inspection once every two months. However, regular quality inspection is omitted for the products of the same type of which manufactured or imported quantity does not exceed 20 units a month.

(3) Routine sample inspection shall be performed for the type of products in accordance with (1) whenever the inspection application is made.

4.1.2.2.2 Production process inspection shall be performed as follows:

(1) Production process inspections shall be classified into regular quality inspection, process identification audit and occasional quality inspection, and each inspection or audit shall be separately performed.

(2) The process identification audit of the products of which audit is applied for shall be conducted when the applicant has the implementation experience not less than three months of the quality system appropriately documented in accordance with Appendix A.

(3) Occasional quality inspection shall be performed twice a year or more often without prior notice on the product items which have undergone regular quality inspection and process identification audit.

(4) Occasional quality inspection shall be performed for one representative type of products by the same method as that of regular quality inspection.

(5) A person who has undergone production process inspection may apply for product identification inspection as required.

4.1.2.2.3 Comprehensive process inspection shall be performed as follows:

(1) Comprehensive process inspections shall be classified into comprehensive quality control system audit and occasional quality inspection, and each audit or inspection shall be separately performed.

(2) The comprehensive quality control system audit of the products of which audit is applied for shall be performed when the applicant has the implementation experience not less than three months of the quality system appropriately documented in accordance with Appendix A.

(3) Occasional quality inspection shall be performed once a year or more often without prior notice on the products which have undergone comprehensive quality control system audit.

(4) Occasional quality inspection shall be performed for one representative type of products by the same method as that of regular quality inspection.

(5) A person who has undergone comprehensive process inspection may apply for product identification inspection as required.

4.2 Object Audit of Process Inspection

4.2.1 Application for audit

A gas appliance manufacturer who has a gas appliance manufacturing experience not less than three months in accordance with Appendix A may apply for production process inspection or comprehensive process inspection.

4.2.2 Audit method

The audit shall be conducted for the persons who are to undergo process inspection, who have failed process inspection or who apply for process re-inspection in conformity to 4.4.2.2.2(5).

4.2.2.1 Audit on new or failed business places or business places applying for re-inspection

The audit standard for process identification audit or comprehensive quality control system audit shall conform to Appendix A for those who apply for process inspection, those who have failed process inspection or those who apply for process re-inspection in conformity to 4.4.2.2.2(5) (hereinafter referred to as "process inspection applicants").

4.2.2.2 Regular audits

In the case of process identification audit performed once every three months and comprehensive quality control system audit performed once every six months, the maintenance states of the quality system specified in Appendix A such as changes, process management, self inspection and use of acceptance marks within the interval are audited. The audit for production process inspection or comprehensive process inspection is performed as follows:

4.2.2.2.1 Comprehensive process inspections shall be classified into comprehensive quality control system audit and occasional quality inspection, and each audit or inspection shall be separately performed.

4.2.2.2.2 The comprehensive quality control system audit of the products of which audit is applied for shall be performed when the applicant has an implementation experience not less than three months of the quality system appropriately documented in accordance with Appendix A.

4.2.2.2.3 Occasional quality inspection shall be performed once a year or more often without prior notice on the products which have undergone comprehensive quality control system audit.

4.2.2.2.4 Occasional quality inspection shall be performed on the type of one representative item

among the items by the method the same as that of regular quality inspection.

4.2.2.2.5 A person who has undergone comprehensive process inspection may apply for product identification inspection as required.

4.2.3 Adjudication committee

Korea Gas Safety Corporation shall establish an adjudication committee as follows to deliberate the matters related to the judgment of acceptance or rejection of the results of production process inspection and comprehensive process inspection.

4.2.3.1 The adjudication committee shall be comprised of no more than five members including one chairperson.

4.2.3.2 The members of the committee shall be commissioned by the president of Korea Gas Safety Corporation from among persons who have extensive knowledge and experience in gas safety or quality control and persons who can represent consumers' right to secure open and aboveboard deliberation.

4.2.3.3 Necessary matters concerning the operation of the committee shall be prescribed by the president of Korea Gas Safety Corporation.

4.3 Inspection Items

4.3.1 Manufacturing installation inspection

The manufacturing installation inspection of automatic shut-off devices shall be performed on the following items in accordance with the Enforcement Regulation, Table 7 to check whether manufacturing facilities and inspection facilities are fully furnished:

- (1) Conformity of manufacturing facilities in accordance with 2.1, and
- (2) Conformity of inspection facilities in accordance with 2.2.

