



Code for Facilities, Technology and Inspection for Fuel Vehicles Refueling by Type of On-Site Hydrogen Production

Deliberation/Resolution by Gas Technical Standards Committee : December 16, 2022

Approval by the Ministry of Trade, Industry & Energy : December 30, 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 FP216 ²⁰²²
Code Title	Code for Facilities, Technology and Inspection for Fuel Vehicles Refueling by Type of On-site Hydrogen Production

Date of Establishment/Revision	Description
April 5, 2011	Established (Notification of the Ministry of Knowledge Economy No. 2011-173)
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. 2016-006)
December 15, 2016	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2016-638)
February 10, 2017	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2017-066)
August 7, 2017	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2017-411)
December 14, 2017	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2017-582)
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. 2020-169)
September 4, 2020	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2020-525)
January 12, 2021	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2021-012)
May 12, 2021	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2021-378)
August 9, 2021	Revised (Notification of the Ministry of Trade, Industry & Energy

	No. 2021-583)
October 8, 2021	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2021-583)
January 11, 2022	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2022-013)
August 30, 2022	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2022-641)
December 30, 2022	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2022-918)

Table of Contents

1. General	1
1.1 Scope.....	1
1.2 Validity of Code	1
1.3 Definitions.....	1
1.4 Application of the Code <i>Mutatis Mutandis</i>	5
1.5 Interim Measures	5
1.5.1 Interim measure for installation of sleeve pipes for piping passing through the wall <Newly established on August 16, 2013>	5
1.5.2 Interim Measures for the Installation of Steel Plate Protection Walls <New established on January 12, 2021>	5
1.5.3 Interim Measures for the Establishment of Real-Time Monitoring System <Newly established on May 12, 2021>	5
1.5.4 Interim Measures for the Installation of Emergency Shut-Off Device <Newly established on May 12, 2021>	5
1.5.5 Interim Measures for the Installation of Check Valve <Newly established on May 12, 2021>	6
1.5.6 Interim Measures for the Installation of Ventilation system <Newly established on May 12, 2021>	6
1.5.7 Interim Measures for the Installation of Flame Detector <Newly established on May 12, 2021>	6
1.5.8 Interim Measures for Gas facility and High-Pressure Gas Facilities <Newly established on August 9, 2021>	6
1.5.9 Interim Measures for Those Excluded as High-Pressure Gas Facilities <Newly established on August 9, 2021>	6
1.5.10 Transitional measures concerning hydrogen appliance installations <Newly established on August 30, 2022>	6
1.5.11 Transitional measures concerning protective walls between buildings within a business site accommodating people <Newly established on August 30, 2022>	6
1.5.12 Transitional measures concerning safety impact assessments <Newly established on August 30, 2022>	7
1.5.13 Transitional measures concerning gas tubing construction <Newly established on August 30, 2022>	7
1.5.14 Transitional measures concerning geotechnical survey <Newly established on December 30, 2022>	7
1.5.15 Transitional measures concerning filling equipment guards <Newly established on	

December 30, 2022>	7
1.5.16 Transitional measures concerning the installation of discharge pipes for pressure safety devices <Newly established on December 30, 2022>	7
1.5.17 Transitional measures concerning the installation of a detection and alarm system <Newly established on December 30, 2022>	7
1.5.18 Transitional measures concerning the installation of safety glass <Newly established on December 30, 2022>	7
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	11
2.1.5 Distance from road boundary	11
2.2 Foundation Standard	11
2.2.1 Site survey	11
2.2.2 Foundation works	15
2.2.3 Fixation of storage tanks	17
2.3 Storage Facility Standard	20
2.3.1 Materials of storage facilities	20
2.3.2 Construction of storage facilities	21
2.3.3 Installation of storage facilities	21
2.4 Gas Facility Standard	25
2.4.1 Materials of gas facilities	25
2.4.2 Construction of gas facilities	25
2.4.3 Thickness and strength of gas facilities	26
2.4.4 Installation of gas facilities	32
2.4.5 Performance of gas facilities	36
2.5 Piping Facility Standard	37
2.5.1 Materials of piping facilities	37
2.5.2 Configuration of piping facilities	45
2.5.3 Thickness of piping facilities	45
2.5.4 Jointing of piping facilities	48
2.5.5 Measures for absorption of expansion and contraction of piping facilities	49
2.5.6 Electric insulation of piping facilities	50
2.5.7 Installation of piping facilities	51
2.5.8 Installation of associated piping facilities	53

