

Overview of the High Pressure Gas Safety Act

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The High Pressure Gas Safety Institute of Japan (KHK)

Overview of the High Pressure Gas Safety Act

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1. Introduction

1-1. The Use of High Pressure Gas

High pressure gas is widely used in industrial activities, as shown in the examples below.



Photo 1: Petroleum refineries, petrochemical plants



Photo 2: Storage and shipment of LPG



Photo 3: Filling compressed hydrogen in containers



Photo 4: Storage and consumption of liquid oxygen

High pressure gas is regulated by the High Pressure Gas Safety Act (hereinafter referred to as “the Act”) in Japan. In addition to the Act, which regulates high pressure gas itself, coordination is established with the Fire Service Act designed to prevent and extinguish fire; the Industrial Safety and Health Act designed to ensure the health and safety of industrial workers; and the Act on the Prevention of Disasters in Petroleum Industrial Complexes and Other Petroleum Facilities designed to prevent occurrence of disasters within special disaster management zones of petrochemical complexes, thereby maintaining the safety of high pressure gas handling in Japan.

This document explains the High Pressure Gas Safety Act.

1-2. The History of the High Pressure Gas Safety Act

The High Pressure Gas Safety Act is a law that was first enacted in 1922 as the High Pressure Gas and Liquefied Gas Control Law. It was fully revised in 1951 as the High Pressure Gas Control Law, which then was renamed to its current title in the amendment passed in 1996. The history of the Act is briefly summarized in Table 1.

Table 1: The history of the High Pressure Gas Safety Act

| Year | Major events |
|-------------|---|
| 1907- | Production of liquefied carbon dioxide started using natural carbon dioxide gas as raw material. Production of oxygen gas started using air separation equipment. Production of nitrogen gas, oxygen gas, dissolved acetylene gas, and hydrogen gas started. |
| 1917- | A container rupture accident, gas blowout accident, and explosion occurred. |
| 1922 | The High Pressure Gas and Liquefied Gas Control Law was issued. |
| Around 1948 | Explosions of air liquefaction separation device and refrigeration equipment accidents occurred consecutively. |
| 1949 | A catastrophic explosion happened at an ammonia synthesis plant. |
| 1951 | The High Pressure Gas Control Law was issued. |
| 1953 | Use of LP gas at ordinary homes started. |
| 1955 | LP gas explosions at ordinary homes occurred consecutively. An accident of equipment catching fire occurred, following a liquid oxygen spill. |
| 1956 | The first amendment of the High Pressure Gas Control Law Ordinance of liquid oxygen consumption; Introduction of the system of Operation Safety Chief appointment for the sale of oxygen, propane and other gases, etc. |
| 1962 | LP gas accidents continued. |
| 1963 | The second amendment of the High Pressure Gas Control Law The High Pressure Gas Safety Institute of Japan was founded; Ordinance for LP gas dealer was tightened; etc. |
| 1964 | An explosion occurred at a propylene oxide plant. A chlorine spill accident occurred in the process of chlorine consumption. |
| 1965 | The third amendment of the High Pressure Gas Control Law Consumers of liquid chlorine, etc., were defined as Specific High Pressure Gas Consumer, etc. |
| 1966 | The enforcement ordinances of the High Pressure Gas Control Law were divided into the several ordinances by industries. General High Pressure Gas Safety Ordinance, Liquefied Petroleum Gas Safety Ordinance, Refrigeration Safety Ordinance, Container Safety Ordinance, etc. were established. |
| 1967 | The Act on the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas was issued. The matters pertaining to the sales of LPG to household and commercial consumers were taken out from the High Pressure Gas Control Law and made into a separate law. |

| | |
|------|---|
| 1973 | <p>Catastrophic accidents that caused damages to the surrounding areas occurred consecutively at industrial complexes around the country, causing serious social concerns.</p> <p>Safety issues of the industrial complexes were examined by the High Pressure Gas and Explosives Safety Council.</p> |
| 1975 | <p>The Industrial Complex Safety Ordinance was enacted and issued.</p> <p>An Ordinance established in addition to the General High Pressure Gas Safety Ordinance and the Liquefied Petroleum Gas Safety Ordinance.</p> <p>The fourth amendment of the High Pressure Gas Control Law</p> <p>The High Pressure Gas Safety Institute of Japan received government funding;</p> <p>Systems for the Designated Equipment Inspection, container accessory inspection and reinspection were established; etc.</p> <p>Standards related to the Industrial Complex Safety Ordinance were established.</p> |
| 1976 | <p>Designated Equipment Inspection Ordinance was established and issued.</p> |
| 1981 | <p>Aseismatic design was made mandatory for tower-vessels (including supporting structures and foundations).</p> <p>Seismic Resistant Design Code for High Pressure Gas Facilities, etc., was issued.</p> |
| 1986 | <p>The fifth amendment of the High Pressure Gas Control Law</p> <p>The High Pressure Gas Safety Institute of Japan was privately incorporated;</p> <p>The system to designate examination agencies for the national examination services, container inspection, and other inspections was introduced., etc.</p> <p>The High Pressure Gas Safety Institute of Japan was privately incorporated.</p> <p>Funding was refunded to the government, and</p> <p>Institutional monopoly of the affairs conducted by the Institute was eliminated.</p> <p>The Industrial Complex Safety Ordinance was fully revised.</p> |
| 1991 | <p>An explosion occurred at a university while using monosilane gas.</p> <p>The sixth amendment of the High Pressure Gas Control Law</p> <p>Special high pressure gases (monosilane, etc.) were added to Specific High Pressure Gas; etc.</p> |
| 1996 | <p>The seventh amendment of the High Pressure Gas Control Law</p> <p>Transition toward ordinance that promote independent safety measures by private operators;</p> <p>The High Pressure Gas Control Law was renamed the High Pressure Gas Safety Act;</p> <p>Units of pressure etc. were changed to the International System of Units (SI); etc.</p> |

1-3. The Legal Structure of the High Pressure Gas Safety Act

Diagram 1 shows the legal structure of the Act and examples of the provisions.