4.3.2 Product inspection

Inspection of automatic shut-off devices shall be classified into design stage inspection and production stage inspection, and each inspection shall be separately performed in accordance with the Enforcement Regulation, Table 7 to check whether the automatic shut-off devices are manufactured in accordance with the manufacturing standard:

4.3.2.1 Design stage inspection

The inspection items of design stage inspection to check whether the automatic shut-off devices conform to the manufacturing standard are as follows. However, in case the test report on a part of which performance is certified by Korea Gas Safety Corporation or an authorized test and inspection agency is submitted, the design stage inspection of that part may be exempted.

- (1) Conformity of materials in accordance with 3.2
- (2) Conformity of construction and dimensions in accordance with 3.4
- (3) Conformity of performances in accordance with 3.8
- (4) Conformity of marking in accordance with 3.9

4.3.2.2 Production stage inspection

The inspection items of production stage inspection by inspection kinds to check whether the automatic shut-off devices conform to the manufacturing standard are as follows.

4.3.2.2.1 Product identification inspection

(1) Regular quality inspection

- (1-1) Conformity of construction and dimensions in accordance with 3.4
- (1-2) Conformity of gas tightness performance in accordance with 3.8.1.2
- (1-3) Conformity of excess flow cut-off performance in accordance with 3.8.3.1
- (1-4) Conformity of leakage check performance in accordance with 3.8.3.2

(2) Routine sample inspection

- (2-1) Conformity of construction in accordance with 3.4
- (2-2) Conformity of gas tightness performance in accordance with 3.8.1.2
- (2-3) Conformity of marking in accordance with 3.9

4.3.2.2.2 Production process inspection

(1) Regular quality inspection

The inspection items of regular quality inspection shall conform to 4.3.2.2.1(1).

(2) Process identification audit

The audit items of process identification audit shall conform to Table 4.3.2.2.

(3) Occasional quality inspection

The inspection items of occasional quality inspection shall conform to 4.3.2.2.1(1).

4.3.2.2.3 Comprehensive process inspection

(1) Comprehensive quality control system audit

The audit items of comprehensive quality control system audit shall conform to Table 4.3.2.2.

(2) Occasional quality inspection

The inspection items of occasional quality inspection shall conform to 4.3.2.2.1(1).

Table 4.3.2.2 Items of Process Identification Audit and Comprehensive Quality Control System Audit

<Revised on December 10, 2015>

Classification		Audit Item	Application	
			Process Identification Audit	Comprehensive Quality Control System Audit
General	Organization	Securement of organizations with appropriate technical and business capability	○	○
		Possession of a research or development organization to reflect the causes of potential troubles to product design		○
	Quality System	Operation of appropriate quality system and review of operation results	○	○
	Human Resource	Maintenance of appropriate qualification of employees affecting quality	○	○
	Facility & Equipment	Securement of facilities and equipment in conformity to product requirements and quality control	○	○
Design	Design & Development	Securement of design and development system in conformity to product requirements		○
		Verification of product design through analysis of the effects of potential troubles and assessment of reliability, and results of output supply		○
		Check on feasibility of design and development and operation of change procedure		○
Manufacturing	Purchase	Maintenance of appropriate management system for purchased materials	○	○
		Reflection of evaluation of suppliers to purchase policy		○
	Production	Possession of production process in conformity to product requirements and verification of implementation	○	○
		Possession of acceptance criteria for process approval	○	○
		Verification of process management capability by means of statistical technique		○
		Operation of control plan and work guidelines		○
		Preventive and forecast maintenance and operation of production tool management system		○
		Operation of systems for handling and storage of materials and products	○	○
Self-Inspection	Inspection Method & Procedure	Maintenance of methods and procedures for inspection to secure product conformity	○	○
		Maintenance of the acceptance criteria for tally data sampling at zero defect level		○
		Maintenance of traceability for determination	○	○

		of measuring devices and guarantee of effective results, and maintenance of procedure for record management		
		Analysis of measurement system		○
		Self inspection of the whole items of design stage inspection (once a year)	○	
		Self inspection of the whole items of design stage inspection (twice a year)		○
	Correction & Preventive Measures	Management of unconformity items and operation of preventive measures for recurrence prevention	○	○
	Internal Audit	Possession of capability to maintain system conformity	○	○
Obligation	Acceptance Marking	Maintenance of documented management regulation for acceptance marking	○	○
		Maintenance of separate documented regulation for manufacturing acceptance marks		○
	Safety Control	Prevention of accidents due to faulty products and circulation of unconformity products	○	○
Others		Other matters related to maintenance of safety	○	○

