



**Code for Facilities, Technology, Inspection, Supervision  
and Detailed Safety Diagnosis for Specified  
Manufacturing of High-Pressure Gases**



## Personnel

### Gas Technical Standards Committee

Chairman	Kwang-Won Lee, Professor of Hoseo University
Vice-Chairman	Seung-Hoon Nam, Principal Researcher of KRISS
Ex Officio Member	Hui-Won Lee, Manager of Energy Safety Department, Ministry of Trade, Industry & Energy
	Hae-Myeong Yang, Director of Technology and Safety, Korea Gas Safety Corporation
High-Pressure Gas	Seung-Hoon Nam, Principal Researcher of KRISS
	Beom-Seok Lee, Principal Professor of Kyung Hee University
	Dong-Myeong Ha, Professor of Semyung University
	Chang-Gi Kim, Principal Researcher of Korea Institute of Machinery and Materials
	Hyuk-Myun Kwon, Director General of Occupational Safety & Health Research Institute
	Su-Dong Byun, CEO of Q-Best
Liquefied Petroleum Gas	Doo-Seon Park, Managing Director of Daesung Industrial Gas Co., Ltd
	Hyeong-Hwan Ann, Professor of Korea National University of Transportation
	Byeong-Hak Choei, Professor of Gangneung-Wonju National University
	Seong-Min Lee, Director of KOGAS Research Institute
	Yong-Gwon Lee, Vice-President of EG CNE Co.,Ltd
	Gi-hyeon Jang, Director of Kiturmi
	Jeong-Sik Chon, Direto of E1 CO., Ltd.



### History of Establishment and Revision of KGS Code

Code Number	KGS FP111 <sup>2020</sup>
Code Title	Code for Facilities, Technology, Inspection, Supervision and Detailed Safety Diagnosis for Specified Manufacturing of High-Pressure Gases

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)
September 25, 2009	Revised (Notification of the Ministry of Knowledge Economy No. 2009-357)
April 29, 2010	Revised (Notification of the Ministry of Knowledge Economy No. 2010-173)
January 3, 2011	Revised (Notification of the Ministry of Knowledge Economy No. 2010-489)
August 13, 2012	Revised (Notification of the Ministry of Knowledge Economy No. 2012-391)
May 20, 2013	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2013-087)
August 16, 2013	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2013-200)
November 17, 2014	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2014-589)
January 8, 2016	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2016-6)
August 24, 2016	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2016-430)
October 19, 2016	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2016-545)
February 10, 2017	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2017-066)
October 16, 2018	Revised (Notification of the Ministry of Trade, Industry & Energy, No. 2018-512)
January 16, 2019	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2019-026)

June 14, 2019	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2019-375)
March 18, 2020	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2020-167)

## Table of Contents

1. General	1
1.1 Scope	1
1.2 Validity of Code	1
1.3 Definitions	1
1.4 Application of Other Codes	5
1.5 Interim Measures	5
1.5.1 Interim measure for distance between safety zones	5
1.5.2 Interim measure for installation of storage tanks	6
1.5.3 Interim measure for piping materials	6
1.5.4 Interim measure for installation of protection plates	6
1.5.5 Interim measure for prevention of leakage dispersion	6
1.5.6 Interim measure for installation of overpressure safety devices	6
1.5.7 Interim measure for installation of bund walls	6
1.5.8 Interim measure for installation of protection walls	6
1.5.9 Interim measure for installation of vent stacks and flare stacks	6
1.5.10 Interim measure for installation of combustible gas storage tanks	6
1.5.11 Interim measure for installation of instrument rooms	7
1.5.12 Interim measure for emergency shutoff devices	7
1.5.13 Interim measure for installation of sleeve pipes for piping passing through walls	7
1.5.14. Interim measure for tail pipes of overpressure safety devices	7
1.5.15. Interim measure for detoxification facilities	7
1.5.16 Interim measure for protection apparatuses of toxic gas facilities	7
1.5.17 Interim measure for loading arms	8
1.6 Restriction to Use of Appliances	8
2. Installation Standard	8
2.1 Layout Standard	8
2.1.1 Distance from protected installations	8
2.1.2 Distance from naked lights	9
2.1.3 Distance from other facilities	10
2.1.4 Distance from boundary of business place	10
2.1.5 Distance from road boundary (currently not used)	11
2.1.6 Distance from railroad (currently not used)	11

2.1.7 Securement of open space (currently not used)	11
2.1.8 Special cases for extension or modification (currently not used)	11
2.1.9 Establishment of safety zones	11
2.2 Foundation Standard	19
2.2.1 Site survey	19
2.2.2 Foundation works	22
2.2.3 Fixation of storage tanks	24
2.3 Storage Facility Standard	27
2.3.1 Materials of storage facilities	27
2.3.2 Construction of storage facilities	27
2.3.3 Installation of storage facilities	28
2.4 Gas Facility Standard	31
2.4.1 Materials of gas facilities	31
2.4.2 Construction of gas facilities	32
2.4.3 Thickness and strength of gas facilities	32
2.4.4 Installation of gas facilities	38
2.4.5 Performance of gas facilities	39
2.5. Piping Facility Standard	39
2.5.1 Materials of piping facilities	39
2.5.2 Configuration of piping facilities	47
2.5.3 Thickness of piping facilities	49
2.5.4 Jointing of piping facilities	51
2.5.5 Measures for absorption of expansion and contraction of piping facilities	52
2.5.6 Electric insulation of piping facilities	54
2.5.7 Installation of piping facilities	55
2.5.8 Installation of associated piping facilities	67
2.5.9 Performance of piping facilities	70
2.6. Accident prevention facility standard	70
2.6.1 Installation of overpressure safety devices	70
2.6.2 Installation of gas leak alarm and automatic shutoff devices	84
2.6.3 Installation of emergency shutoff devices	86
2.6.4 Installation of check valves	90
2.6.5 Installation of flame arrestors	90
2.6.6 Installation of hazard monitors and controllers (currently not used)	90
2.6.7 Installation of accidental start prevention devices (currently not used)	90
2.6.8 Installation of explosion-proof electrical facilities	90
2.6.9 Installation of ventilation systems	90
2.6.10 Installation of corrosion protection systems	91



