

Safe Handling of Gases, Cylinders & Apparatus

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Safe Handling of Oxy-fuel Apparatus

Description/Function

Typical Oxy-fuel workstations normally include the following items, each designed to perform specific function: Oxygen and fuel supply, regulators, hose, torch and operator safety equipment.

Regulators

Oxygen and fuel pressure regulators are attached to the cylinders or manifold outlets to reduce high cylinder or supply pressures to suitable low working pressures for cutting and welding applications. Never use high pressure gases directly from the cylinder without a suitable pressure-reducing regulator. Become familiar with the external parts of a regulator as follows: inlet connection with filter, pressure adjusting screw, high pressure gauge, low pressure gauge, outlet connection, relief valve (where provided).



Inlet Connection

Regulators are attached to the cylinders or manifolds by their "inlet connections". All inlet connections conform to specifications and standards set by the Compressed Gas Association (CGA) and are marked with an identifying CGA number. CGA numbers identify the cylinder valve/gas service for which that inlet connection designed. Examples: CGA 510 has been designated for standard fuel gas cylinder connections such as Acetylene, Methyl Acetylene and Propane. CGA 540 connections are designated for Oxygen service only. Fuel gas inlet connections usually have left-hand threads. Those with left-hand threads also have a "V" notch around the inlet nut to further designate the connection for fuel gas service. All oxygen connections have right hand threads. All inlet connections must have a clean filter.

Pressure Adjusting Screw

The regulator adjusting screw controls the delivery pressure of the gas to the hose. As previously stated, the regulators function to reduce high supply pressures to a suitable working pressure range. When the adjusting screw is turned clockwise, the regulator allows gases to flow through the regulators to the hoses and to the torch. The threaded adjusting screw applies mechanical force to a spring and diaphragm which controls a pressure valve in the regulator. If the adjusting screw is turned counterclockwise, tension on the spring is released and the regulator does not allow the gas to flow.

Pressure Gauges

The high pressure gauge indicates the cylinder or supply pressure entering the regulator. The low pressure gauge indicates the delivery pressure from the regulator to the hose. All gauges are precision instruments, handle with care.

Outlet Connections

Welding hoses are attached to the regulator outlet connections. Fuel gas regulators have left-handed threaded outlet connections to mate with the left-hand hose connections and have a "V" notch around the outlet connection to further designate the connection for fuel gas service. Oxygen regulators have a right-hand threaded outlet connection to mate with the right-hand hose connections.

Relief Valve (where provided)

The relief valve is designated to protect the low pressure side of the regulator from high pressure. **Relief valves are not intended to protect downstream equipment from high pressure.**

FLAMMABLE

- ◆ Propane is a flammable gas. If this gas mixes with air or Oxygen, the mixture is subject to ignition or explosion if exposed to an ignition source. The low level of concentration needed for propane is 2.2% in air.
- ◆ Store cylinders containing flammable gases outdoors or in well-ventilated areas. Away from oxidizers and never near sources of heat, flames or sparks.
- ◆ Never use a flame to detect for gas leaks.
- ◆ Propane is much heavier than air; therefore, it will flow to low points, to be ignited at distances that may be quite far from the source or leakage.

Hose

The welding hose transports low pressure gases (maximum 200PSIG) from the regulators to the torch. Proper care and maintenance of the hose assists the operator in maintaining a safe, efficient shop or work area. Industrial welding hose is color coded for gas service identification. The hose that carries the Oxygen gas is green and the hose that carries the fuel gas is red. All approved domestically fabricated hose are flame retardant. They will burn, but will not support a flame if the heat source is removed. Welding hoses are often exposed to severe abuse. They can provide efficient service with proper care. Molten slag and sparks can burn into the hose exterior. The operator should frequently inspect the hoses and replace if necessary. Never allow the hoses to become coated with oil, grease or dirt as that could conceal damaged areas.

Flashback Arrestors

Flashback arrestors are designed to prevent a flashback from reaching upstream equipment. They are usually installed in the gas system between the outlet of the regulator and the inlet of the hose leading to the torch or between the hose and the torch.

Storage of Cylinders

State and local building and fire codes will apply to the installation and storage of compressed gases. The following information covers some of the major requirements for the storage of compressed gases.