4.4 Inspection Method

4.4.1 Manufacturing installation inspection

Inspection on manufacturing facilities checks whether manufacturing facilities and inspection facilities in conformity to 4.3.1 are fully furnished. 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 inspection method of design stage inspection shall conform to the standard established by the president of Korea Gas Safety Corporation to clearly judge whether each inspection item conforms to the manufacturing standard.

4.4.2.2 Production stage inspection

The inspection method of production stage inspection shall conform to the followings for each inspection item to clearly judge whether each item is manufactured in accordance with the manufacturing standard.

4.4.2.2.1 Product identification inspection

(1) Sampling

(1-1) The number of test specimens for regular quality inspection shall be two.

(1-2) The sampling standard for routine sample inspection shall be as follows:

(1-2-1) The same products manufactured in the same production unit shall form one lot.

(1-2-2) The number of test specimens to be taken from the lot formed in accordance with (1-2-1) shall conform to Table 4.4.2.2.1(1).

Table 4.4.2.2.1(1) Number of Test Specimens for Routine Sample Inspection

Number of Products Forming 1 Lot	10 and less	11 to 100 inclusive	101 to 300 inclusive	301 to 700 inclusive	701 to 3000 inclusive	3001 and over
Number of Test Specimens	All	10 or over	15 or over	20 or over	25 or over	1/100 of the quantity applied for inspection

(2) Judgment on acceptance or rejection

(2-1) Product identification inspection shall be performed by performing both of regular quality inspection and routine sample inspection, and the products which have passed both inspections shall be deemed acceptable.

(2-2) Routine sample inspection shall be performed on sampled test specimens. All the products in the lot which has passed the inspection shall be deemed acceptable, and all the products in the lot which has failed the inspection shall be deemed rejected.

4.4.2.2.2 Process inspection**(1) Sampling**

The number of test specimens shall be two for the regular quality inspection and occasional quality inspection of production process inspection and comprehensive process inspection.

(2) Judgment on acceptance or rejection**(2-1) Judgment on acceptance or rejection for process inspection applicants**

Judgment on acceptance or rejection for production process inspection or comprehensive process inspection for process inspection applicants shall be as follows. In this case, previous inspection results shall be valid until the decision of the adjudication committee meeting.

(2-1-1) Korea Gas Safety Corporation shall prepare the report on the results of regular quality inspection and process identification audit or comprehensive quality control system audit and submit it to the adjudication committee.

(2-1-2) The adjudication committee shall deliberate the submitted report and determine its acceptance or rejection. In this case, if it is judged that part of quality system shall be complemented in accordance with the deliberation results, conditional acceptance may be

granted.

(2-1-3) In case a product has passed regular quality inspection by types and process identification audit for the item, the product shall be deemed to have passed production process inspection.

(2-1-4) In case a product has passed comprehensive quality control system audit, the product shall be deemed to have passed comprehensive process inspection.

(2-2) Judgment of acceptance or rejection on regular process inspection

Judgment of acceptance or rejection shall be made as follows on the production process inspection performed once every three months and the comprehensive process inspection performed once every six months:

(2-2-1) Korea Gas Safety Corporation shall perform regular quality inspection and process identification audit or comprehensive quality control system audit and determine the acceptance or rejection.

(2-2-2) In case a product has passed regular quality inspection by types and process identification audit for the item, the product shall be deemed to have passed production process inspection.

(2-2-3) In case a product has passed comprehensive quality control system audit, the product shall be deemed to have passed comprehensive process inspection.

(2-3) Judgment of acceptance or rejection on occasional quality inspection

Judgment of acceptance or rejection on occasional quality inspection shall be made by Korea Gas Safety Corporation by performing the inspection by the same method as that of regular quality inspection.

