



Guideline IO-1.0: Safe Handling, Storage and Use of Industrial Compressed Gas Cylinder

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1.0 Introduction:

Compressed gas cylinders are widely used in “Fabrication, Pilot plant, Laboratory, small scale manufacturing and processing operations as a way to provide convenient, economical and safe source of high-pressure gases for various application. These gases can be inert, flammable, toxic or oxidizing (or mixture of any or all) and are typically supplied at pressures ranging from 800 psig to 6,000 psig, with 2,500 psig being common.

2.0 Scope:

These guidelines aim to promote safer use of portable compressed gas cylinders, covers awareness of potential hazards & precautionary measures to be taken, advices on safe operating procedures and on the need for training, personal protective equipment, fire precautions, maintenance, examination and testing of equipment.

3.0 Guidelines:

3.1 Cylinder Basics & Identification

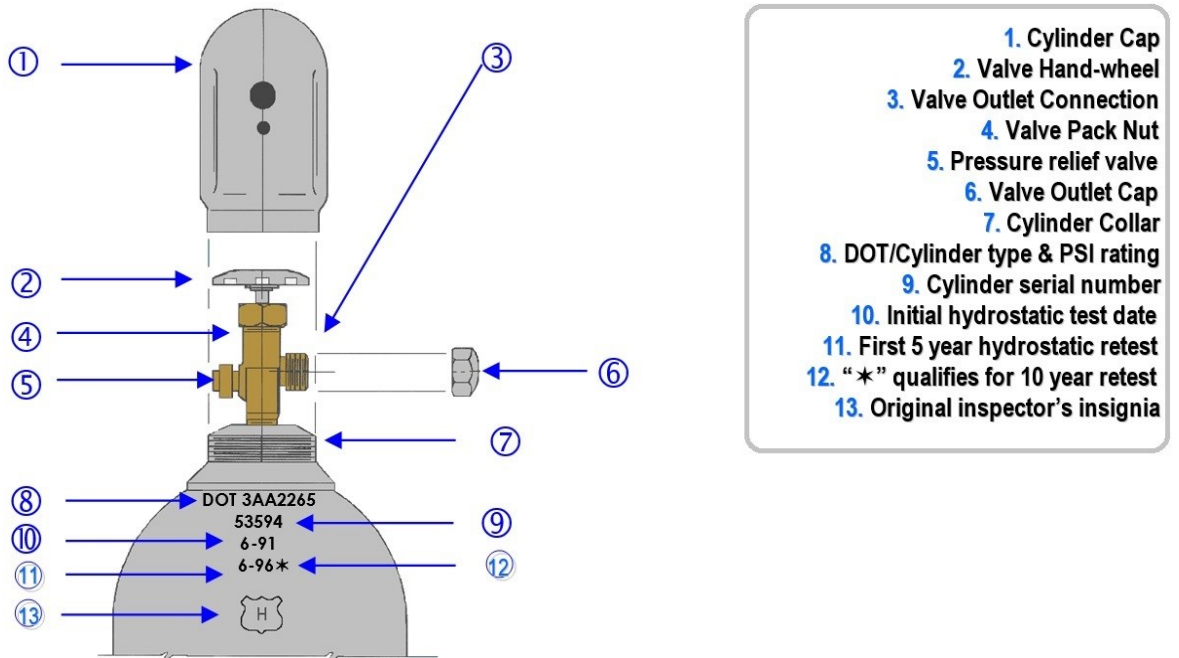


FIGURE 1. Key components of a compressed gas cylinder

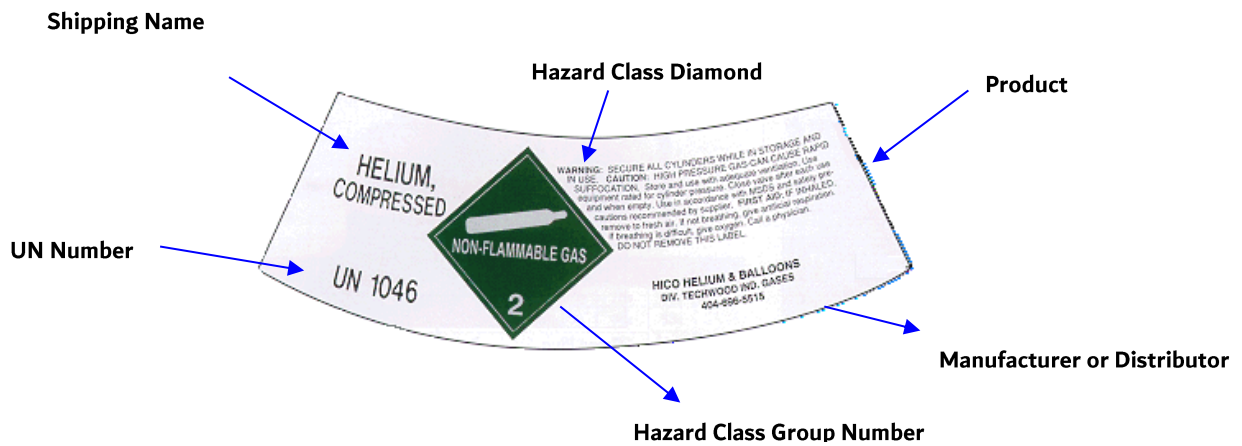


FIGURE 2. The manufacturer’s label provides critical information to assist the end user

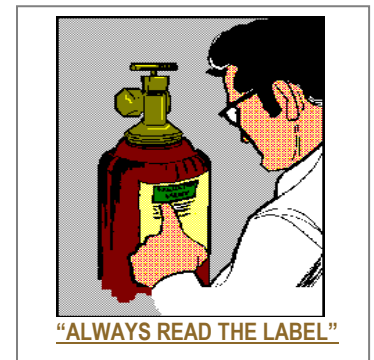


FIGURE- 3. Common Gas cylinder forms & sizes

- a) All compressed gas cylinders received, used or stored shall be legibly marked, for the purpose of identifying the gas content, with either the chemical or the

trade name of the gas. Such marking shall be by means of stencilling, stamping or labelling, and shall not be readily removable. It is manufacturer's and shipper's responsibility to label the cylinder.

- b) Do not accept the cylinder without appropriate label. If the labelling on the cylinder becomes unclear or an attached tag is defected to the point the contents cannot be identified, the cylinder should be marked "Contents unknown" and returned directly to the manufacturer.
- c) All label of the industrial gas cylinders should be identified by colour coding - The labels should be colour coded to distinguish the content and hazard involved (such as flammable, toxic, or corrosive substances); **NEVER RELY ON THE COLOUR OF CYLINDER FOR IDENTIFICATION** – cylinder colour is not reliable since it may vary with the supplier. Additionally, labels on the caps have diminutive value as caps are interchangeable