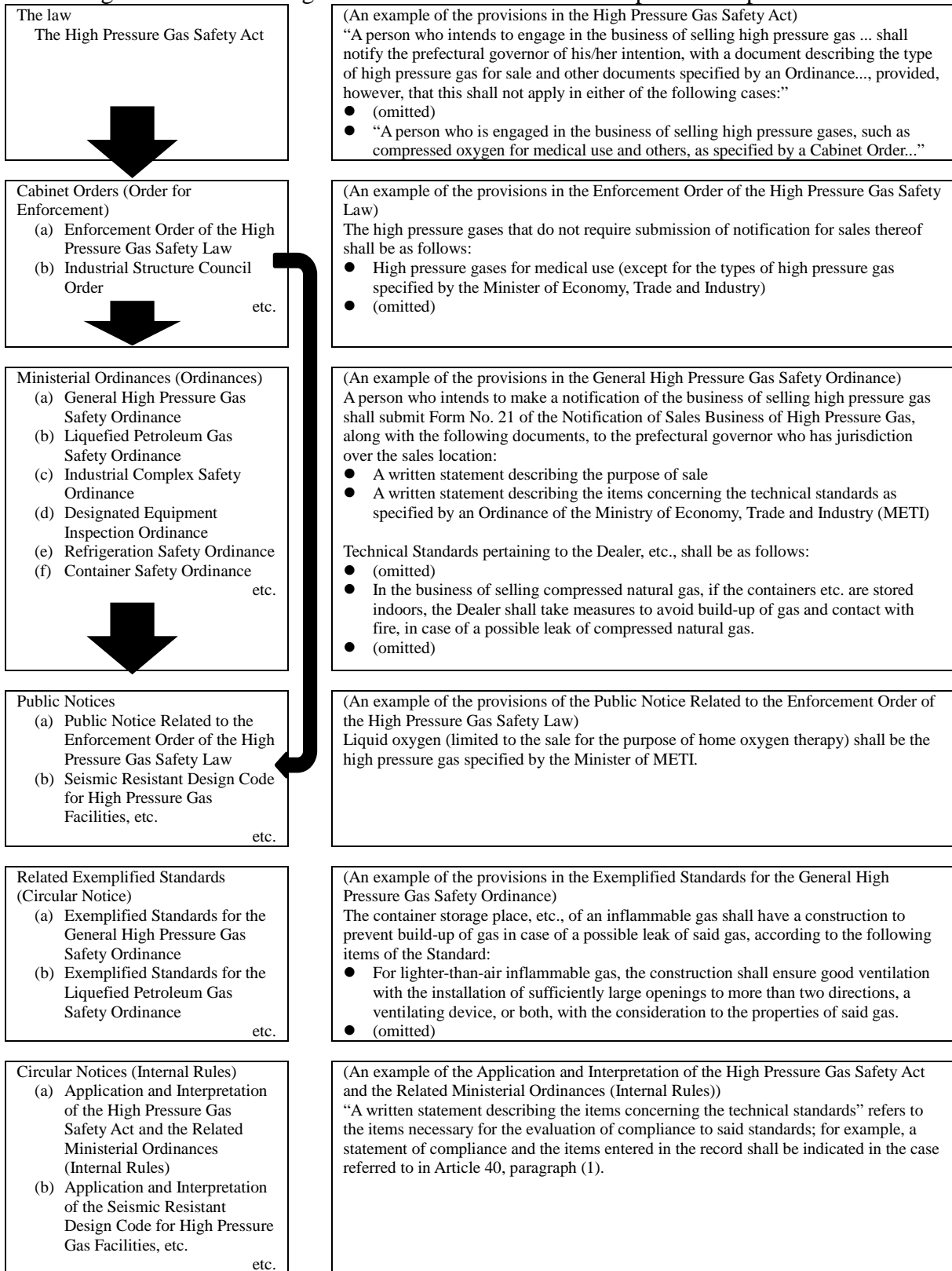


Diagram 1: The legal structure of the High Pressure Gas Safety Act and examples of the provisions

“The laws” are enacted and amended by resolutions of the Diet and are published in the official gazette, following each enactment and amendment.

The High Pressure Gas Safety Act is, as explained in 2., a law first established in 1922 as the High Pressure Gas and Liquefied Gas Control Law, and was fully revised in 1951 as the High Pressure Gas Control Law, which then was renamed to the current title in the amendment passed in 1996.

“Cabinet Orders,” “Ministerial Ordinances,” and “Public Notices” define the details necessary for the administration of the laws. Cabinet Orders are established by the Cabinet, whereas the Ministerial Ordinances and Public Notices are established and made public in the official gazette by a minister of each ministry who has jurisdiction over the laws.

Several Ministerial Ordinances (Regulations) are set forth under the Act, as indicated in Diagram 1, to reflect the different contents of ordinances in accordance with the types of high pressure gas, processing capacity, etc. Table 2 shows the main Ministerial Ordinances (Regulations) and their scopes and examples of application. Please note that the details of the Ministerial Ordinances (Regulations) listed in Table 2 are to be referred to in the separate materials prepared for each Ordinance.

Table 2: The main Ministerial Ordinances (Regulations) and the scopes and examples of application

| Ministerial Ordinances (Regulations) | Scope of Application | Examples of Application |
|--|--|---|
| General High Pressure Gas Safety Ordinance | Wide variety of high pressure gases, such as inflammable gas, toxic gas, inert gas, etc. Excludes those included in the scope of other ordinances, such as the Liquefied Petroleum Gas Safety Ordinance, etc. | A producer of oxygen, nitrogen, argon, etc., using air separation equipment; a Dealer of industrial gases such as hydrogen, oxygen, nitrogen, etc.; a consumer of oxygen, nitrogen, etc. |
| Liquefied Petroleum Gas Safety Ordinance | Liquefied petroleum gas (LPG). LPG is limited to those gases mainly composed of hydrocarbons, containing three or four carbon atoms, and excludes those under the scope of other ordinance. | An LPG filling station, an LPG Dealer, etc. (LPG for general consumers is under the scope of the Act on the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas. For details, refer to the separate material “The Overview of the Act on the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas.”) |

| | | |
|---|---|--|
| Industrial Complex Safety Ordinance | A production plant which is located in an industrial complex or which possesses a processing capacity surpassing a certain volume of gas. Industrial complexes refer to the 10 designated areas where production plants are established or are planned to be established in concentration, in the way that those production plants within said area produce or are expected to produce an extremely large volume of high pressure gas in total. | Oil refining and petrochemical plants that are located in an industrial complex |
| Refrigeration Safety Ordinance | Refrigerant gases used for freezing. Refrigeration includes heating by the use of refrigeration equipment. | A person using refrigeration equipment for air conditioning of a refrigerated warehouse, an office, etc. |
| Container Safety Ordinance | Containers to be filled with high pressure gas that can be transported on the ground surface. | Seamless containers to be filled with oxygen gas, hydrogen gas, etc.; welded containers to be filled with liquefied petroleum gas, etc.; or ultra-low temperature containers to be filled with liquid oxygen, liquid nitrogen, etc.; and the accessories for those containers. |
| Designated Equipment Inspection Ordinance | Among equipment for high pressure gas production, the designated equipment for which inspection of its design or material quality or inspection in the process of its manufacturing is deemed particularly necessary for the prevention of explosions or other accidents due to high pressure gas. | Internal pressure containers and towers with certain pressure and volume, reactors, spherical tanks, flat bottom cylindrical tanks, etc. |