(3) Treatment of inspection results

(3-1) Treatment of inspection results of process inspection applicants

The results of the production process inspection or comprehensive process inspection of a process inspection applicant shall be treated as follows:

(3-1-1) In case the inspection results are accepted in their deliberation, Korea Gas Safety Corporation shall issue the acceptance notification to the applicant.

(3-1-2) In case the inspection results are conditionally accepted in their deliberation, the treatment shall conform to the followings:

(3-1-2-1) The applicant shall submit the complement results of the quality control system to Korea Gas Safety Corporation within one month.

(3-1-2-2) Korea Gas Safety Corporation shall review the submitted complement results, and accept the inspection results if it is confirmed that the complement has been completed.

(3-1-2-3) In case the applicant who has been conditionally accepted fails to submit the complement results within the time limit, Korea Gas Safety Corporation shall reject the inspection.

(3-1-3) In the case of rejection in deliberation, it shall be treated as follows:

(3-1-3-1) Korea Gas Safety Corporation shall notify the details of unconformity to the applicant and then perform product identification inspection.

(3-1-3-2) In case an applicant who has been notified the unconformity intends to undergo production process inspection or comprehensive process inspection, the applicant may apply for production process inspection or comprehensive process inspection after three months from the date of the unconformity notification issued by the adjudication committee.

(3-1-3-3) Applicants who have failed comprehensive process inspection may convert the inspection to production process inspection.

(3-2) Treatment of results of regular process inspection

Treatment of the results of the production process inspection performed once every three months and the comprehensive process inspection performed once every six months shall be as follows:

(3-2-1) In case the inspection results are accepted, Korea Gas Safety Corporation shall inform the applicant of the acceptance of production process inspection or comprehensive process inspection.

(3-2-2) In case the inspection results are rejected, Korea Gas Safety Corporation shall inform the applicant of the details of unconformity, withdraw the conformity notification and then perform product identification inspection.

(3-2-3) In case an applicant who has been notified the unconformity intends to undergo production process inspection or comprehensive process inspection, the applicant may apply for production process inspection or comprehensive process inspection after three months from the date of the unconformity notification issued by Korea Gas Safety Corporation.

(3-3) Treatment of results of occasional quality inspection

The results of quality inspections performed occasionally shall be treated as follows:

(3-3-1) In case a manufacturer or an importer fails occasional quality inspection, Korea Gas Safety Corporation shall inform the manufacturer or importer of the details of unconformity and then perform the second occasional quality inspection.

(3-3-2) The number of test specimens for the second occasional quality inspection shall be twice the number of test specimens for the first occasional inspection.

(3-3-3) In case the manufacturer or importer fails the second occasional quality inspection, the products shall be rejected, product identification inspection shall be performed and then collection inspection shall be performed for the relevant type.

(3-3-4) In case an applicant who has been notified the unconformity intends to undergo production process inspection or comprehensive process inspection, the applicant may apply for production process inspection or comprehensive process inspection after three months from the date of the unconformity notification issued by Korea Gas Safety Corporation.

(4) Suspension or change of kind of inspection

In case a person who is subject to production process inspection or comprehensive process inspection in accordance with the Enforcement Regulation, Table 7, No.3 intends to suspend production of an inspection object item for no less than six months or to change the kind of inspection, the person shall notify the matter to Korea Gas Safety Corporation and return the

acceptance notification.

(5) Process re-inspection

In case a person intends to undergo production process inspection or comprehensive process inspection in accordance with the Enforcement Regulation, Table 7, No.3-b and comes under one of the following cases, the person shall undergo production process inspection or comprehensive process inspection again.

(5-1) The location of the business place is changed,

(5-2) A production item is added,

(5-3) Three years have elapsed from the acceptance date of production process inspection or comprehensive process inspection. However, in case a relevant gas appliance item is added, the period shall be the remaining period of the existing item.

4.5 Other Inspection Standards

4.5.1 Inspection of imported products

In principle, inspection of imported products shall be performed in a place which the importer wants, and the costs and expenses required for inspection such as equipment and materials shall be borne by the applicant.

4.5.2 Partial omission of inspection

4.5.2.1 In case a person who undergoes production process inspection or comprehensive process inspection adds inspection items, part of process identification audit or comprehensive quality control system audit may be omitted.

4.5.2.2 In case a person whose quality assurance system has been certified by a certification body authorized in accordance with the Quality Management and Safety Control of Industrial Products Act applies for production process inspection or comprehensive process inspection, part of process identification audit or comprehensive quality control system audit may be omitted.

