KGS FS111 2019


# Facility/Technical/Inspection Code for Selling High-pressure Gases by Cylinder

Deliberation/Resolution by Gas Technical Standards Committee : May 17, 2019
Approval by the Ministry of Trade, Industry & Energy : June 14, 2019

# Personnel

## Gas Technical Standards Committee

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| Chairman | Kwang-Won Lee, Professor of Hoseo University |
| Vice-Chairman | Seung-Hoon Nam, Principal Researcher of KRISS |
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| 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 |
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| | 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 |
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| | Gi-hyeon Jang, Director of Kiturmi |
| | Jeong-Sik Chon, Direto of E1 CO., Ltd. |

| KGS Code Establishment/Revision History | |
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| Item Code No. | KGS FS111 2019 |
| Code Name | Code for Facility, Technology and Inspection of High-pressure Gas Sales by Cylinder |

| Establishment/ Revision Date | Content |
|---|---|
| Dec. 30, 2008 | Established (Notification of the Ministry of Knowledge Economy, No. 2008-379) |
| Sep. 25, 2009 | Revised (Notification of the Ministry of Knowledge Economy, No. 2009-357) |
| Jan. 3, 2011 | Revised (Notification of the Ministry of Knowledge Economy, No. 2010-489) |
| May 20, 2013 | Revised (Notification of the Ministry of Knowledge Economy, No. 2013-087) |
| Dec. 31, 2013 | Revised (Notification of the Ministry of Trade, Industry and Energy, No. 2013-353) |
| Oct. 6, 2014 | Revised (Notification of the Ministry of Trade, Industry and Energy, No. 2014-510) |
| Jul. 3, 2015 | Revised (Notification of the Ministry of Trade, Industry and Energy, No. 2015-372) |
| Dec. 15, 2016 | Revised (Notification of the Ministry of Trade, Industry and Energy, No. 2016-638) |
| Aug. 7, 2017 | Revised (Notification of the Ministry of Trade, Industry and Energy, No. 2017-411) |

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| Dec. 14, 2017 | Revised (Notification of the Ministry of Trade, Industry and Energy, No. 2017-582) |
| Jul. 12, 2018 | Revised (Notification of the Ministry of Trade, Industry and Energy, No. 2018-378) |
| Jun. 14, 2019 | Revised (Notification of the Ministry of Trade, Industry and Energy, No. 2019-375) |
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# Facility/Technology/Inspection Code for Selling High-pressure Gases by Cylinder

## 1. General Matters

### 1.1 Scope of Application

This code applies to the facility, technology, and inspection related to the sales of high pressure gases by cylinder (including sales of imported high-pressure gases) among the high pressure gas sales facilities pursuant to Paragraph 3, Article 3 of the 「Enforcement decree of the High-pressure Gas Safety Control Act」 (hereinafter referred to as the "Decree").

### 1.2. Effectiveness of Standard

**1.2.1** This code has gone through the deliberation and resolution by the Gas Technical Standard Committee (Bill no. 2019-4, dated May 17, 2019) in accordance with the High-pressure Gas Safety Control Act (hereinafter referred to as "the Act"), has been approved by the Minister of Trade, Industry and Energy (Notification of the Ministry of Trade, Industry and Energy of Knowledge Economy, No. 2019-375 dated Jun. 14, 2019), and is valid and effective as the detailed standard in conformity to Article 22, Clause 1 of the Act.

**1.2.2** Conformity to this code is deemed to conform to Attached Table 9, Subparagraph 1 of the 「Enforcement Rule of the High-pressure Safety Control Act」(hereinafter referred to as the "Enforcement Rule") in accordance with Article 22-2, Clause 4 of the Act.

### 1.3. Terms and 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, cyclopropane, propylene, propylene oxide, butane, butadiene, butylene, methyl ether, mono methylamine, dimethylamine, trimethylamine, ethylamine, benzene, ethyl benzene, and other gases combustible in air of which the lower explosive limit (limit of gas concentration in air which

can be combustible when mixed with air) is not over 10 percents and of which the difference between the upper limit and the lower explosive limit is not less than 20 percents.

**1.3.2** Toxic Gas" means acrylonitrile, acrylaldehyde, sulfurous acid gas, ammonia, carbon monoixde, carbon disulfide, fluorine, chloride, methyl bromide, methyl chloride, chloroprene, ethylene oxide, hydrogen cyanide, hydrogen sulfide, mono methylamine, dimethylamine, trimethylamine, benzene, phosgene, hydrogen iodide, hydrogen bromide, hydrogen chloride, hydrogen fluoride, mustard gas, algin, monosilane, disilane, diborane, hydrogen selenide, phosphine, monogermane, and other gases of which the allowable concentration (means the gas concentration that kills half or more of mature white rats within 14 days when they are exposed to the relevant gas in the air continuously for 1 hour every day) is 5/1000 or lower among the gases that have toxicity harmful to human bodies when a certain amount or bigger exists in the air. In this case, the test for calculation of the allowable mixture gas concentration shall be conducted as per the procedure specified in 3.2 of KS B ISO 10298 and, when there is no effective test data, Expression 1.3.2 shall be used <Revised on Dec. 14, 2017>.

$$LC_{50} = \frac{1}{\sum_{i=1}^{n} \frac{C_i}{LC_{50i}}} \quad \text{... (Expression 1.3.2)}$$

Here

LC50: Allowable concentration of the toxic gas

n: Number of gas types that make up the mixture gas

Ci: Mole fraction of the ith toxic ingredient in the mixture gas

LC50i: Allowable concentration of the ith gas expressed in volume ppm

**1.3.3** "Liquefied gas" means a gas made to be in a liquid state by a method such as pressurization, cooling, etc. of which the boiling point at atmospheric pressure is not higher than 40 ℃ or the ambient temperature.

**1.3.4** "Compressed gas" means a gas compressed at a certain pressure.

**1.3.5** "Storage facility" means a facility used to charge/store a high-pressure gas and includes storage tanks and charging cylinder storage facilities.

**1.3.6** "Filling cylinder" means a cylinder in which a high-pressure gas is filled up to half or more of the filling mass or filling pressure.

**1.3.7** "Residual gas cylinder" means a cylinder in which a high-pressure gas is filled less than half of the filling mass or filling pressure.