The main public notices for the Act include the following:

- (a) Public Notice Providing the Details of Technical Standards Pertaining to Location, Construction, and Equipment of Facilities for Production and the Methods of Production
- (b) Seismic Resistant Design Code for High Pressure Gas Facilities, etc.
- (c) Public Notice of the Safety Inspections Methods
- (d) Public Notice on the Standards of the System for Plants Pertaining to Accreditation of Accredited Completion Inspection Executors and Accredited Safety Inspection Executor

“Circular Notices (Internal Rules)” are issued to the prefectural governors by the ministries that have jurisdiction over the laws, in order to clarify the application and interpretation of the laws, cabinet orders, ministerial ordinances, and public notices.

The main Circular Notices (Internal Rules) for the Act include the following:

- (a) Application and Interpretation of the High Pressure Gas Safety Act and the Related Ministerial Ordinances (Internal Rules)
- (b) Application and Interpretation of the Seismic Resistant Design Code for High Pressure Gas Facilities, etc.
- (c) Accreditation of Accredited Completion Inspection Executors and Accredited Safety Inspection Executors (Internal Rules)
- (d) Emergency Response Manual of the High Pressure Gas Safety Act

Among the Circular Notices (Internal Rules), “Related Exemplified Standards (Circular Notices)” are those summarized as standards for each ordinance or piece of equipment, and provide concrete examples of technical details that satisfy the technical standards specified by each Ministerial Ordinance. Related Exemplified Standards indicate the examples that comply with the technical standard specified by an Ordinance of the ministry, and therefore do not necessitate absolute conformity, but appropriateness judged by the prefectural governor having authority of the permission

The main Related Exemplified Standards for the Act include the following:

- (a) Exemplified Standards for the General High Pressure Gas Safety Ordinance
- (b) Exemplified Standards for the Liquefied Petroleum Gas Safety Ordinance
- (c) Exemplified Standards for the Industrial Complex Safety Ordinance
- (d) Exemplified Standards for the Refrigeration Safety Ordinance
- (e) Interpretation of the Technical Standards for Ordinary Seamless Containers
- (f) Interpretation of the Technical Standards for Welded Containers
- (g) Interpretation of the Technical Standards for Ultra-Low Temperature Containers
- (h) Interpretation of the Technical Standards for Accessories
- (i) Interpretation of the Technical Standards for Designated Equipment
- (j) Interpretation of the Technical Standards for Class 2 Designated Equipment

In some cases, privately established standards are specified in public notices. For instance, among the technical standards established by the High Pressure Gas Safety Institute of Japan, the following standards (KHKS) are designated in the public notices:

- (a) Safety Inspection Standards (8 types)
- (b) Inspection Standard of Flexible Tubes
- (c) Standard Related to Inspection of Bulk Storage Tank and its Accessories in Accordance with Notification of METI

2. The Overview of the High Pressure Gas Safety Act

The High Pressure Gas Safety Act outlines the basic matters and consists of the following 9 Chapters and the Supplementary Provisions.

Chapter I General Provisions

| | |
|--------------------------|---|
| Chapter II | Undertaking of Business |
| Chapter III | Safety |
| Chapter III-2 | Accreditation Regarding Completion Inspection and Safety Inspection |
| Chapter IV | Containers, etc. |
| Chapter IV-2 | Designated Examining Body, etc. |
| Chapter IV-3 | The High Pressure Gas Safety Institute of Japan |
| Chapter V | Miscellaneous Provisions |
| Chapter VI | Penal Provisions |
| Supplementary Provisions | |

Chapter I establishes the purpose of the Act and definitions of high pressure gases.

Chapter II prescribes the permissions to be obtained, notifications to be submitted, and the technical standards to be complied with by a person who intends to produce and store high pressure gas. The authority of a prefectural governor is also defined.

Chapter III stipulates the appointment of persons in charge, and safety training and periodical self- inspections that are required of a business operator to ensure the safety of high pressure gas. Safety inspection by a prefectural governor and emergency measures are also described.

Chapter III-2 prescribes the accreditation of a person who conducts a completion inspection and safety inspection by himself.

Chapter IV establishes the method of manufacture and inspection and reinspection pertaining to the equipment related to manufacturing containers to be filled with a high pressure gas and the equipment for high pressure gas production.

Chapter IV-2 stipulates the examining bodies that execute the examinations for high pressure gas production Safety Technical Manager, etc., and the inspection bodies that conduct a completion inspection, safety inspection, container inspection, or the Designated Equipment Inspection.

Chapter IV-3 defines the purpose, organization, officers and staff, and services of the High Pressure Gas Safety Institute of Japan.

Chapter V prescribes matters that were not included in the preceding Chapters, such as the entrance for inspection, notification report of accident, etc.

Chapter VI defines the penal provisions applied to a person who violates the provisions of the Act and other ordinances.

Supplementary Provisions provide the effective dates and the interim measures.

This document explains the overview of the High Pressure Gas Safety Act in accordance with the Chapters of the Act. However, details of the exceptive clauses are not included; therefore, the details of the provisions shall be verified with the original text of the Act. Furthermore, the details of the main Ministerial Ordinances (Ordinances) are to be referred to in the separate materials prepared for those Ordinances, as indicated in 1-3.

2-1. General Provisions (Chapter I)

Article 1 Purpose

The purpose of this act is to secure public safety by preventing disasters caused by high pressure gas.

The following are the two means to accomplish the objective of the Act:

- (a) Ordinance of the production, storage, sale, transportation, and other matters related to the handling of high pressure gases, their consumption, and the manufacture and handling of their containers; and
- (b) Promotion of voluntary activities by private businesses and the High Pressure Gas Safety Institute of Japan (hereinafter referred to as “the Institute”), for the safety of high pressure gases.

