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## **GB/T** 34525-2017

# **Safety rules for handling, loading and unloading, storing and using of cylinder**

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GB/T 34525-2017

**Preface**

This standard was drafted in accordance with the provisions of GB/T 1.1-2009.

It shall be noted that some contents in this document may involve patents. The issuing body of this document shall not be responsible for the identification of any or all such patent rights. This standard is proposed by and under the centralized management of China Gas Cylinders Standardization Technical Committees (SAC/TC 31).

This standard was drafted by Hangzhou New Century Mixed Gas Co., Ltd., Beijing AP BAIF Gases Industry Co., Ltd., Beijing Praxair Utility Gas Co., Ltd., and China Industry Gases Industry Association.

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**Safety rules for handling, loading and unloading, storing and using of cylinder**

**1 Scope**

This standard specifies the basic safety technical requirements for handling, loading and unloading, storing and using of gas cylinder in production, operation, storage and above places.

This standard is applicable to seamless cylinders, welded cylinders, welded insulated cylinders, wound cylinders and filled cylinders at the normal ambient temperature of -40℃ ~ 60℃. With the nominal volume of 0.4 L~ 3000 L, the nominal working pressure of 0.2 MPa ~ 35 MPa (gauge pressure, the same below) and the product of pressure and volume of greater than or equal to 1.0 MPa, these cylinders are used to fill compressed gases, high (low) pressure liquefied gases, cryogenic liquid gases, dissolved gases, adsorbed gases, liquid with standard boiling point equal to or lower than 60℃ and gas mixture.

This standard does not apply to the below cylinders, namely, the cylinders for fire extinguishers that only bear the instantaneous pressure during fire fighting but not the pressure during storage, the cylinder type pressure vessels for fixed use, as well as the cylinders for military equipment, nuclear facilities, aerospace vehicles, railway locomotives, marine facilities and ships, civil airport special equipment, vehicle cylinders, long tube trailers, cylinders with large volume for tube bundle vehicle containers.

**2 Normative references**

The following documents are essential to the application of this document. For dated references, only the dated versions shall be applicable to this document. For any undated references, the latest version (including all amendments) is applicable to this document.

GB/T 7144 Coloured cylinder mark for gases

GB/T 13005 Terminology of gas cylinders

GB/T 16804 Precautionary labels for gas cylinders

GB/T 26571 Specification for the shelf life of a specialty gas

GB/T 28054 The bundles of seamless steel gas cylinders

JT 617 Regulations concerning road transportation of dangerous goods

**3 Terms and definitions**

Terms and definitions defined in GB/T 13005 and GB/T 28054 are applicable to this document.

**4 Operators**

4.1 Operators conducting the handling, loading and unloading, storing and using of cylinders shall hold relevant certificates according to relevant regulations.

4.2 The operators shall understand the characteristics of the cylinder and the medium in it, relevant requirements and emergency handling technology in case of accidents.

4.3 Operators shall check the safety of cylinders during operation in a regular manner and take measures in time in case of problems found.

**5 Labor protection**

5.1 The operation unit shall be equipped with necessary personal protective equipment (PPE) and on-site first aid kit.

5.2 The operators shall wear the corresponding PPE and take corresponding personal and body protection measures during operation.

5.3 The operation unit shall provide regular health examination and training of accident prevention and first aid knowledge for the operators.

5.4 Once human body suffered damages from the cylinder, such as bruise, injuries by falling objects, burns, poisoning, etc., it shall be provided with immediate on-site first aid and promptly sent to the hospital for treatment.

**6 Handling, loading and unloading equipment**

6.1 All kinds of handling, loading and unloading machinery and tools shall be provided with reliable safety factors.

6.2 Machinery and tools for handling, loading and unloading inflammable and explosive cylinders shall be provided with measures to prevent explosion, eliminate static electricity or avoid sparks.

**7 Handling, loading and unloading of cylinders**

**7.1 Handling of cylinders**

7.1.1 When handling cylinders in a close range, the cylinders with concave bottom or with round base shall be handled through tilting and rolling with bare hands. For cylinders with square base, safe and labor-saving special trolley shall be used. If the distance is far or the road surface is uneven, they shall be handled with special machinery and tools and properly fixed with iron chains. They shall not be carried on the shoulder, on the back, in the arms, under the arms, by lifting, or by two people.

