

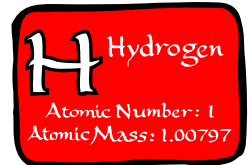
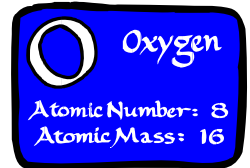
TECH Bulletin: Gas Cylinders

GAS CYLINDER HANDLING & STORAGE

Compressed Gas Cylinders

Gas cylinders are constructed and maintained in accordance with regulations of the Department of Transportation (DOT). The purchaser should make sure all cylinders bear DOT specification markings, and the contents should be legibly marked on each cylinder in large letters.

- ♦ **Oxygen** is supplied in steel cylinders under pressure of 2,200 psi. A cap should be provided to protect the outlet valve when the cylinder is not connected for use. *The fastest drag racer can reach 30 mph in 1 or 2 seconds. A compressed oxygen cylinder can reach 30 mph in less than 0.01 second. This is enough momentum to make it rocket through a cinder block wall over 200 feet away.*
- ♦ **Hydrogen** is supplied in cylinders under pressure of 2,000 psi. It may ignite in the presence of air or oxygen when in contact with a spark, open flame or other source of ignition. Hydrogen-air mixtures ranging from 4.1 to 74.2 percent hydrogen are flammable.
- ♦ **Acetylene** for welding and cutting is usually supplied in cylinders under pressure of 250 psi.



Handling Cylinders

Serious accidents may result from the misuse, abuse, or mishandling of compressed gas cylinders. Only competent employees should be assigned to handling of cylinders under pressure. Observance of the following rules will help control hazards in the handling of compressed gas:

- ♦ Accept only cylinders approved for use in interstate commerce for transportation of compressed gases.
- ♦ Do not remove or change numbers or marks stamped on cylinders.
- ♦ Because of their shape, smooth surface, and weight, cylinders are difficult to carry by hand. Cylinders may be rolled on their bottom edge but never dragged. Cylinders should be transported on a hand or motorized truck, suitably secured to keep them from falling.
- ♦ Do not lift compressed gas cylinders with an electromagnet. Where cylinders must be handled by crane or derrick, as on construction jobs, carry them in a cradle or suitable platform and take extreme care that they are not dropped or bumped. Do not use slings.
- ♦ Do not drop cylinders or let them strike each other violently.
- ♦ Do not tamper with the safety devices in valves or on cylinders.
- ♦ When empty cylinders are to be returned to the vendor, mark them "Empty" or "MT" with chalk. Close the valves and replace the valve protection caps, if the cylinder is designed to have a cap.
- ♦ Load cylinders to be transported to allow as little movement as possible. Secure them to prevent violent contact or upset.
- ♦ Always consider cylinders as being full and handle them with appropriate care. Accidents have resulted when containers under partial pressure were thought to be empty.
- ♦ Valve caps should never be used for lifting the cylinder.
- ♦ The fusible safety plugs on acetylene cylinders melt at about the boiling point of water. If an outlet valve becomes clogged with ice or frozen, it should be thawed with warm (not boiling) water, applied only to the valve. A flame should never be used.

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Storing Cylinders

Cylinders should be stored in an upright position in a safe, dry, well-ventilated area. Chains or other restraints should secure cylinders to prevent them from being knocked over. Flammable substances, such as oil and volatile liquids, should not be stored in the same area. Cylinders should not be stored near elevators, gangways, stairwells, or other places where they can be knocked down or damaged.

Oxygen cylinders must not be stored within 20 feet of cylinders containing flammable gases or in the location of other highly combustible materials. If closer than 20 feet, cylinders should be separated by a fire-resistive partition at least 5 feet high with a fire-resistive rating of at least 30 minutes (16 gauge steel plate).

Acetylene and liquefied fuel gas cylinders should be stored with the valve end up. If storage areas are within 100 feet of each other and not protected by automatic sprinklers, the total capacity of acetylene cylinders stored and used inside the building should be limited to 2,500 cu. ft. of gas, exclusive of cylinders in use or connected for use. Quantities exceeding this total should be stored in a special room built in accordance with the specifications of NFPA 51, in a separate building, or outdoors. Acetylene storage rooms and buildings must be well ventilated, and open flames must be prohibited. Storage rooms should have no other occupancy.