4.5.3 Disposal of rejected products (not applicable)

4.5.4 Detailed inspection standards

Other detailed matters necessary for design stage inspection and production stage inspection shall conform to what the president of Korea Gas Safety Corporation specifies.

Appendix A General Standard for Operation of Quality Control System for Gas Appliance Manufacturing Plants

1. Introduction	
	<p>A. This standard has been established so that gas appliance manufacturers may produce safe and reliable products through production process inspection and comprehensive process inspection in production stage inspections in accordance with the Enforcement Regulation, Table 7, No.3-b-2)-b).</p> <p>B. This standard consists of general, design, manufacturing, self-inspection and obligations, and is intended to be used to assess whether the quality control system of a gas appliance manufacturing plant conforms to the requirements of undergoing process identification audit or comprehensive quality control system audit.</p>
2. General <Revised on December 10, 2015>	
A. Organization	
(1)	The organizations shall have technical and business capability to produce products satisfactory to customers and statutory requirements.
(2)	The top management shall guarantee that processes and procedures required for the quality system have been established and are being executed and maintained.
(3) 【Comprehensive】	<p>Research and development organizations including the followings shall be maintained to study various trouble forms which can appear in design process or after extended use and to reflect them to the design.</p> <p>(a) Persons in charge of research and development and manpower</p> <p>(b) Appropriate facilities and equipment required for research and development</p>
B. Quality System	
(1)	The manufacturer shall establish, document and implement a quality control system in accordance with the requirements of this standard.
(2)	When any change in the quality control system is planned and made, the integrity of the system shall be maintained and the system shall be updated through continuous improvement.
(3)	<p>The top management shall present the implementation evidences for development and implementation of the quality control system and continuous improvement of its effectiveness through the followings:</p> <p>(a) Establishment of quality policy and quality target</p> <p>(b) Implementation of management review (effectiveness of quality system and improvement of products)</p>
(4) <Newly established on December 10, 2015>	<p>Documents necessary for quality system shall be managed and documented procedures necessary for the management of the followings shall be established:</p> <p>(1) Approval, review, renewal and re-approval of documents</p> <p>(2) Identification of documents (new edition, outsourced documents, etc.)</p> <p>(3) Prevention of misuse of invalidated documents</p>
C. Human Resources	
(1)	<p>Persons affecting product quality shall be qualified on the basis of appropriate educational background, training, expertness and experiences, and the manufacturer shall implement the followings in accordance with the written procedures:</p> <p>(a) Decision on qualification of personnel</p> <p>(b) Education and training to satisfy qualification requirements and assessment of its effectiveness</p> <p>(c) Maintenance of appropriate records of qualification matters</p>

(2) 【Comprehensive】	In the case of persons in charge of design and development of products, it shall be assured that they achieve the requirements of design and development and are skillful with the tools and in the techniques to be applied.
D. Facilities and Equipment	
(1) 【Interval】	Following facilities, equipment and business environment required to conform to the product requirements shall be determined, secured and maintained: (a) Buildings, business places and utilities (b) Process equipment (hardware and software) (c) Supporting services (transportation, communication, etc.)
(2) 【Interval】	The sites shall be maintained in neatly arranged and clean conditions to conform to the requirements of products and manufacturing process.
(3) 【Comprehensive】	The means to minimize potential hazards to employees shall be manifested in design, development and manufacturing activities.
3. Design	
A. Design and Development	
(1) 【Comprehensive】	Design and development capability shall be secured to materialize products in conformity to the product requirements.
(2) 【Comprehensive】	The output of product design shall be provided in a form verifiable for the requirements, be approved before distribution, and include the followings: (a) Analysis results such as potential failure mode effect analysis and reliability results (b) Characteristics of products, and specifications when required (c) Measures to prevent mishandling of products, if applicable (d) Definition of products including drawings or mathematical basic data (e) Review results of product designs
(3) 【Comprehensive】	The output of process design shall be provided in a form verifiable for the requirements, be approved before its distribution, and include the followings: (a) Drawings, and specifications when required (b) Flow diagram and layout of manufacturing process (c) Analysis results such as potential failure mode effect analysis, etc. (d) Control plan (e) Work manuals (f) Acceptance criteria for process approval (g) Methods of detection of product/process nonconformity and feed back
(4) 【Comprehensive】	The appropriateness of design and development shall be checked, and the records of the results of appropriateness check and all necessary measures shall be maintained.
(5) 【Comprehensive】	Changes in design and development shall be easily grasped and their records shall be maintained. Changes shall be reviewed, verified, checked for their appropriateness, and approved before their implementation, when applicable.
4. Manufacturing	
A. Purchase	
(1) 【interval】	Inspection or other activities required to ensure that purchased materials satisfy their specified purchase requirements shall be determined and implemented.
(2)	Suppliers shall be selected on the basis of their capability to supply materials in conformity to the specified purchase requirements. The selection standard shall be established and all records related to the selection shall be maintained.
(3) 【Comprehensive】	Suppliers shall be regularly evaluated, their evaluation results shall be reflected in the purchase policy, and the management methods of suppliers shall be accordingly differentiated.
B. Production	