7.1.2 When cylinders of different natures are handled at the same time, their loading shall be carried out in accordance with the requirements of the dangerous goods loading table specified in JT 617.

7.1.3 It is not allowed to handle the cylinder with a tilting cart or tractor shovel. When handling the cylinder with e the forklift, it shall be put into the container lattice or the container basket.

7.1.4 In case that lifting is required during cylinder handling, electromagnetic lifting equipment shall not be used. When lifting cylinders in bulk with mechanical lifting equipment, the cylinder shall be put into the cylinder lattice or cylinder basket and fixed properly. It is not allowed to lift the cylinder through chain rope, steel wire rope binding or cylinder cap hooking.

7.1.5 In case of gas leakage, combustion and other dangerous situations in the process of handling, the handling personnel shall handle it urgently and effectively based on the reasons of the danger.

7.1.6 After the cylinder is transported to the destination, it shall be placed safely and reliably on the ground which shall be flat to prevent dumping or rolling.

**7.2 Loading and unloading of cylinders**

7.2.1 Cylinders shall be loaded and unloaded with care to avoid collision with each other or other hard objects. They shall not be loaded and unloaded through throwing, rolling, sliding, falling and collision.

7.2.2 When the cylinder is lifted manually to a high place or needs to be lowered to the ground from a high place, it shall be operated by two people jointly, and the lifting and landing actions shall be coordinated. The cylinder shall be lifted and lowered gently, and shall not be tossed, thrown nor slipped or dropped during lifting and lowering.

7.2.3 When loading, unloading and handling the wound cylinder, protective measures shall be taken to prevent the composite layer of the cylinder from wearing and scratching, as well as the cylinder from getting damp.

7.2.4 When loading and unloading the cylinder, the cylinder cap shall be equipped, and the valve of the cylinder shall be protected to prevent damage.

7.2.5 When unloading the cylinder, the lead pad or rubber pad shall be laid on the landing point of the cylinder. The cylinder shall be unloaded one by one, and multiple cylinders unloaded continuously shall not be allowed.

7.2.6 During the loading and unloading operation, the valve shall not be aimed at the human body, the cylinder shall be rotated vertically, rolling or passing and receiving the cylinder out of hand is not allowed, and the cylinder shall be placed upright safely and stably.

7.2.7 When loading and unloading toxic gases, corresponding anti-virus measures shall be taken in advance.

7.2.8 When loading and unloading oxygen and oxidizing gas cylinders, the work clothes, gloves, handling tools and machines and tools shall not be stained with grease.

**8 Cylinder storage**

**8.1 Inspection and handling of cylinders before storage**

8.1.1 The cylinder shall be in the charge of a specially assigned person and inspected one by one before storage. The inspection shall at least include the followings:

a) Cylinders shall be produced by units with "Special Equipment Manufacturing License";

b) Imported cylinders shall be approved by the Special Equipment Safety Supervision and Management Department;

c) The gas to be stored shall be consistent with the name or chemical formula of the filled gas described in the manufacturing steel seal mark of the cylinder;

d) The name and chemical formula of the filled gas printed on the warning label made according to GB/T 16804 shall be consistent with the steel seal mark of the cylinder;

e) Carefully checking that the thread of the air outlet of the cylinder valve is consistent with the thread type specified by the filled gas, and all parts of the anti-misloading joint shall be flexible and easy to use;

f) The colour mark on the outer surface of the cylinder shall conform to the provisions of GB/T 7144 and be clear and easy to recognize;

g) The outer surface of the cylinder shall be free of cracks, serious corrosion, obvious deformation, and other serious external damage defects;

h) The cylinder shall be within the stipulated validity period of inspection and effective service life;

i) The safety accessories of the cylinder shall be complete, be within the specified validity period of inspection and meet the safety requirements;

j) Regarding the cylinder filled with oxygen or other strongly oxidizing gas, the cylinder body and valve shall not be contaminated with grease or other combustible materials.

8.1.2 The cylinder that fails to meet the requirements after inspection shall be stored in isolation from the qualified ones and marked clearly to prevent confusion.

**8.2 Cylinder storage**

8.2.1 Special personnel shall be assigned to manage the storage of cylinders.

8.2.2 Empty cylinders, solid cylinders and unqualified cylinders shall be stored separately with obvious area and mark.

8.2.3 For the storage of gas cylinders of different natures, the assembly shall be in accordance with the requirements of JT 617.