- d) The date of manufacturing or last hydrostatic test shall be clearly and legibly displayed on cylinders.
- e) Safety Data Sheet (SDS) must be obtained and maintained for all types of compressed gases.



3.2 General Handling Procedures:

- a) All personnel involved in handling compressed gas cylinders shall be trained in safe handling and use of compressed gas cylinder and are fully aware of the hazards associated with it.
- b) All personnel shall be provided with appropriate personal protective equipment depending on the types of gas being handled.
- c) All cylinders must be transported, stored and used upright, and must be securely fastened to prevent them from falling or being knocked over. Suitable racks, straps, chains or stands are required to support the cylinders.



- d) Never move a cylinder with the regulator attached. Do not move cylinders by rolling, carrying, sliding, or dragging them across floor.
- e) Cylinders shall not be dropped or be allowed to be strike/hit violently.
- f) All cylinders must be in good condition with an operable valve or regulator. Cylinders without valves and regulators should be capped.
- g) Make sure the protective cap covers the cylinder valve when not in use (empty or full). Regulators are to be protected with covers where there is likelihood of damage.
- h) Safety devices in valves or on cylinders shall not be tampered.
- i) Never force a cap or regulator. The cap should be hand tight.
- j) Cylinders shall not be exposed in extreme temperature, spark producing electrical tools, cigarettes, and open flame nor stored in the vicinity of combustibles.
- K (Cylinders shall not be exposed to excessive dampness, or to corrosive chemicals or fumes.
- L) Chains or a clamp-plus-strap assembly are the most common methods of keeping cylinders in upright position. Ensure the chain or strap is attached appropriately to prevent the cylinder(s) from falling over.
- m) No transfer of Gases shall be carried out from one cylinder to another, do not try to refill compressed gas cylinders unless the licensed activity permits to carryout & subsequent approval obtained from EHS department.
- n) Under no circumstances should any attempt be made to repair a cylinder or valve.
- o) If leaking cylinder is discovered move it to safe place (if it is safe to do so) and inform "Emergency Control Center (048833111 or 997). Supplier/vendor shall be called as soon as possible.