(1)	The manufacturer shall plan and implement production in the managed conditions including the followings: (a) Use of work manuals as required (b) Use of appropriate equipment (c) Measurement (d) Application of acceptance standard for judgment of process approval
(2) 【interval】	The manufacturer shall identify the states of products in connection with the measurement requirements in manufacturing stages.
(3) 【Comprehensive】 【interval】	The manufacturer shall identify the states of products in connection with the measurement requirements and traceability in manufacturing stages.
(4) 【interval】	Work preparation shall be verified whenever the work is initially started, the material is replaced or the work is changed.
(5) 【Comprehensive】	An appropriate statistical technique for each process shall be determined before mass production and be included in the control plan. Basic philosophy such as distribution and process capacity shall be utilized in the overall organization.
(6) 【Comprehensive】	The manufacturer shall establish and maintain the control plan in consideration of analysis results such as potential failure mode effect analyses in products and manufacturing processes.
(7) 【Comprehensive】 【interval】	Written work manuals shall be prepared for all personnel affecting product quality. These manuals shall be readily available for reference on work sites.
(8) 【Comprehensive】	The manufacturer shall grasp major processes and provide resources for preservation of machines, equipment, jigs and tools, and develop an overall preventive maintenance system. The system shall include the followings: (a) Planned maintenance activities (b) Packing and maintenance of equipment, tools and gauges (c) Availability of replaceable parts for major manufacturing equipment (d) Documentation, evaluation and improvement of maintenance activities (e) Identification specifying the states of production, repairs or disposal <Revised on December 10, 2015>
5. Self-Inspection	
A. Inspection Method and Procedure	
(1) 【interval】	The manufacturer shall determine the inspections to be performed, and check whether products conform to specified requirements. Inspections shall be performed in relevant stages of production process.
(2) 【interval】	The evidences that inspected products conform to the acceptance criteria shall be maintained. The person who approves the shipment of the products shall be specified in the record.
(3) 【Comprehensive】 【interval】	The acceptance criteria for tally data sampling shall be of zero-defect.

(4) 【interval】	Measurements shall be made in such a way as to meet the requirements, and the measurement equipment shall be as follows to guarantee effective results: (a) Measurement equipment shall be calibrated or verified to the measurement standard traceable to the international or national standard at specified intervals or before application. In case such standards are not available, the bases for such calibration or verification shall be recorded. (b) Identification to judge the calibrated states (c) Protection from manipulation which may invalidate measurement results (d) Protection from damage or deterioration during handling, maintenance and storage
(5) 【interval】	The records of calibration and verification results shall be maintained, and the measured values shall be used in their corrected states.
(6) 【Comprehensive】	Changes in measurement systems indicated in the results of measurement and test in each form shall be analyzed by a statistical method.
(7) 【interval】	The manufacturer shall inspect the whole items of design stage inspection once a year or more often and maintain the records.
(8) 【Comprehensive】 【interval】	The manufacturer shall inspect the whole items of design stage inspection twice a year or more often and maintain the records. <Revised on November 17, 2014 and December 10, 2015>
(9) 【Comprehensive】	The manufacturer's laboratory shall be included in the quality system documentation by specifying the following technical requirements: a) Appropriateness of personnel, equipment and facilities b) Capability to accurately conduct tests in accordance with relevant specifications c) External laboratories shall be certified in accordance with KS Q ISO IEC 17025 or equivalent standard <Revised on November 17, 2014>
B. Corrective and Preventive Measures	
(1) 【interval】	It shall be assured that unconfirmable products and suspicious products are identified and separately managed.
(2)	Measures shall be taken to prevent recurrence of nonconformity, and the followings shall be specified in the written procedure: (a) Review of nonconformity (inclusive of customer complaints) (b) Determination, implementation and recording of corrective measures
(3)	The effectiveness of the quality system shall be continuously improved through utilization of quality policy, quality target, audit results, data analyses, corrective measures, preventive measures and management review.
(4)	Preventive measures shall be taken to remove the potential causes of nonconformity to prevent its occurrence.
C. Internal Audit	
(1)	The manufacturer shall conduct internal audits at planned intervals to check whether the quality system is effectively implemented and maintained.
(2)	Responsibility for and requirements of planning and implementation of audits, assurance of independence of audit, report of audit results and maintenance of records shall be specified in the written procedure.
6. Obligations <Revised on December 10, 2015>	
A. Acceptance marks	

