
FILLING YOUR AVIATOR'S OXYGEN CYLINDER

AVO, AVIATOR'S BREATHING OXYGEN: GEN: SPEC. NO. MIL-PRF-27210

Don't fall victim to unnecessary FDA protocols! If you do not have a transfilling device and are not able to have your aviator's oxygen cylinder filled at an FBO, but by a compressed gas agency, be sure to inform them that your oxygen cylinder is for 'AVO/ABO' Aviator's breathing oxygen and not medical. Otherwise, they will assume it is for medical purposes and you may be in for a great deal of inconvenience or denied service altogether. A medical prescription is not needed for 'AVO/ABO' Aviator's breathing oxygen. Furthermore, aviators breathing oxygen 'AVO/ABO' is under the auspices of the DOT and not the FDA! As far as the FDA is concerned any oxygen cylinder not marked as 'AVO/ABO' will be considered a drug and has to be held, dispensed, and used under strict FDA protocols and cannot be lawfully used for any other purpose.

Contrary to a common myth, there are no different grades of oxygen being produced or contained in cylinders maintained under DOT regulations. In addition, oxygen for medical use does not have any more moisture than oxygen for any other purposes. Furthermore, because of the chemical nature of oxygen it must be as pure and dry as possible if stored under pressure or else the cylinder and equipment may be damaged, or worse, personal injury or death may occur. By the very nature of the (state-of-the-art) process commonly used by compressed gas plants today, oxygen produced for any purpose will be better than 99.99% pure. In other words, it all originally comes from the same spout. What happens thereafter is why there is a set of hygiene protocols detailing the handling, inspection, and transportation of oxygen to ensure purity at the destination. No doubt these protocols may be the cause of the oxygen grade misconception in the compressed gas industry. Oxygen holding corrode at an accelerated rate. The confusion may have stemmed from the fact that there are various grades of air mixtures. Some air mixture protocols may allow higher amounts of water moisture to be present. This also may have helped cause the misconception that there are different grades of oxygen. This misconception is so widespread that some aircraft manuals and flight-training manuals tell pilots not to use 'MEDICAL' oxygen because the moisture will freeze the lines and/or equipment. This is FALSE! Ask for 'AVO/ABO' or else the FDA may freeze your plans, and not from any moisture.

Pilot Safety & Warning Supplement For Oxygen

Before servicing any aircraft with a built-in oxygen system, consult the specific aircraft service/maintenance manual to determine the proper type of servicing equipment to be used. An aircraft should not be serviced with oxygen during refueling or other maintenance work, which could provide fuel and a source of ignition. Also it is advisable that oxygen servicing of aircraft be accomplished outside and not inside hangars. Oxygen is a very reactive material (element) that combines with most of the other chemical elements. The union of oxygen with other substances is known as oxidation. Extremely rapid or spontaneous oxidation is known as combustion. While oxygen is non-combustible in itself, it strongly and rapidly accelerates the combustion of all flammable materials: some to an explosive state.

Some Do's & Don'ts For Handling And Using Oxygen:

1. **Do** check that only master cylinders marked as 'AVO/ABO' Aviators breathing oxygen are used to fill any oxygen system cylinder for aviation use!
2. **Do** reject any oxygen that has an abnormal odor (pure oxygen is completely odorless)!
3. **Do** follow the published applicable instructions regarding charging, transfilling, purging, and maintenance of built in aircraft oxygen systems!
4. **Do** wash your hands to free any type of oils, greases, and food residues before servicing any oxygen system!
5. **Don't** use oil or grease (including certain lipstick and lib balm) around any high pressure fitting of any oxygen system!
6. **Don't** expose oxygen containers (cylinders) to high temperatures!
7. **Don't** overfill oxygen cylinders. Not all cylinders have the same operating pressure!
8. **Don't** use breathing air mixture as a substitute for aviators breathing oxygen. Air will not provide the needed oxygen at altitude and the mixture may have moisture added which could freeze and plug the lines, valves, and regulators of the system!