3.3 Use of Compressed Gas Cylinders:

- a) Always inspect all parts of a compressed gas cylinder before use. A soapy water solution may be used to check for leaks.
- b) The threads on a regulator shall be identical to those on the cylinder valve outlet. Connections that do not fit shall not be forced on.
- c) **Cylinders shall not be used without a regulator**, always use a correct pressure regulator. Regulators and pressure gauges shall be used only with gases for which they are designed and intended.

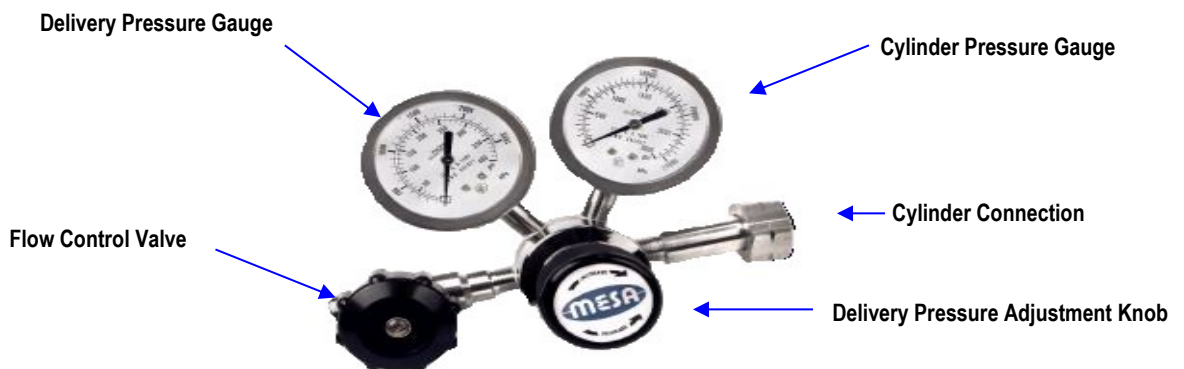
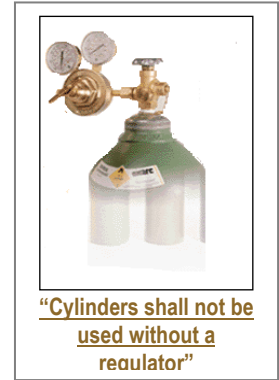


FIGURE 4. Component of a pressure regulator

- d) Before using or making connection to cylinder valve outlet, the valve shall be cracked opened for an instant to clear the opening of particles of dust or dirt. The valve and opening shall always be pointed away from the body and not toward anyone else. Fuel gas cylinder valves shall not be even slightly opened for an instant particularly near to other welding work, sparks, open flames, or other possible sources of ignition.
- e) Only approved tools shall be used to open or closed cylinder valves. Do not use wrenches/hammer or any other tools in opening valves equipped with hand wheels. Spark proof tools shall be used when working with flammable gas cylinders.
- f) Oil or grease shall never be used as a lubricant on valves or attachments of oxygen cylinders. Oxygen cylinders and fittings shall be kept away from oil and grease such cylinders or apparatus shall not be handled with oily hands, gloves, or clothing.

- g) After attaching the regulator to cylinder valve outlet and before the cylinder is opened; turn the delivery pressure adjustment knob counter-clockwise until it turns freely. Ensure the flow control valve is in the closed position
- h) Slowly open the cylinder valve until the regulator registers the cylinder pressure. Turn the delivery pressure adjustment knob clockwise until the desired delivery pressure is reached.
- i) Cylinders shall never be brought into confined spaces or unventilated rooms.
- j) “Flash back arrestor and Non Return Valve” shall be provided for cutting set (fuel gas and oxygen cylinder being used).
- k) “Permit to work” system should be followed while carrying out non-routine activity such as hot works or involving toxic gases.
- L) Cylinders shall not be completely empty, always leave a residual pressure of 30 psi
- m) Cylinders should be placed with the valve accessible at all the times. The main cylinder valve should be closed as soon as it is no longer necessary that it be open (i.e. It should never be left open when the equipment is unattended or not operating).