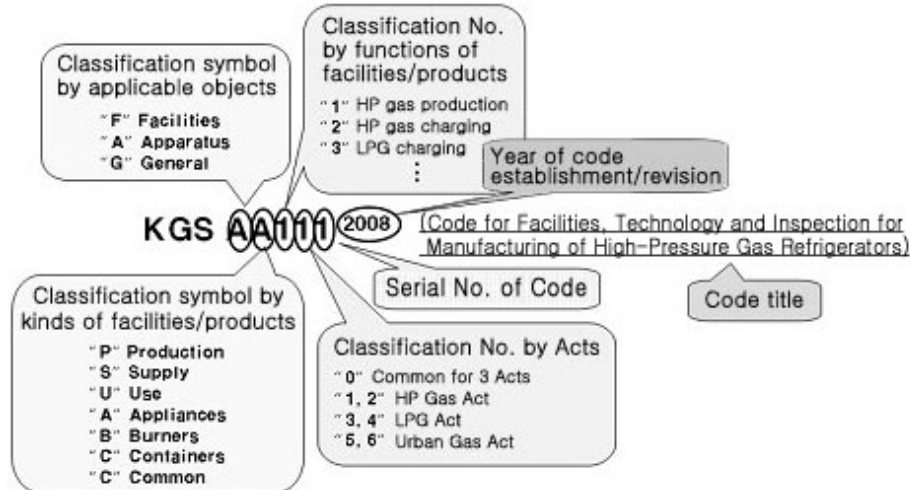
(1) 【Interval】	The manufacturer shall maintain a written management regulation on acceptance marks (certificates or stamps), and the records of awards, utilization, keeping and withdrawal of acceptance marks shall be updated and maintained. The management regulation shall include the followings: (a) Handling of acceptance marks (certificates or stamps) by authorized persons only (b) Use of acceptance marks subject to the approval of top management/ management representative and in accordance with the planned procedure. (c) Record of the use of acceptance marks in detail (d) Establishment of a plan to prevent misuse of acceptance marks (e) Safekeeping of acceptance marks to prevent their damage or robbery
(2) 【Comprehensive】 【Interval】	The regulation on manufacturing of acceptance marks shall be separately documented, and all matters related to the manufacturing and change of acceptance marks shall be recorded and updated.
B. Safety Control	
(1)	For recent one year, the manufacturer shall be free from any accident due to product defects and there shall be no unconformity case in the sampling inspection undergone by the manufacturer.
(2) 【Comprehensive】	For recent three years, the manufacturer shall be free from any accident due to product defects and there shall be no unconformity case in the sampling inspection undergone by the manufacturer.
C. Others	
(1)	When any case which may cause quality deterioration of products or serious harm to the users breaks out, the manufacturer shall take appropriate measures.
(2)	When there is any important change in the operation of the manufacturer's quality system, the manufacturer shall inform Korea Gas Safety Corporation of the change within 15 days.

[Remarks]

1. **【Comprehensive】** means that the provisions are applicable only to the objects of comprehensive process inspection.
2. **【Interval】** means that the provisions are applicable to the inspection in accordance with its inspection interval.
3. Provisions without any mark are common provisions for production process inspection and comprehensive process inspection.