2.6 Accident Prevention Facility Standard.....	53
2.6.1 Installation of pressure safety devices.....	53
2.6.2 Installation of gas leak detection and alarm systems.....	66
2.6.3 Installation of emergency shutoff devices.....	69
2.6.4 Installation of check valves.....	71
2.6.5 Installation of flame arresters (currently not used).....	72
2.6.6 Installation of hazard monitors and controllers (currently not used).....	72
2.6.7 Installation of accidental start prevention devices.....	72
2.6.8 Installation of explosion-proof electrical facilities.....	72
2.6.9 Installation of ventilation systems <Revised on May 12, 2021>.....	72
2.6.10 Installation of corrosion protection system.....	73
2.6.11 Installation of static eliminators.....	74
2.6.12 Installation of toppling prevention devices (not applicable).....	75
2.6.13 Installation of insulation facilities (currently not used).....	75
2.6.14 Installation of internal reaction monitors (currently not used).....	75
2.6.15 Installation of hazard prevention facilities (currently not used).....	75
2.6.16 Installation of interlocks (currently not used).....	75
2.6.17 Installation of gas cutoff devices (currently not used).....	76
2.6.18 Installation of emergency decoupling devices.....	76
2.6.19 Installation of protection facility for dispensers.....	76
2.6.20 Installation of flame supervision devices.....	77
2.7 Damage Control Facility Standard.....	77
2.7.1 Installation of dikes.....	77
2.7.2 Installation of protection walls.....	81
2.8 Associated Facilities Standard.....	88
2.8.1 Installation of measuring facilities.....	89
2.8.2 Installation of emergency power systems.....	90
2.8.3 Installation of communication systems.....	91
2.8.4 Installation of operation facilities.....	92
2.8.5 Installation of safety maintenance facilities (not applicable).....	92
2.8.6 Installation of safe supply facilities (not applicable).....	92
2.8.7 Installation of vent system.....	92
2.9 Marking Standard.....	93
2.9.1 Boundary markings and warning signs.....	93
2.9.2 Identification marks and hazard signs (not applicable).....	96
2.9.3 Boundary fences.....	96
2.10 Other standards <Newly established on May 12, 2021>.....	97
2.10.1 facility other than the following shall not be installed in the canopy above the refueling	

facility.....	97
2.10.2 In case of installing facility in the upper part of the canopy pursuant to 2.10.1, the safety level of the canopy structure shall be assessed by an architect under subparagraph 1 of Article 2 of the Certified Architects Act or a structural engineering registered pursuant to Article 5-7 of the Professional Engineers Act.	97
3. Technical Standard	98
3.1 Safety Maintenance Standard.....	98
3.1.1 Maintenance of foundations (currently not used).....	98
3.1.2 Maintenance of storage facilities.....	98
3.1.3 Maintenance of gas facilities	102
3.1.4 Maintenance of piping (currently not used).....	105
3.1.5 Maintenance of accident prevention facilities	105
3.1.6 Maintenance of damage control facilities (currently not used)	105
3.1.7 Maintenance of associated facilities.....	105
3.1.8 Operating room <Newly established on January 11, 2022>	105
3.2 Manufacturing and Filling Standard	105
3.2.1 Preparation for manufacturing and filling <Revised on January 11, 2022>	105
3.2.2 Manufacturing and filling operation	106
3.2.3 Post management after manufacturing and filling	106
3.3. Inspection Standard.....	107
3.3.1 Inspection of overall systems (currently not used).....	107
3.3.2 Inspection of foundations (currently not used)	107
3.3.3 Inspection of storage facilities (currently not used)	107
3.3.4 Inspection of filling facilities.....	107
3.3.5 Inspection of piping (currently not used).....	110
3.3.6 Inspection of accident prevention facilities (currently not used).....	110
3.3.7 Inspection of damage control facilities.....	110
3.3.8 Inspection of associated facilities	110
3.4 Repairs, Cleaning and Removal Standard	110
3.4.1 Preparation for repairs, cleaning and removal	111
3.4.2 Repairs, cleaning and removal works.....	112
3.4.3 Post management after repairs, cleaning and removal	113
3.5 Other criteria <Newly established on May 12, 2021>	114
4. Inspection Standard.....	114
4.1 Inspection Items.....	114
4.1.1 Intermediate inspection.....	114
4.1.2 Completion inspection.....	114
4.1.3 Regular inspection	115

4.1.4 Occasional inspection.....	117
4.2 Inspection Methods.....	117
4.2.1 Intermediate inspection.....	117
4.2.2 Completion inspection and regular inspection.....	121

Code for Facilities, Technology and Inspection for Fuel Vehicles Refueling by Type of On-site Hydrogen Production

1. General

1.1 Scope

This code applies to the facilities, technology and inspection for installations producing, compressing and filling hydrogen into vehicles among high-pressure manufacturing installations 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, 2.

1.2 Validity of Code

1.2.1 This Code has passed the deliberation and resolution by the Gas Technical Standards Committee (Bill No. 2022-10, December 16, 2022) 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. 2022-918 of the Ministry of Trade, Industry & Energy, December 30, 2022), 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 5, 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 other gases combustible in air of which lower explosion limit (limit of gas concentration in air which