

Inspecting and Testing Scuba Cylinders

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Photos by Stephen Frink

AFTER CYLINDERS FIRST ENTER SERVICE, an annual visual inspection and a five-year hydrostatic test are required. These requirements include cylinders used for diving and other life-support applications and cover breathing air, nitrox, heliox, trimix, oxygen for decompression and argon for drysuit inflation.

How are these standards mandated and enforced? What are good and safe practices?

- **Visual inspection, internal and external:** The Compressed Gas Association (CGA) publication P-5, Care of High-Pressure Cylinders for Underwater Breathing, lists the annual visual inspection requirement. While federal regulations do not enforce visual inspection, it is the best practice because diving exposes scuba cylinders to a corrosive environment and frequent handling. Cylinder manufacturers may require this inspection, and filling stations may require it before filling a cylinder.
- **Five-year hydrostatic pressure testing:** The U.S. Code of Federal Regulations (CFR), specifically 49 CFR 180.209 Table 1, requires a five-year requalification period for all scuba cylinders, including visual inspection and hydrostatic testing or ultrasonic examination. This regulation is federally enforced for business owners, so a filling station must require recertification before filling a cylinder. This CFR applies to all requalification, maintenance and use of cylinders. While the law doesn't apply to privately owned cylinders, any person taking

a cylinder into a public place, transporting it on a public highway or attempting to fill or rent cylinders for profit must comply. For private owners and users, requalification is still critical for safety.

- **6351-T6 aluminum alloy cylinders:** 49 CFR 209 provides additional recertification requirements for cylinders made of this material. Visual inspection and eddy current examination (VE) are required every five years to determine the presence of any sustained-load cracks. The visual inspection should be in accordance with CGA C-6.1.
- **Marking:** 49 CFR 180.213 requires that the five-year recertification shall be durably and legibly marked with the retester identification number (RIN) and the year. The inspector may apply additional markings.
- **Suspicion of any issues between inspections:** If you have any reason to doubt your cylinder's integrity, such as leaking at the valve, deformation or mechanical damage, immediately have your cylinder examined by a formally trained and certified inspector. They will visually inspect the cylinder and take further actions as needed.
- **Oxygen cleaning:** All cylinders used for breathing gases containing more than 23.5 percent oxygen (nitrox, decompression gases or pure oxygen) must be oxygen-cleaned according to CGA G-4.1 requirements. If you suspect that the breathing gas contains any oil, hydrocarbon or aromatic substances, the cylinder must be cleaned again for oxygen. Operators who fill with oxygen-



Although cylinder failures are rare, the effects can be catastrophic. Regular inspection and paying close attention to your cylinder can help identify issues before they become a danger.

enriched gases should require cylinders to be oxygen-clean.

- **Rejected cylinders:** According to 49 CFR 180.205, any cylinder that the test station has permanently rejected must be stamped as condemned or with a series of X's over the code specification and marked pressure. Alternatively, with the owner's permission, the tester can render it incapable of being filled.
- **Records:** Retain all inspection, testing and recertification records while you own the cylinder, and give them to the new owner if you sell your cylinder.

A cylinder filling station can reject a cylinder and require further evaluation. They may choose to err on the side of caution to protect the safety of their staff, divers and the general public. AD