Article 2 Definitions

The term “high pressure gas” as used in this Act means any gas that falls under any of the items in Table 3.

Table 3: Definitions of high pressure gas

| | |
|--------------------------|---|
| Compressed gas | (a) Pressure of 1 MPa or greater at its normal operating temperature (b) Pressure of 1 MPa or greater at 35°C |
| Compressed acetylene gas | (a) Pressure of 0.2 MPa or greater at its normal operating temperature (b) Pressure of 0.2 MPa or greater at 15°C |
| Liquefied gas | (a) Pressure of 0.2 MPa or greater at its normal operating temperature (b) Temperature of 35°C or less in the case that the pressure is 0.2 MPa |
| Others | Other liquefied gases with the pressure exceeding 0 Pa at a temperature of 35°C, such as liquefied hydrogen cyanide, liquefied methyl-bromide, and others specified by a Cabinet Order. |

The term “compressed gas” refers to a compressed gas in its gaseous state and is used in contrast to “liquefied gas.” The ordinance specifying 1 MPa (“10 kg/cm²” at the time of original enactment) for a compressed gas is adopted from the legislation of foreign countries. In addition, a gas that is dissolved in a liquid (dissolved gas) is handled as compressed gas.

Compressed acetylene gas is acetylene gas being dissolved in a container filled with solvents containing acetone etc. ; and thus, is a dissolved gas which is treated as a compressed gas as indicated above. Due to the high risk of explosive decomposition of compressed acetylene gas, it is regulated at 0.2 MPa, apart from other compressed gases.

Liquefied gases are currently in a liquid state and fall under any of the following:

- (a) Gas with boiling point of 40°C or less under atmospheric pressure; or
- (b) Liquid with boiling point higher than 40°C under atmospheric pressure and that are at a temperature higher than its boiling point.

Due to an enormous pressure created when liquefied gas is converted to compressed gas, it is regulated at 0.2 MPa, apart from other compressed gases.

The other specified liquefied gases are specified due to their dangers such as toxicity and flammability, and are regulated at 0 Pa or greater, apart from other liquefied gases.

Due to the outside air temperature reaching approximately 35°C in the summer in Japan, compressed gas and liquefied gas are regulated at the temperature of 35°C, in addition to the ordinance at the normal operating temperature.

Article 3 Exemptions

The provisions of this Act shall not apply to high pressure gases which are regulated under other laws and ordinances, such as the Ship Safety Act, Civil Aeronautics Act, Electricity Business Act, and the Act on the Ordinance of Nuclear Source Material, Nuclear Fuel Material and Reactors, and to other high pressure gases specified by a Cabinet Order which have no possibility of causing accidents or disasters. Diagram 2 shows examples of the exemptions.

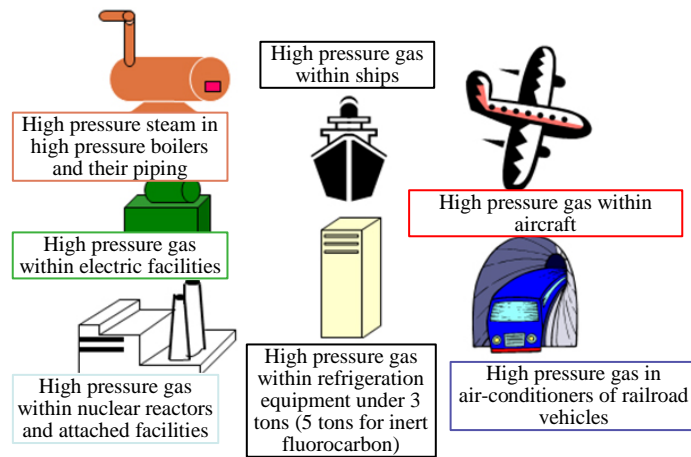


Diagram 2: Examples of the exemptions to the High Pressure Gas Safety Act

The provisions pertaining to the methods of manufacture and inspection of containers, etc., shall not apply to containers with an internal volume of 1 deciliter or less and to containers to be used without tight sealing.

2-2. Undertaking of Business (Chapter II)

Chapter II stipulates the production, storage, and disposal of high pressure gas. Table 4 summarizes the subdivisions of the provisions under Chapter II.

Table 4: Regulatory overview of production, storage, etc., of high pressure gas

| Type of handling | Procedures | Legal classification | Notes |
|------------------|--------------|-------------------------------------|--|
| Production | Permission | Class 1 Producer | Classified by processing (production) capacity of high pressure gas |
| | Notification | Class 2 Producer | |
| | Unnecessary | – | |
| Storage | Permission | Class 1 Producer | Classified by amount of high pressure gas stored |
| | Notification | Class 2 Producer | |
| | Unnecessary | – | |
| Sale | Notification | Dealer | |
| Transport | Unnecessary | – | |
| Import | Unnecessary | – | Requirement of import inspection when importing |
| Consumption | Notification | Specific High Pressure Gas Consumer | Classified by specific high pressure gas (stored amount, etc., for type and consumption) |
| | Unnecessary | – | |
| Disposal | Unnecessary | – | |

Examples of production (Class 1 Producer):

Oil refinery plants, petrochemical plants, chlorine production plants, production plants for semiconductor material gas, production plants for liquid oxygen by air separation equipment, filling pumps for CNG, hydrogen, and LPG, and filling stations for LPG or industrial gases (oxygen, nitrogen, acetylene, etc.)

Examples of production (Class 2 Producer):

Hospitals and ironworks using CE (oxygen, nitrogen, carbon dioxide, argon, etc.), laboratories of universities and research institutes, differential-pressure LPG pumps, home oxygen therapy (transfer of oxygen)

Examples of production (No procedure is necessary):

Air suspension, buffer devices (shock absorber, accumulator, etc.), automobile airbag gas producer

Examples of storage (Class 1 Storage Place):

Ironworks, hospitals, universities and research institutes, container storage for a Dealer (large-scale)

Examples of storage (Class 2 Storage Place):

Ironworks, hospitals, universities and research institutes, container storage for a Dealer (mid-scale)

Examples of storage (No procedure is necessary):

Hospitals, universities, and research institutes (small-scale), privately owned few containers

Examples of consumption (Specific High Pressure Gas Consumer):

Ironworks, hospitals (large-scale), semiconductor-related plants, universities and research institutes (large-scale or consumer of specific high pressure gas), plants receiving pipelines

Examples of consumption (No procedure is necessary):

Universities and research institutes (mid- to small-scale), welding and cutting at construction sites, scuba diving, home oxygen therapy

Furthermore, as indicated in Table 5, application of the Act to each action is implemented by defining cut-off values and exemptions.