2.6.11 Installation of static eliminators	92
2.6.12 Installation of toppling prevention devices (currently not used)	93
2.6.13 Installation of insulation facilities (currently not used)	93
2.6.14 Installation of internal reaction monitors	93
2.6.15 Installation of hazard prevention facilities	95
2.6.16 Installation of interlocks	95
2.7 Damage Control Facility Standard	95
2.7.1 Installation of bund walls	95
2.7.2 Installation of protection walls	100
2.7.3 Installation of sprinkler systems (currently not used)	103
2.7.4 Installation of detoxification facilities	103
2.7.5 Installation of neutralization and transfer facilities	107
2.7.6 Installation of wind indicators	111
2.7.7 Installation of firefighting facilities	111
2.7.8 Installation of passages	111
2.7.9 Installation of temperature rise prevention facilities	112
2.8 Associated Facilities Standard	114
2.8.1 Installation of measuring facilities	114
2.8.2 Installation of emergency power systems	115
2.8.3 Installation of communication systems	117
2.8.4 Installation of operation facilities	117
2.9 Marking standard	119
2.9.1 Boundary markings and warning signs	119
2.9.2 Identification marks and hazard signs	122
2.9.3 Boundary fences	123
2.10 Other standards	123
2.10.1 LPG filling standard	123
3. Technical Standard	126
3.1 Safety Maintenance Standard	126
3.1.1 Maintenance of foundations (currently not used)	126
3.1.2 Maintenance of storage facilities	126
3.1.3 Maintenance of gas facilities	130
3.1.4 Maintenance of piping facilities (currently not used)	133
3.1.5 Maintenance of accident prevention facilities	134
3.1.6 Maintenance of damage control facilities (currently not used)	134
3.1.7 Maintenance of associated facilities	134
3.2 Manufacturing and Filling Standard	135

3.2.1 Preparation for manufacturing and filling	135
3.2.2 Manufacturing and filling operation	135
3.3 Inspection Standard	142
3.3.1 Inspection of overall systems (currently not used)	142
3.3.2 Inspection of foundations (currently not used)	143
3.3.3 Inspection of storage facilities (currently not used)	143
3.3.4 Inspection of gas facilities	143
3.3.5 Inspection of piping (currently not used)	145
3.3.6 Inspection of accident prevention facilities (currently not used)	145
3.3.7 Inspection of damage control facilities	145
3.3.8 Inspection of associated facilities	146
3.4 Repairs, Cleaning and Removal Standard	146
3.4.1 Preparation for repairs, cleaning and removal	146
3.4.2 Repairs, cleaning and removal works	148
3.4.3 Follow-up measures of repairs, cleaning and removal	150
3.5 Other Standards	150
3.5.1 Drills on putting on personal protection apparatuses	151
4. Inspection Standard	151
4.1 Inspection Items	151
4.1.1 Intermediate inspection	151
4.1.2 Construction supervision and completion inspection	151
4.1.3 Regular inspection	153
4.1.4 Occasional inspection	156
4.1.5 Detailed safety diagnosis	156
4.2 Inspection Methods	157
4.2.1 Intermediate inspection	157
4.2.2 Construction supervision, completion inspection and regular inspection	162
4.2.3 Detailed safety diagnosis	176
Appendix A Standard for Installation of Overpressure Safety Devices before August 1, 1998	179
Appendix B Standard for Installation of Protection Walls before June 23, 1993	184
Appendix C Standard for Installation of Instrument Rooms before July 16, 1985	185

**KGS FP111<sup>2020</sup>****Code for Facilities, Technology, Inspection, Supervision and Detailed Safety  
Diagnosis for Specified Manufacturing of High-pressure Gases****1. General****1.1 Scope**

This code applies to the installations, technology, inspection, supervision and detailed diagnosis for specified manufacturing of high-pressure gas in conformity to the Enforcement Decree of the High-pressure Gas Safety Control Act (hereinafter referred to as "the Enforcement Decree"), Article 3, Clause 1, 1.

**1.2 Validity of Code**

**1.2.1** This Code has passed the deliberation and resolution by the Gas Technical Standards Committee (Bill No. 2019-10, December 20, 2019) in accordance with to the High-pressure Gas Safety Control Act (hereinafter referred to as "the Act"), Article 22-2, Clause 2, has been approved by the Minister of Trade, Industry & Energy (Notification No. 2019-375 of the Ministry of Trade, Industry & Energy, March 18, 2020) 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 Attached Table 4, 1 of the Enforcement Rule of the High-pressure Gas Safety Control Act (hereinafter referred to as "Enforcement Rule") in accordance with the Act, Article 22-2, Clause 4.

**1.3 Definitions**

The meanings of the terms used in this Code are as follows:

**1.3.1** "Combustible gases" mean acrylonitrile, acrylaldehyde, acetaldehyde, acetylene, ammonia, hydrogen, hydrogen sulfide, hydrogen cyanide, carbon monoxide, carbon disulfide, methane, methane chloride, methane bromide, ethane, ethane chloride, vinyl chloride, ethylene, ethylene oxide, propane, cyclo-propane, propylene, propylene oxide, butane, butadiene, butylene, methyl ether, mono-methylamine, di-methylamine, tri-methylamine, ethylamine, benzene, ethyl benzene, and