Hazards of High Pressure Oxygen and Transfilling:

Transfilling of gaseous oxygen from one cylinder to another involves hazards associated with the handling of oxygen under pressure. A hazardous condition does exist if high-pressure oxygen equipment becomes contaminated with hydrocarbons such as oil, grease, or other combustible materials, which may include oil from a persons hands or contaminated tools. A cylinder will heat as it is filled from a high-pressure source. The more rapidly the cylinder is filled the higher the temperature

rise in the cylinder resulting from the heat of compression of the gas. Excessive temperature may result in the ignition of any combustible materials that may be present in the system. Refill the cylinder at a flow rate that reduces heating of the cylinder. Use only equipment designed for refilling and transfilling.

Although oxygen itself is nonflammable, materials that burn in oxygen rich environments will burn more vigorously and at higher temperatures. If ignited some combustible materials such as oil will burn in oxygen with explosive violence. Many other materials, which do not burn in air, will burn vigorously in oxygen enriched atmospheres. Ignition temperatures are reduced in oxygen-enriched atmospheres. Compressed oxygen presents a hazard in the form of stored energy.

Open the cylinder valve slowly. The rapid release of high pressure oxygen through orifices, control valves, etc.. If in the presence of foreign particles can cause friction or impact resulting in temperatures which may be sufficient to ignite combustible materials present in the system.

If any part of the system should become contaminated or you suspect so, you can clean it with hot water and detergent. Do not use the system if it has become contaminated with oil or grease. If the contamination is mild a liquid form of automatic dishwasher detergent or cleaning product "Formula 409" has shown to work best for the purpose. This type of detergent is able to cut and remove almost all types of oils or greases and will rinse off without any detectable residue.

To test for contamination, take a clean cotton swab "Q-Tip" and wipe the suspected area with it. Next place the tip of the cotton swab into the surface of a pan of CLEAN water while you are observing a clear reflection of light that shows the water's surface. You should not detect any oil whatsoever bleeding from the cotton tip over the water surface. This is an accepted method for oil contamination detection.

An oil clean surface will pass this test without any doubt. If the service line should become contaminated internally by oil or grease it can be cleaned by soaking the entire line in a vat of hot water and a liquid form of automatic dishwasher detergent. Rinse the line in hot water and inspect. If contaminants are still present repeat soaking. Dry the line by hanging it vertically in hot air or direct sunlight environment. However, if the contamination is more severe you may have to perform the cleaning process several times or use a solvent such as "11 Trichloroethane".

Refilling the Cylinder

A word about oxygen: Oxygen is oxygen. There are no specific grades or purity with oxygen under pressure. Oxygen is produced by a process known as liquefaction. Therefore, oxygen under pressure regardless of the cylinder's claim must be 99.9% pure or the cylinder will be damaged by rust or corrosion prematurely. All utility oxygen cylinders will/must have a service fitting of type **CGA-540**. This will be for welding, aviation, and medical purposes. **Oxygen specifically intended for medical purposes will most likely have a service valve fitting of type CGA-870 sometime referred to as a post valve to help make distinction with a hygiene protocol, but still is no different.** Oxygen for medical purposes does have a specific protocol for hygiene and transport. However, various mixtures of air that may be used strictly for medical purposes or industrial are not interchangeable, and this may be the reason many think that there are different grades of oxygen purity. Vessels holding these air mixtures will have a CGA-346 type service fitting that is not compatible with the CGA-540 fitting for oxygen. Once again oxygen is oxygen. It can't be under pressure without any adverse reaction if it is not as pure and dry as possible. CGA stands for the Compressed Gas Association. The CGA has developed almost all the standards for compressed gases used in the USA and adopted by the FDA, DOT and other government agencies as well as many foreign governments. They have a variety of documents about compressed gases, vessels, and fitting.

To receive additional specific information contact:

**Compressed Gas Association, Inc.
1235 Jefferson Davis Highway
Arlington, VA 22202**



Telephone: 541-548-7500 • Fax: 541-923-4141 • E-Mail: sales@mhoxxygen.com • www.MHoxxygen.com

2244 SE Airport Way, Suite 100 • Redmond OR 97756-7537