Table 5: Exemptions for each action

| Action | Production | Storage | Sale | Transport | Import | Consumption | Disposal |
|--------------------------------|---------------|---------------------|---|---------------|--|-------------|----------------|
| Exemption by cut-off values | N/A | 0.15 m ³ | 5m ³ and Oxygen for medical use, 300 cc | N/A | N/A | N/A | N/A |
| Other provisions of exemptions | No provisions | No provisions | high pressure gas in automobile, in shock absorbers, etc. | No provisions | In shock absorbers, automobile airbag gas, aircraft life jackets, etc. | Inert gas | Air, Inert gas |

Contents of each ordinance are as follows:

Articles 5 to 14 and 21 Production

The Act classifies producers of high pressure gas into the 3 classes listed below based on the scale of their operations for ordinance. Permission and notification referred herein are required for each place of business (plant).

- (a) A person who shall obtain the permission of the prefectural governor;
- (b) A person who shall submit a notification report to the prefectural governor; or
- (c) A person who shall conduct production of high pressure gas in accordance with the technical standards specified, without requiring permission or notification.

For example, any person who falls under any of the following items shall obtain the permission of the prefectural governor, and those who have obtained such permission are referred to as Class 1 Producers:

- (a) A person who uses equipment with processing capacity of 100 m³ or more per day; or
- (b) A person who uses equipment with a refrigerating capacity of 20 tons or more per day.

However, in the case of a gas specified by a Cabinet Order, the values are those specified by such Cabinet Order.

Class 1 Producer shall comply with the following matters:

- (a) Maintain the facilities for production so as to keep the location, construction, and equipment of the facilities in conformity with the technical standards;
- (b) Produce high pressure gas in accordance with the technical standards;
- (c) Obtain the permission of the prefectural governor when intending to implement any change in the location, construction, or equipment of the facilities for production or to change the type of high pressure gas to be produced or the method of production thereof; and
- (d) Submit a notification report to the prefectural governor without delay, upon commencement or discontinuation of the production of high pressure gas.

Furthermore, disqualification for permission, standards for permission, revocation of permission, and succession are also prescribed.

Diagram 3 shows the subdivision of permission and notification of a producer of high pressure gas (excluding refrigeration).

Gases specified by a Cabinet Order include helium, neon, argon, krypton, xenon, radon, nitrogen, carbon dioxide, fluorocarbon (excludes flammable), and air.

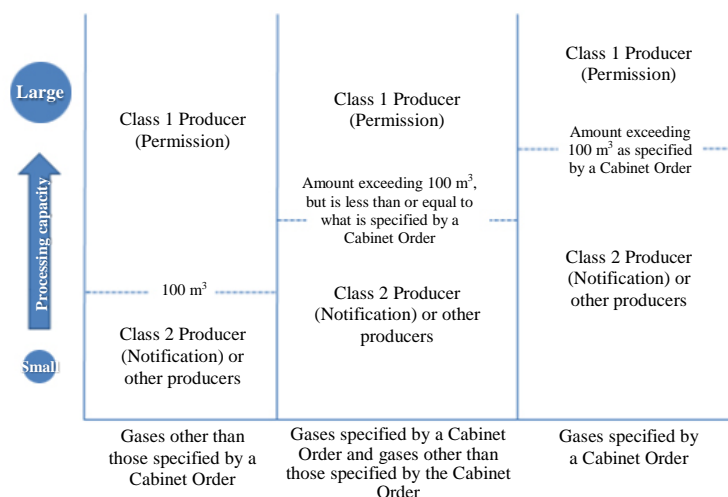


Diagram 3: Divisions of permission and notification of a producer of high pressure gas (excluding refrigeration)

Articles 15 to 19 and 21 Storage

The Act classifies storage places of high pressure gas into the following 3 classes based on their scale:

- (a) A storage place to be set up with the permission of the prefectural governor;
- (b) A storage place whose installation shall be notified to the prefectural governor; and
- (c) Storage place other than above

For any of the storage places above, the storage of high pressure gas shall be conducted in accordance with the technical standards specified by an Ordinance of METI.

A storage place to be set up with the permission of the prefectural governor is referred to as a Class 1 Storage Place. The owner or possessor of such storage place shall comply with the following matters:

- (a) Maintain the Class 1 Storage Place so as to keep its location, construction, and equipment in conformity with the technical standards; and
- (b) Obtain the permission of the prefectural governor when intending to implement any change in the location, construction, or equipment of the Class 1 Storage Place.

A storage place whose installation shall be notified to the prefectural governor is referred to as a Class 2 Storage Place. Provisions for the owner or possessor of such storage place are also provided.

Articles 20 to 20-3 Completion Inspection

Upon completion of the setting up of facilities for the production of high pressure gas or of the setting up of a Class 1 Storage Place, in principle, the person who was given permission by a prefectural governor shall subject such production facilities or Class 1 Storage Place to a completion inspection by the prefectural governor in order to verify its conformity with the technical standards.

However, this shall not apply in the following case:

- [a] When a completion inspection of said facility has been conducted by the Institute or a Designated Completion Conformity Inspection Body and a notification report thereof has been submitted to the prefectural governor

Upon completion of the work to change the location, construction, or equipment of the facilities for the production of high pressure gas or a Class 1 Storage Place, a person who has obtained permission by a prefectural governor shall subject such production facilities or Class 1 Storage Place to a completion inspection by the prefectural governor in order to verify its conformity with the technical standards.

However, this shall not apply in the following cases:

- [a] When a completion inspection of said facility has been conducted by the Institute or a Designated Completion Conformity Inspection Body and a notification report thereof has been submitted to the prefectural governor
- [b] When an Accredited Completion Inspection Executor has conducted a completion inspection and notified the records thereof to the prefectural governor.

In addition, a completion inspection for the following equipment is not required, if the production facility for said equipment undergoes a completion inspection within the period specified by an Ordinance of METI:

- (a) Equipment which has successfully passed the Designated Equipment Inspection and for which such a fact may be confirmed by a Designated Equipment Inspection Certificate; and
- (b) Equipment manufactured by a Registered Manufacturer of Designated Equipment and for which such a fact may be confirmed by a Designated Equipment Standards Conformity Certificate.