3.4 Storage of Compressed Gas Cylinders:

- a) Rooms or cabinet containing compressed gases must be conspicuously labeled “COMPRESSED GAS”. Cylinder storage area must be prominently posted with the hazard class and the name of the gases stored.
- b) Empty cylinder shall be marked “EMPTY” and shall be stored apart from full cylinders while waiting to be removed.
- c) When gases of different types are to be stored in the same location, cylinders shall be grouped by the type of gas and arranged taking into account the type of gas contained. Flammable gases shall not be stored near to corrosive/oxidizing gases.

- d) Ensure that storage rooms are fire resistant, dry, cool and well ventilated. Cylinders shall not be stored at temperatures above 51 oC (125 oF) or near to Furnace/Boilers or other sources of heat. Cylinders shall be shaded from the direct rays of the sun.
- e) Cylinders shall be stored a minimum of 20 Ft. (6 meters) with flammable and/or incompatible materials, and minimum of 10 FT. with combustible materials including vegetation.
- f) Inside buildings or storage room, there should be a separation of 20 Ft. between oxygen and fuel gas cylinders unless there is fire-resistive partition between them.
- g) All the electrical fixtures shall be of explosion proof material in flammable gas storage area.
- h) Cylinders shall be protected from any object that will produce cut or other abrasion in the surface of the metal. Do not store near elevators or gangways, or in locations where heavy moving objects may strike or fall on them.
- i) All gas cylinders shall be capped with protective guards and secured in upright position when stored. Nesting of cylinders is not permitted.
- j) A “No smoking” policy shall be implemented within or in the vicinity of cylinder stores and warning notices to this effect shall be prominently displayed.
- k) Storage, use and handling areas shall be secured against unauthorized entry or access to unauthorized personnel.



3.5 Transport of Compressed Gas Cylinders:

- a) All vehicles transporting compressed gas cylinders shall be approved by Dubai Municipality & Civil Defence for the same purpose. All vehicle entering in Dubai World jurisdiction shall obtain a prior Approval/ Entry Permit from EHS Department in accordance with the Procedure for Obtaining EHS Entry Permit for Gas Cylinder-Liquefied Gas Vehicle.
- b) The name of the distribution/transporting company shall be written clearly on the truck/vehicle.





- c) Cylinder of different gas shall not be mixed together in same container when being transported. Oxygen cylinders shall not be transported together with acetylene and other forms of flammable gas cylinders.
- d) Cylinders should not be rolled or dropped on the ground from vehicles onto rubber tires or similar packaging but shall be lowered under controlled conditions.
- e) If more than one cylinder has to be lifted, “a properly designed and certified cradle shall be used”.
- f) Trucks/vehicle shall be provided with a minimum of 2 Dry chemical power extinguishers of 6 kg each and shall be maintained in good condition.
- g) Driver/personnel carrying compressed gases should be trained in safe handling & transportation, and ensure that they are familiar with the properties of contents, the hazards involved and emergency procedures to be followed.



3.6 Emergencies:

- a) In an event of leak or suspected leak of gas, evacuate the building or area. Activate the alarm and contact Dubai Civil Defence (DCD) (997).
- b) An emergency plan shall be prepared when handling compressed gas cylinder. The plan shall include the following information:
 - i. The type of emergency equipment available and its location (e.g. fire extinguisher, emergency eyewash & shower)
 - ii. The hazard identification labelling
 - iii. The location of posted emergency response plan
 - iv. Safety Data Sheet (SDS) and inventory for each compressed gas
 - v. List of personnel who are designated and trained to be liaison personnel for DCD and emergency responders

4.0 References

- DM Technical Guidelines No. 6
- Health and Safety Guidelines 139; Health and Safety Executive, UK
- NFPA 55
- Compressed Gas Association (CGA) Standards
- OSHA Standard for General Industry