



Facility/Technical/Inspection/Safety Diagnosis Code for Production of High-pressure Gases during Refrigeration

Deliberation/Resolution by Gas Technical Standards Committee : October 21, 2022

Approval by the Ministry of Trade, Industry & Energy : November 4, 2022

Gas Technical Standards Committee

Chairman	Byung-Hak Choi, Professor of Gangneung-Wonju National University
Vice-Chairman	Gi-hyun Jang, Professor of Inha University
Ex Officio Member	Yoon-Gil Hwang, Manager of Energy Safety Department, Ministry of Trade, Industry & Energy Chae-Sik Kwak, Director of Technology and Safety, Korea Gas Safety Corporation
<hr/>	
High-Pressure Gas	Byung-Hak Choi, Professor of Gangneung-Wonju National University Seong-Jin Song, Vice president of SungKyunKwan University Beom-Seok Lee, Professor of KyungHee University Chun-Seok Yoon, CEO of Hanul E&R Yeong-Hoon Ann, Professor of HanYang University
Liquefied Petroleum Gas	Hyeong-Hwan Ann, Professor of Korea National University of Transportation Hyuk-Myun Kwon, Professor of YonSei University Jeong-Sik Cheon, Director of E1 CO., Ltd. kyung-Soo Kang, Senior Researcher of Korea Institute of Energy Research Yong-Kwon Lee, Vice-President of DaeYeon Co., Ltd.
Urban Gas	Dong-Il Shin, Professor of MyongJi University Jeong-Hoon Kim, Principal Researcher of Korea Institute of Machinery and Materials In-Cheol Jeong, Director of Yesco Co., Ltd. Gi-hyun Jang, Professor of Inha University
Hydrogen Gas	Kwang-Won Lee, Professor of HoSeo University Ho-young Jeong, Professor of ChonNam National University In-Yong Kang, CEO of H&Power Co., Ltd. Woon-Bong Baek, Senior Researcher of Korea Institute of Standards and Science

This code is the detailed standards established by the Gas Technical Standards Committee in accordance with Article 22-2 of "High-Pressure Gas Safety Control Act", Article 45 of "Safety Control and Business of Liquefied Petroleum Gas Act" and Article 17-5 of "Urban Gas Business Act", Article 48 of "Hydrogen Economy Promotion and Hydrogen Safety Management Act". Since conformity to this Code is deemed to conform to the laws and regulations above, this Code must be observed.

This English version of KGS Code is an informal translation from its Korean original version. Only the Korean version of the KGS Code is officially effective since it has been authorized by the Gas Technical Standards Committee (KGS Code Committee). The secretariat of the Committee reserves the right to revise the English version whenever translation errors are found.

History of Establishment and Revision of KGS Code	
Code Number	KGS FP113 ²⁰²²
Code Title	Facility/Technical/Inspection/Safety Diagnosis Code for Production of High-pressure Gases during Refrigeration

Date of Establishment/Revision	Description
Dec. 30, 2008	Established (Ministry of Trade, Industry & Energy Notice No. 2021-518)
May 15, 2009	Revised (Ministry of Trade, Industry & Energy Notice No. 2021-699)
Jan. 3, 2011	Revised (Ministry of Trade, Industry & Energy Notice No. 2010-489)
Aug. 16, 2013	Revised (Ministry of Trade, Industry & Energy Notice No. 2013-200)
Nov. 17, 2014	Revised (Ministry of Trade, Industry & Energy Notice No. 2014-589)
July 3, 2015	Revised (Ministry of Trade, Industry & Energy Notice No. 2015-372)
Jan. 8, 2016	Revised (Ministry of Trade, Industry & Energy Notice No. 2016-6)
April 15, 2016	Revised (Ministry of Trade, Industry & Energy Notice No. 2016-177)
Dec. 15, 2016	Revised (Ministry of Trade, Industry & Energy Notice No. 2016-638)
Feb. 10, 2017	Revised (Ministry of Trade, Industry & Energy Notice No. 2017-066)
Aug. 7, 2017	Revised (Ministry of Trade, Industry & Energy Notice No. 2017-411)
Dec. 14, 2017	Revised (Ministry of Trade, Industry & Energy Notice No. 2017-582)
Oct. 16, 2018	Revised (Ministry of Trade, Industry & Energy Notice No. 2018-512)
June 14, 2019	Revised (Ministry of Trade, Industry & Energy Notice No. 2019-375)

Date of Establishment/Revision	Description
Sept. 4, 2020	Revised (Ministry of Trade, Industry & Energy Notice No. 2020-525)
Nov. 4, 2022	Revised (Ministry of Trade, Industry & Energy Notice No. 2022-793)
	- Blank hereunder -

Table of Contents

1. General	7
1.1 Scope	7
1.2 Validity of the Code	7
1.3 Definitions of Terms	7
1.4 Application of the Code <i>Mutatis Mutandis</i> (N/A)	10
1.5 Transitional Measures	10
1.5.1 Transitional measures concerning discharge embankment installations.....	10
1.5.2 Transitional measures concerning the installation of a protective tube where the pipe passes through a wall <Newly added on Aug. 16, 2013>	10
1.5.3 Transitional measures concerning overpressure safety device <Newly added on Aug. 16, 2013>	10
1.5.4 Transitional measures concerning decontamination facilities <Newly added on Aug. 16, 2013>	10
1.5.5 Transitional measures concerning detailed safety diagnosis <Newly added on April 15, 2016>	10
1.5.6 Transitional measures concerning maintenance of gas (refrigeration) equipment <Newly added on Nov. 4, 2022>	11
1.6 Restrictions on Use	11
2. Facility Standards	11
2.1 Layout Criteria	11
2.1.1 Distance from protection facilities (N/A)	11
2.1.2 Distance from open flames.....	11
2.2 Foundation Standards (N/A)	13
2.3 Storage Equipment Standards (N/A)	13
2.4 Gas Equipment Standards	13