Furthermore, equipment which has been accredited as Specified Equipment and for which such a fact may be confirmed by Specified Equipment Accreditation Certificate is not required to be subjected to a completion inspection.

Articles 20-4 to 21 Sales

A person who intends to engage in the business of selling high pressure gas shall comply with the following matters:

- (a) Notify the prefectural governor of his/her intention prior to the business commencement for each sales location;

However, this shall not apply in the following cases:

- [a] A person who is engaged in the business of selling high pressure gases, such as compressed oxygen for medical use and others, as specified by a Cabinet Order at a sales location where the storage quantity is always less than 5 m³;
- [b] A person who intends to conduct a business of selling LPG specified by the Act on the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas; or
- [c] A person who continues to deliver high pressure gas and repeatedly do so for non-commercial purposes (for example, a person who intends to deliver propane gas as bonus goods).

- (b) Inform a buyer of those items specified by an Ordinance of METI which are deemed necessary to prevent the occurrence of accidents caused by said high pressure gas;
- (c) Sell high pressure gas in accordance with the technical standards specified by an Ordinance of METI;
- (d) Notify any change of the type of high pressure gas he/she sells to the prefectural governor without delay; and
- (e) Submit a notification report to the prefectural governor without delay upon discontinuation of the business of selling high pressure gas.

Article 22 Import Inspection

Any person who has imported high pressure gas shall have the imported high pressure gas and the container therefor undergo import inspection by the prefectural governor and may not remove said gas until it has been verified as being in conformity with the technical standards specified by an Ordinance of METI.

However, this shall not apply in the following cases:

- [a] When the import inspection of the imported high pressure gas and the container therefor has been conducted by the Institute or an Designated Import Conformity Inspection Body and a notification report thereof has been submitted to the prefectural governor;
- [b] When importing high pressure gas by unloading through a pipeline from a ship;
- [c] When importing the high pressure gas in shock-absorbers specified by an Ordinance of METI; or
- [d] Other cases specified by an Ordinance of METI as having no risk of interfering with the maintenance of public safety and the prevention of disasters.

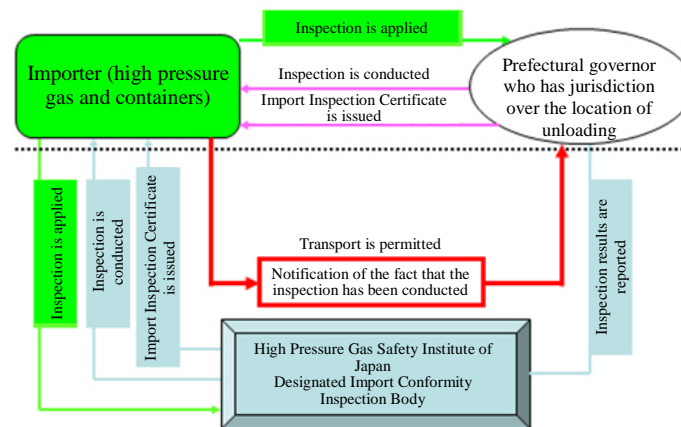


Table 4: Import procedure of high pressure gas

Article 23 Transportation

In transporting high pressure gas, the following matters shall be observed:

- (a) The necessary safety measures as specified by an Ordinance of METI shall be taken with respect to the containers;
- (b) In transporting high pressure gas in a vehicle, the technical standards provided by an Ordinance of METI shall be complied with as to the methods of loading and transportation; and
- (c) As for the pipeline transportation of high pressure gas, such pipeline shall be installed and maintained in accordance with the technical standards specified by an Ordinance of METI.



Photo 5 Transportation of liquid ammonia by a tanker truck

Articles 24-2 to 24-5 Consumption

The Act classifies persons who consume high pressure gas into the following 2 classes:

- (a) Specific High Pressure Gas Consumer; and
- (b) Consumer of high pressure gas specified by an Ordinance of METI, other than those specified as Specific High Pressure Gases

For example, a Specific High Pressure Gas Consumer shall comply with the following matters:

- (a) Report to the prefectural governor for each place of business prior to commencement of consumption;
- (b) Maintain the facilities for consumption so as to keep such facilities in conformity with the technical standards specified by an Ordinance of METI;
- (c) Consume in accordance with the technical standards specified by an Ordinance of METI;
- (d) Submit a report of changes to the prefectural governor when intending to implement any alteration construction or to change the type of Specific High Pressure Gases to be consumed or the method of consumption thereof; and
- (e) Submit a notification report to the prefectural governor without delay upon discontinuation of the consumption of Specific High Pressure Gas.

Specific High Pressure Gases referred herein include special high pressure gases (monosilane, phosphine, arsine, diborane, hydrogen selenide, monogermane, and disilane), and high pressure gases which exceed a certain storage quantity (or are received by pipelines), such as compressed hydrogen, compressed natural gas, liquid oxygen, liquid ammonia, liquefied petroleum gas, and liquid chlorine.

Furthermore, high pressure gases specified by an Ordinance of METI, other than those specified as Specific High Pressure Gases, include the following:

General High Pressure Gas Safety Ordinance:

inflammable gas, toxic gas, oxygen, and air

Liquefied Petroleum Gas Safety Ordinance:

Liquefied petroleum gas

Article 25 Disposal

The disposal of high pressure gases specified by an Ordinance of METI shall be conducted in accordance with the technical standards specified by an Ordinance of METI.

2-3. Safety (Chapter III)

Article 26 Hazard Prevention Rule

A Class 1 Producer shall draw up a Hazard Prevention Rule and shall submit a notification report thereof to the prefectural governor. Such notification shall be required likewise for any alteration being made to the Hazard Prevention Rule. In addition, a Class 1 Producer and his/her employees shall observe the Hazard Prevention Rule.

Article 27 Safety Training

Safety training for employees is stipulated as follows in the Act:

- (a) A Class 1 Producer shall conscientiously implement the Safety Training Program for his/her employees.
- (b) Any Class 2 Producer, owner, or possessor of a Class 1 Storage Place or Class 2 Storage Place, Dealer, or Specific High Pressure Gas Consumer shall provide their employees with safety training.

Articles 27-2, 28, and 32 to 34 Safety Controller and Other Personnel

The Act prescribes the appointment of persons in charge who possess specified qualifications, and assignment of duties as defined by the Act to such personnel in accordance with the scale of the plant. Notification report shall be submitted to the prefectural governor upon the appointment or dismissal of persons in charge. Furthermore, the persons in charge shall be required to take training courses given by the Institute or a Designated Training Agency on the prevention of high pressure gas accidents.