Symbol and Serial Number System of KGS Codes

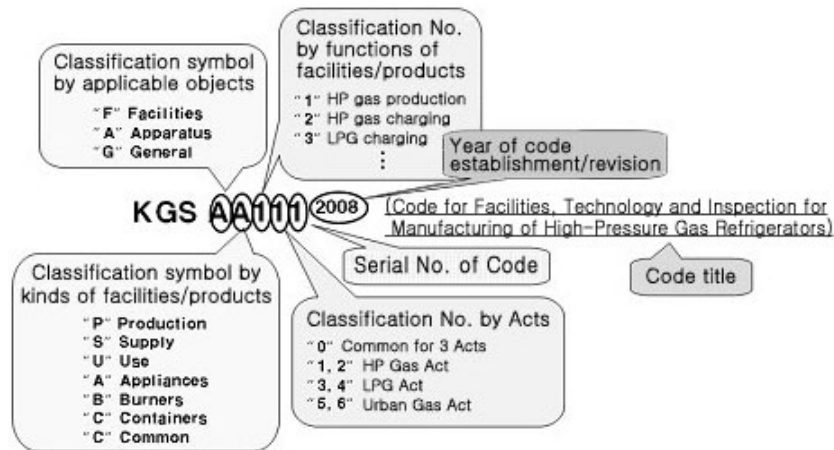
Korea Gas Safety Codes (KGS Codes) are the codes of detailed standards for technical matters such as facilities, technology and inspection stipulated in gas-related laws and regulations and are the technical standards in gas safety areas deliberated and resolved to be adopted by the gas technical standards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



Classification		Symbol	Facility	Classification		Symbol	Facility
Apparatus (A)	Appliances (A)	AA1xx	Refrigerators	Facilities (F)	Production (P)	FP1xx	High-pressure gas manufacturing facilities
		AA2xx	Piping			FP2xx	High-pressure gas filling facilities
		AA3xx	Valves			FP3xx	LP gas filling facilities
		AA4xx	Automatic shut-off devices			FP4xx	City gas wholesales manufacturing facilities
		AA5xx	Automatic shut-off devices			FP5xx	City gas general manufacturing facilities
		AA6xx	Alarm & shutoff devices			FP6xx	City gas filling facilities
		AA9xx	Other appliances		FS1xx	High-pressure gas sales facilities	
	AB2xx	Heaters	FS3xx		LP gas complex supply facilities		
	AB3xx	Ranges	FS4xx		City gas wholesales supply facilities		
	AB9xx	Other burners	FS5xx		City gas general supply facilities		
	AC2xx	Cylinders	FU2xx		High-pressure gas burning facilities		
	AC3xx	Cans	FU3xx		LP gas storage facilities		
	AC4xx	Composite containers	FU4xx		LP gas burning facilities		
	AC9xx	Other containers	FU5xx		City gas burning facilities		
	GC2xx	Common matters					

Symbol and Serial Number System of KGS Codes

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Classification		Symbol	Facility	Classification		Symbol	Facility
Apparatus (A)	Appliances (A)	AA1xx	Refrigerators	Facilities (F)	Production (P)	FP1xx	High-pressure gas manufacturing facilities
		AA2xx	Piping			FP2xx	High-pressure gas filling facilities
		AA3xx	Valves			FP3xx	LP gas filling facilities
		AA4xx	Pressure regulators			FP4xx	City gas wholesales manufacturing facilities
		AA5xx	Hoses			FP5xx	City gas general manufacturing facilities
		AA6xx	Alarm & shutoff devices		Supply (S)	FS1xx	High-pressure gas sales facilities
		AA9xx	Other appliances			FS2xx	LP gas sales facilities
	Burners (B)	AB1xx	Boilers			FS3xx	LP gas complex supply facilities
		AB2xx	Heaters			FS4xx	City gas wholesales supply facilities
		AB3xx	Ranges			FS5xx	City gas general supply facilities
		AB9xx	Other burners		Use (U)	FU1xx	High-pressure gas storage facilities
	Containers (C)	AC1xx	Tanks			FU2xx	High-pressure gas burning facilities
		AC2xx	Cylinders			FU3xx	LP gas storage facilities
		AC3xx	Cans			FU4xx	LP gas burning facilities
		AC4xx	Composite containers			FU5xx	City gas burning facilities
		AC9xx	Other containers		Common (C)	GC1xx	Basic matters
				General (G)		GC2xx	Common matters