2.4.1 Gas equipment material.....	13
2.4.2 Gas (refrigerant) equipment structure.....	32
2.4.3 Gas (refrigerant) equipment thickness and strength (N/A).....	32
2.4.4 Gas (refrigerant) equipment installation.....	32
2.4.5 Gas (refrigerant) equipment performance.....	33
2.5 Piping Standards (N/A).....	36
2.6 Standards for Accident Prevention Equipment.....	36
2.6.1 Installation of overpressure safety device.....	36
2.6.2 Installation of alarm device for gas leak detection.....	47
2.6.3 Installation of emergency shut-off device (N/A).....	50
2.6.4 Backflow prevention device (N/A).....	50
2.6.5 Installation of flashback prevention device (N/A).....	50
2.6.6 Installation of risk monitoring and control device (N/A).....	50
2.6.7 Installation of erroneous oscillation prevention device (N/A).....	50
2.6.8 Installation of electrical explosion-proof equipment.....	50
2.6.9 Installation of ventilation equipment (N/A).....	50
2.6.10 Installation of anti-corrosion equipment (N/A).....	50
2.6.11 Installation of static electricity removal equipment (N/A).....	51
2.6.12 Installation of overturning prevention equipment (N/A).....	51
2.6.13 Installation of automatic control equipment.....	51
2.7 Damage Reduction Equipment Standards.....	51
2.7.1 Installation of discharge embankment.....	51
2.7.2 Installation of protective wall (N/A).....	55
2.7.3 Installation of water sprinkling device (N/A).....	55
2.7.4 Installation of decontamination equipment.....	55
2.8 Ancillary Equipment Standards.....	58
2.8.1 Installation of instrumentation.....	58
2.9 Marking Standards.....	59

2.9.1 Perimeter sign	59
2.9.2 Identification and hazard signs.....	60
2.9.3 Perimeter fence	61
3. Technical Standards	62
3.1 Safety Maintenance Standards	62
3.1.1 Maintenance of the foundation (N/A)	62
3.1.2 Maintenance of storage equipment (N/A)	62
3.1.3 Maintenance of gas (refrigeration) equipment.....	62
3.2 Production and Filling Standards (N/A).....	63
3.3 Inspection Criteria.....	63
3.3.1 Inspection of entire facility (N/A)	63
3.3.2 Inspection of the foundation (N/A).....	63
3.3.3 Inspection of storage equipment (N/A)	63
3.3.4 Inspection of gas equipment (N/A)	63
3.3.5 Inspection of piping (N/A).....	63
3.3.6 Inspection of accident prevention equipment	63
3.4 Repair, Cleaning, and Dismantling Standards	66
3.4.1 Preparation for repair, cleaning, or dismantling.....	66
3.4.2 Repair, cleaning, and dismantling work.....	68
3.4.3 Follow-up measures after repair and cleaning	69
3.5 Other Standards.....	70
3.5.1 Training on putting on PPE.....	70
4. Inspection Criteria	70
4.1 Inspection items.....	70
4.1.1 Interim inspection <Revised on July 3, 2015>.....	70
4.1.2 Completion inspection	70
4.1.3 Regular inspection.....	71
4.1.4 On-demand inspection.....	71

4.2 Inspection Method	72
4.2.1 Interim inspection	72
4.2.2 Completion inspection and regular inspection	75
Appendix A Example of Summing the Cooling Capacity	81
Appendix B	82
Appendix C	142

Facility/Technical/Inspection/Safety Diagnosis Code for Production of High-Pressure Gases during Refrigeration

1. General

1.1 Scope

1.1.1 This Code is applicable to high-pressure gas production facilities, technologies, and inspections in accordance with Article 3 (1) 4 and Article 4 subparagraph 2 of the Enforcement Decree of the High-Pressure Gas Safety Control Act (hereinafter referred to as the "Enforcement Decree"). <Revised on Aug. 7, 2017>

1.2 Validity of the Code

1.2.1 This Code has been approved by the Minister of Trade, Industry and Energy (MOTIE Notice No. 2022-793, November 4, 2022) following a review and resolution (Agenda No. 2022-8, October 21, 2022) by the KGS Code Committee pursuant to Article 22-2 (2) of the High-Pressure Gas Safety Control Act (hereinafter referred to as the "Act") and is in effect as detailed standards under Article 22-2 (1) of the Act.

1.2.2 Compliance with this Code shall be regarded as conformity to the matters set forth in attached Table 7 of the Enforcement Rule of the High-Pressure Gas Safety Control Act (hereinafter referred to as the "Enforcement Rule") in accordance with Article 22-2 (4) of the Act.

1.3 Definitions of Terms

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

1.3.1 "Cooling capacity" means the cooling capacity per day calculated in accordance with attached Table 3 of the Enforcement Rule, and the cooling capacity shall be summed in the following cases under (1) through (5), provided that it may not be summed in the case of falling under (6) <Revised on Nov. 4, 2022>:

- (1) Refrigeration equipment with a refrigerant gas in common due to piping;
- (2) Two or more equipment units with different refrigerant systems assembled in an equipment unit recognized as one standard product (unit type);
- (3) Refrigeration equipment with more or two stage cascade refrigeration method;