Diagram 5 shows the classifications and duties of persons in charge. Table 6 summarizes the examples of conditions of appointment.

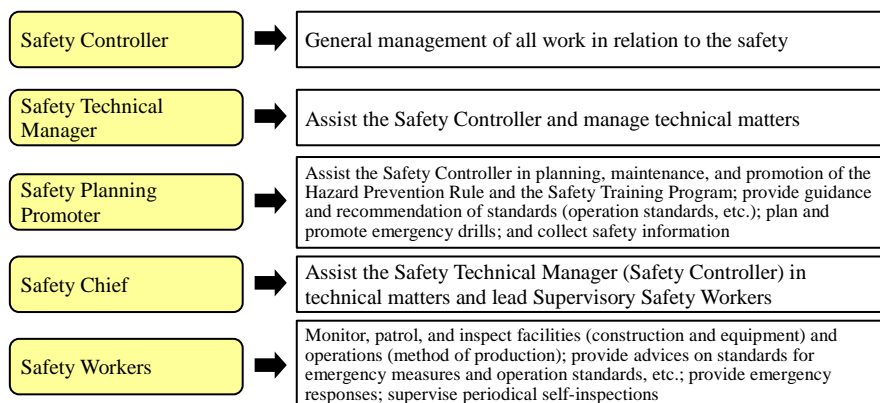


Diagram 5: Duties of the High Pressure Gas Production Safety Controller, Safety Technical Manager, etc.

Table 6: Examples of conditions of appointment for the High Pressure Gas Production Safety Controller, Safety Technical Manager, etc. (In the case of Class 1 Producer and Class 2 Producer who installs flammable liquefied gas pumps)

| Title | Division of appointment | Qualifications, etc. | * Obligatory training course |
|--------------------------|-------------------------|------------------------------|------------------------------|
| Safety Controller | Each plant | General manager of the plant | – |
| Safety Technical Manager | Each plant | Certificate and experience | – |
| Safety Planning Promoter | Each plant | Knowledge and experience | Yes |
| Safety Chief | Each facility | Certificate and experience | Yes |
| Safety Workers | Each facility and shift | Certificate and experience | Yes |

* Training courses given by the High Pressure Gas Safety Institute of Japan or an Authorized Training Agency

Articles 29 to 31-2 Certificate

The Act lists the following types of certificates, for which examinations of necessary knowledge and skills are conducted pertaining to production, sale, and the prevention of disasters caused by high pressure gas:

- (a) Class A Chemical Safety Management
- (b) Class B Chemical Safety Management
- (c) Class C Chemical Safety Management
- (d) Class A Mechanical Safety Management
- (e) Class B Mechanical Safety Management
- (f) Class 1 Refrigeration Safety Manager
- (g) Class 2 Refrigeration Safety Manager
- (h) Class 3 Refrigeration Safety Manager
- (i) Type 1 Sales Safety Chief
- (j) Type 2 Sales Safety Chief

The certificates of Class A Chemical Safety Management, Class A Mechanical Safety Management, and Class 1 Refrigeration Safety Manager are issued by the Minister of METI. Other certificates are issued by a prefectural governor.

In addition, the Institute is conducting the business to issue certificates as so entrusted by the most of the prefectural governors and the Minister of METI.

Article 35 Safety Inspection

With respect to facilities for production which may have the possibility of explosion or other disasters due to high pressure gas, a Class 1 Producer shall subject his/her facilities, periodically and in accordance with the provisions of an Ordinance of METI, to a safety inspection conducted by the prefectural governor.

However, this shall not apply in the following cases:

- [a] When a safety inspection of said facility has been conducted by the Institute or a Designated Safety Conformity Inspection Body and a notification report thereof has been submitted to the prefectural governor; or
- [b] When an Accredited Safety Inspection Executor has conducted a safety inspection and a notification report thereof has been submitted to the prefectural governor.

Article 35-2 Periodical Self Inspection

With respect to facilities for production or consumption specified by an Ordinance of METI, Class 1 Producers, Class 2 Producers who satisfy certain requirements, or Specific High Pressure Gas Consumers shall conduct self-inspections periodically for safety, and shall produce and keep inspection records thereof under the Act.

Table 7 shows the relationship between a safety inspection and a periodical self-inspection.

Table 7: The relationship between a safety inspection and a periodical self-inspection

| | Safety Inspection | Periodical Self-Inspection | |
|----------------------------------|--|---|---|
| Person subject to inspection | Class 1 Producers | Class 1 Producers or Class 2 Producers who satisfy certain requirements | Specific High Pressure Gas Consumer |
| Facilities subject to inspection | Facilities for production which may have the possibility of explosion or other disasters due to high pressure gas (Designated Facilities) | Facilities for production(The General High Pressure Gas Safety Ordinance and the Industrial Complex Safety Ordinance apply to High Pressure Gas Facilities) | Facilities for consumption |
| Frequency of inspection | Once per year | More than once per year | More than once per year |
| Inspecting body | Third-party inspection Prefectural governor The High Pressure Gas Safety Institute of Japan Designated Safety Conformity Inspection Body Accredited Safety Inspection Executor | Self-Inspection (Self-inspection supervised by a Supervisory Safety Worker) | Self-Inspection (Self-inspection supervised by an Operation Safety Chief) |
| Other | It is preferential to conduct a third-party inspection and self-inspection alternately to the extent possible; however, this shall not preclude the use of inspection records from a periodical self-inspection for a safety inspection. | | |

Articles 36 to 39 Measures Taken to Prevent Disaster, and Reporting, etc.

The Act stipulates the matters concerning safety, such as measures taken at the time of disaster and reporting, restricted use of fire, revocation of permission, and emergency measures.

2-4. Accreditation Regarding Completion Inspection and Safety Inspection (Chapter III-2)

Articles 39-2 to 39-12 Accreditation of Accredited Completion Inspection Executors and Accredited Safety Inspection Executors, mentioned in the provisions of Chapter II Completion Inspection and of Chapter III Safety Inspection, respectively, are stipulated. The main provisions are as follows:

- (a) Accreditation Criteria
- (b) Disqualification Clause
- (c) Investigation by the Institute, etc.
- (d) Duty of Accredited Persons
- (e) Revocation of Accreditation, etc.