8.2.4 After the cylinder is put into storage, it shall be fixed to prevent the cylinder from dumping.

8.2.5 The gas stored within a time limit shall be stored according to the requirements of GB/T 26571 and the storage duration shall be indicated.

8.2.6 During the storage of cylinders, the temperature and humidity in the warehouse shall be tested and recorded in a regular manner. The maximum allowable temperature and humidity of the warehouse are determined based on the nature of the gas in the cylinder. A temperature control alarm device can be arranged when necessary.

8.2.7 The cylinders shall be placed neatly in the warehouse, and the number and position marks shall be obvious. A channel shall be reserved for handling the cylinders in a short distance.

8.2.8 The warehouse for the storage of toxic and combustible gases and oxygen and inert gases shall be equipped with corresponding detection and alarm devices for detecting dangerous concentrations.

8.2.9 In case of cylinder leakage, first, human body protection shall be done according to the nature of the gas. Then the cylinder valve shall be closed on the premise of ensuring safety. If the cylinder valve is out of control or the leakage is not on the cylinder valve, emergency treatment measures shall be taken.

8.2.10 The electrical equipment and safety protection facilities inside and outside the warehouse shall be inspected regularly.

8.2.11 It is necessary to establish and implement the system of cylinders in and out of the warehouse, and make sure that the accounts of the cylinder warehouse are clear, the quantity is accurate, the inventory is made on time, the accounts and materials are consistent, and first in first out.

8.2.12 When the cylinder is in and out of the warehouse, the warehouse keeper shall carefully fill in the registration form of in and out of cylinders, which includes: gas name, cylinder number, in and out date, user, operator, etc.

**9 Key points for safe use of cylinder**

9.1 When using gas cylinders, the users and operators shall:

a) Reasonable use and correct operation of the cylinder, checking it according to the requirements of 8.1.1. It can be used after meeting the requirements.

b) The user shall make sure the special cylinder is used for the special purpose, and shall not change the steel seal and color mark of the gas without permission.

c) The cylinder shall be placed vertically when being used, and shall be provided with measures to prevent dumping.

d) When moving the cylinder in a close range, it can be moved through tilting and rolling with bare hands. When moving it to a distant place, it can be transported by a light trolley. Rolling, sliding or turning over is not allowed. When the cylinder is used on the construction site, it shall be placed on the special vehicle or fixed for use.

e) When using the cylinder filled with oxygen or other strongly oxidizing gas, the cylinder body and valve shall not be contaminated with grease or other combustible materials. The work clothes, gloves, handling tools and machines and tools of the users shall not be stained with grease.

f) When installing pressure reducing valve or busbar, checking whether the thread of clamp or connecting nut is in good condition. The pressure reducer, joint, conduit and pressure gauge used to connect the cylinder shall be painted with marks and used on a special type of cylinders.

g) Opening or closing the cylinder valve with a hand or special purpose spanner instead of a hammer, pipe wrench or long handle thread wrench.

h) Opening or closing the cylinder valve slowly.

i) In case of leakage of cylinder valves, no gas when it is opened or other defects found, the cylinder valve shall be closed, marked and returned to the cylinder filling unit for treatment.

j) The gas in the cylinder shall not be used up, and residual pressure shall be reserved.

k) In case of any use occasions that may cause backflow, the use equipment shall be equipped with devices to prevent backflow.

1) The gas in the cylinder shall not be transferred into other cylinders, and the residual gas in the cylinder shall not be disposed of by oneself.

m) The cylinder use site shall be provided with an area for empty cylinders and an area for full cylinders with obvious marks.

n) The cylinder shall not be knocked or collided.

o) Arc striking by electric welding shall not be carried out on the cylinder.

p) Cylinders shall not be used as supports or other inappropriate purposes.

9.2 The cylinder operators shall ensure that the cylinder is used under normal ambient temperature to prevent accidental heating of the cylinder:

a) The cylinder shall not be close to the heat source. Within 10 m around the place where the cylinder is placed, no open fire or operation that may produce sparks shall be carried out (when working at height, the distance is the vertical projection distance on the ground);

b) When the cylinder is used in summer, it shall be prevented from being exposed to the sun;

c) When the cylinder valve is frozen, the cylinder shall be moved to a warmer place and thawed with warm water or a heat source with a temperature not exceeding 40 ℃.

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