Cylinders are not designed for temperatures in excess of 130 F.

Accordingly, they should not be stored near sources of heat, such as radiators or furnaces, or near highly flammable substances like gasoline.

Cylinder storage should be planned so cylinders will be used in the order they are received from the supplier. Empty and full cylinders should be stored separately, with empty cylinders being plainly identified to avoid confusion. Empty cylinders which have held the same contents should be grouped together.

Using Cylinders

Safe procedures for the use of compressed gas cylinders include:

1. Use cylinders, particularly those containing liquefied gases and acetylene, in an upright position and secure them against accidentally being knocked over.
2. Unless the cylinder valve is protected by a recess in the head, keep the metal cap in place to protect the valve when the cylinder is not connected for use. A blow to an unprotected cylinder valve might cause gas under high pressure to escape.
3. Make sure the threads on the regulator or union correspond to those on the cylinder valve outlet. Do not force connections that do not fit.
4. Open cylinder valves slowly. A cylinder without a handwheel valve should be opened with a spindle key or a special wrench or other tool provided or approved by the gas supplier.
5. Do not use a cylinder of compressed gas without a pressure-reducing regulator attached to the cylinder valve, except where cylinders are attached to a manifold, in which case the regulator will be attached to the manifold header.



These cylinders need to be secured, and the oxygen cylinders separated from the flammable gas cylinders!

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Using Cylinders (continued)

6. Before making connection to a cylinder valve outlet, “crack” the valve for an instant to clear the opening of dust or dirt particles. Always point the valve and opening away from the body and away from anyone else. Never crack a fuel gas cylinder valve near other welding work or near sparks, open flames, or other possible sources of ignition.
7. Small fires at the cylinder should be extinguished, if possible, by closing the cylinder valve. In case of a larger fire or if extinguishment is impossible, evacuate and use a heavy stream of water to fight fire.
8. Use regulators and pressure gauges only with gases for which they are designed and intended. Do not attempt to repair or alter cylinders, valves, or attachments. Only the manufacturer should do this work.
9. Unless the cylinder valve has first been closed tightly, do not attempt to stop a leak between the cylinder and the regulator by tightening the union nut.
10. Fuel gas cylinders that develop leaks should be taken out of use immediately and handled as follows:
 - ◆ Close the valve, and take the cylinder outdoors well away from any source of ignition. Properly tag the cylinder, and notify the supplier. A regulator attached to the valve may be used temporarily to stop a leak through the valve seat.
 - ◆ If the leak occurs at a fuse plug or other safety device, take the cylinder outdoors well away from any source of ignition, open the cylinder valve slightly, and permit the fuel gas to escape slowly. Tag the cylinder plainly. Post warnings against approaching with lighted cigarettes or other sources of ignition. Promptly notify the supplier and fire department, and follow instructions for returning the cylinder.
11. Do not permit sparks, molten metal, electric currents, excessive heat, or flames to come in contact with the cylinder or attachments.
12. Never use oil or grease as a lubricant on valves or attachments of oxygen cylinders. Keep oxygen cylinders and fittings away from oil and grease, and do not handle such cylinders or apparatus with oily hands, gloves, or clothing.
13. Never use oxygen as a substitute for compressed air in pneumatic tools, in oil preheating burners, to start internal combustion engines, or to dust clothing. *Oxygen saturated clothing is easily achieved by using a torch to dust clothing. A lit cigarette or any accidental spark will turn the clothing into a burning torch.*
14. Never bring cylinders into tanks or unventilated rooms or other closed quarters.
15. Do not refill cylinders except with the consent of the owner and then only in accordance with DOT regulations. Do not attempt to mix gases in a compressed gas cylinder or use it for purposes other than those intended by the supplier.
16. Before a regulator is removed from a cylinder valve, close the cylinder valve and release the gas from the regulator.
17. Cylinder valves should be closed when work is finished.