2-5. Containers, etc. (Chapter IV)

Articles 41 to 56-2-2 Containers and Accessories Therefor

Manufacturing, inspection, stamping, filling, reinspection, etc., of containers to be filled with high pressure gas are prescribed. In addition, inspection, stamping, reinspection, etc., of accessories are also stipulated. The details are to be referred to in the separate material for the Container Safety Ordinance.



Photo 6: General seamless container



Photo 7: Welded container



Photo 8: Ultra-low temperature container

Articles 56-3 to 56-6-23 Designated Equipment

Inspection, marking, registration of Registered Manufacturer of Designated Equipment, etc., of Designated Equipment are prescribed. Among equipment for high pressure gas production (including storage incident thereto), the equipment for which inspection of its design or material quality or inspection in the process of its manufacturing is deemed particularly necessary for the prevention of explosions or other accidents due to high pressure gas and which is specifically designated by an Ordinance of METI is referred to as Designated Equipment. The details are to be referred to the separate material for the Designated Equipment Inspection Ordinance.



Photo 9: Designated Equipment (tower)



Photo 10: Designated Equipment (heat exchanger)



Photo 11: Designated Equipment (spherical reservoir)

Articles 56-7 to 56-9 Specified Equipment

Accreditation and accreditation certificate of Specified Equipment are described. Among equipment for the production (including storage incident thereto) of high pressure gas, equipment which has no risk of interfering with the maintenance of public safety and the prevention of disasters and which is specified by a Cabinet Order is referred to as Specified Equipment and is classified into the following 2 types:

- (a) Equipment which produces high pressure gas by liquefying the air in order to produce nitrogen (General Ordinance and Industrial Complex Ordinance); and
- (b) Equipment which produces high pressure gas by compressing or liquefying inert gas for refrigeration (Refrigeration Ordinance).

Article 57 Refrigeration Apparatus

The technical standards, etc., concerning manufacturing of apparatuses to be exclusively used in refrigeration equipment are prescribed.

2-6. Designated Examining Body, etc. (Chapter IV-2)

Articles 58-3 to 59 The standards for authorization, disqualification clause, revocation of authorization, etc., are prescribed for the following designated agencies:

- (a) Designated Examining Body
- (b) Designated Completion Conformity Inspection Body
- (c) Designated Import Conformity Inspection Body
- (d) Designated Safety Conformity Inspection Body

- (e) Designated Container Conformity Inspection Body
- (f) Designated Conformity Inspection Body for Designated Equipment
- (g) Designated Accreditation Agency for Specified Equipment
- (h) Investigation Agency of Inspection Organization

2-7. The High Pressure Gas Safety Institute of Japan (Chapter IV-3)

Articles 59-2 to 59-36 Purpose, officers and staff, and services of the Institute are defined.

The main services of the Institute and matters that require authorization of the Minister of METI are listed below; however, the details are to be referred to in the separate materials specifically pertaining to the Institute.

The main duties of the Institute:

- Conduct studies and research, provide guidance, and gather and furnish information concerning the safety of high pressure gases;
- Provide advice and suggestions to the Minister of METI concerning technical matters relating to the safety of high pressure gases;
- Provide training courses on the prevention of high pressure gas accidents or the courses, whose completion allows exemptions of the Production Safety Management Examination or Sales Safety Chief Examination;
- Conduct a Designated Equipment Inspection, container inspection, accessory inspection, completion inspection, safety inspection, or other inspections as necessary for the safety of high pressure gas;
- Conduct investigations of accreditation pertaining to completion inspection and safety inspection, or of registration of manufacturers of containers and manufacturers of designated equipment;
- Accredite Specified Equipment; and
- Conduct business to issue certificates or examination services for Safety Technical Manager Certificate and Sales Safety Chief Certificate.

Affairs that require the authorization of the Minister of METI:

- Any amendment to the Articles of Incorporation of the Institute
- Appointment or dismissal of officers
- Institute's Business Rules
- Business plan and an estimate of revenues and expenditures

2-8. Miscellaneous Provisions (Chapter V)

Article 60 Books

Any Class 1 Producer and Designated Examining Body, etc., shall arrange and keep books to record matters as prescribed by an Ordinance of METI.

Article 61 Demand for Report

When the Minister of METI or the prefectural governor finds it necessary for the maintenance of public safety or the prevention of disasters, he/she may demand a report on the business from any Class 1 Producer, Designated Completion Conformity Inspection Body, etc.

Article 62 Entrance for Inspection

When the Minister of METI or the prefectural governor finds it necessary for the maintenance of public safety or the prevention of disasters, he/she may send his/her staff to enter any office, etc., of any high pressure gas producer, Designated Completion Conformity Inspection Body, etc., and cause such staff to inspect the books and other necessary articles or question the persons concerned.

Article 63 Notification Report of Accident

Any person who handles high pressure gas or containers shall, in the following cases, submit a notification report thereof to the prefectural governor or police official without delay:

- (a) When an accident has taken place with respect to high pressure gas that he/she owns or possesses; or
- (b) When high pressure gas or any container he/she owns or possesses has been lost or stolen.

Furthermore, for the purpose of promptly and appropriately conducting works associated with accidents caused by high pressure gases to which the provision of the Act applies, Emergency Response Manual of the High Pressure Gas Safety Act (Circular Notices (Internal Rules)) is established, along with the definitions of accident, types of accidents, report forms, etc.

Article 64 Prohibition to Change Existing Conditions

When an accident due to high pressure gas has taken place, no person shall change the existing conditions without instructions by the Minister of METI, the prefectural governor, or a police official except for the security of traffic or other inevitable reasons of public interest.

Articles 65 to 79-2 Condition of Permission, Fees, etc.

Condition of Permission, fees, public notices, and interim measures are stipulated.

2-9. Penal Provisions (Chapter VI)

Articles 80 to 86 Violation of the Act is subject to punishment.

For example, any person who falls under any of the following items shall be punished by imprisonment with labor of not more than 1 year or a fine of not more than 1,000,000 yen, or both:

- (a) A person who has produced high pressure gas without obtaining permission;
- (b) A person who has violated an order by a prefectural governor to suspend production;
- (c) A person who has violated an order by a prefectural governor to suspend the use of facilities for production or has violated prohibition or restriction of production;
- (d) A person who has violated a Disaster Prevention Order by the Minister of METI or a prefectural governor; or
- (e) A person who has violated the revocation of registration of a container inspection station or an order to suspend container reinspection or accessory reinspection by the Minister of METI.