- ◆ Store all cylinders in designated areas that are secured.
- ◆ Flammable, toxic and Oxygen (or any other Oxidizer) shall be separated from each other by a distance of at least 20 feet or by a non-combustible barrier at least 5 feet high having a fire resistant rating of at least one-half hour. Inert gases (Argon, Nitrogen, Helium and Carbon Dioxide), since they are compatible with all other gases, may be used within the separation distance.
- ◆ Outdoor storage shall be kept clear of dry vegetation and combustible materials for a minimum distance of 15 feet.
- ◆ Cylinders stored outside shall not be placed on the ground (earth) where water can accumulate.
- ◆ Storage areas shall be provided with physical protection from vehicle damage.
- ◆ Do not store cylinders near elevators, truck loading platforms, gangways, or under operating cranes, or other areas where they can be damaged by falling objects.
- ◆ Cylinders shall not be exposed to temperatures in excess of 125°F.
- ◆ Smoking and open flames shall not be permitted in oxygen and flammable gas storage areas or within 20 feet of such smoking areas.
- ◆ Observe local code limits set for the storage of flammable gases in buildings.

General Precautions

- ◆ In most instances, improper application or misuse of gas or its container causes accidents by inadequately trained personnel. Other major causes of accidents in the use of industrial gases are 1) improper installation, 2) failure to provide proper and adequately maintained equipment, and 3) failing to follow the supplier's instructions in the operation of regulators and other compressed gas accessory equipment.
- ◆ Proper training is essential. You must be able to recognize emergency conditions, knowing what action to take under circumstances, while preventing exposure.
- ◆ Never identify contents by container color, except in the case of medical gases. Color codes are not uniform throughout the compressed gas industry.
- ◆ If an identifying label on the cylinder is not legible, return the container to the supplier unused.
- ◆ Do not store or transport compressed gases in closed vans or automobiles.
- ◆ Always secure cylinders in transit or in storage to insure against their tipping over.
- ◆ Never attempt to lift cylinders by the valve protection cap.
- ◆ Always use a pressure reducing regulator that is properly conditioned for the gas being used.
- ◆ The internal working parts of the regulator are precision units. Only qualified technicians should clean or repair a regulator.
- ◆ Always keep the regulator free of oil, grease and other flammable substances.
- ◆ Never use oil or grease on the regulator, cylinder or manifold connection.
- ◆ Do not tamper with the relief valve or remove it from the regulator.
- ◆ Do not change the inlet connection on a regulator in an attempt to use the regulator for a different gas service.
- ◆ Never attempt to transfill gas from one cylinder to another, or mix any gases in a cylinder.



Setting up Equipment for Use

Cylinders

Secure the Oxygen and fuel cylinders. Cylinders are highly pressurized. Always handle with care. When moving cylinders, always be certain that the valve protection caps are secured in place. Replace cap when cylinders are empty. Store fulls and empties in separate locations. Do not use a cylinder that does not have a label telling you the contents of that cylinder.



Regulators

Carefully inspect the cylinder valve and regulator threads and mating surfaces for traces of oil or grease. Make sure the regulator has the correct pressure rating for the cylinder being used.

Do not use the regulator if oil, grease or damaged parts are detected on the regulator or cylinder valve or if the inlets filter is missing or dirty.



Momentarily open and close (called "cracking" or "dusting") the cylinder valve. This dislodges any loose contaminant that is present. Open the valve only slightly; stand behind or to one side (not in front) of the valve. It is not recommended practice to do this to Acetylene cylinders in that you may exceed the minimum 15PSIA and the fuel could spontaneously combust.



Attach the Oxygen regulator to the Oxygen cylinder valve. Tighten securely with a wrench. Do the same with the fuel regulator. Before opening cylinder valves, release the tension on the regulator adjusting the screws by turning them counterclockwise until all spring pressure is released.



Stand so the cylinder valve is between you and the regulator. Slowly and carefully open the cylinder valve until the maximum pressure registers on the high pressure gauge. **Now open the valve on both cylinders completely to seal the valve packing.** If your fuel cylinder requires a wrench to open, do not open it more than 1 1/2 turns. Keep the wrench on the valve in case you need to shut it off quickly.

Connect hoses to appropriate regulator and tighten with a wrench. Attach torch to hoses and tighten with a wrench. Adjust regulator pressure settings for your application and you are ready to start.