COMPRESSED GAS SAFETY:

Using Compressed Gases

PART 3 OF THE
AIRGAS EBOOK SERIES

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Please note:
The information in this guide is general information and should not be used as specific information for a particular gas, or in lieu of an SDS for any specific gas product. Emergency response activities must only be undertaken by certified hazmat technicians, in accordance with OSHA 29 CFR §1910.120(q). Further, this information is not a substitute for training nor is it to be used as a replacement reference for Federal and State laws and regulations. It simply presents brief highlights of some of the more common compressed gas categories, and associated compressed gas handling, storing and transporting procedures that are industry standards.

Potential hazards of mishandling compressed gases

All compressed gases, no matter their properties, are considered hazardous materials due to their ability to create unsafe environments and conditions. It is therefore essential to minimize all risks associated when using compressed gases. Federal and State regulations mandate that all personnel working with these substances must complete specific training covering safe storage, handling and transportation practices before even touching a cylinder.

To assist these teams, this part of our guide will highlight some key information regarding the safe usage of compressed gas cylinders.

Before using cylinders

Before using a cylinder, check to make sure it is properly labeled. Do not accept or use cylinders without a clearly identifiable label. For more information on compressed gas classifications, refer to the first eBook in this series, Compressed Gas Safety: Understanding Gas Types & Hazards.

After ensuring the cylinder is labeled correctly, it's important to read and understand the accompanying Safety Data Sheet (SDS) for detailed technical and regulatory information on the product. This can also be found online in the SDS library on Airgas.com.

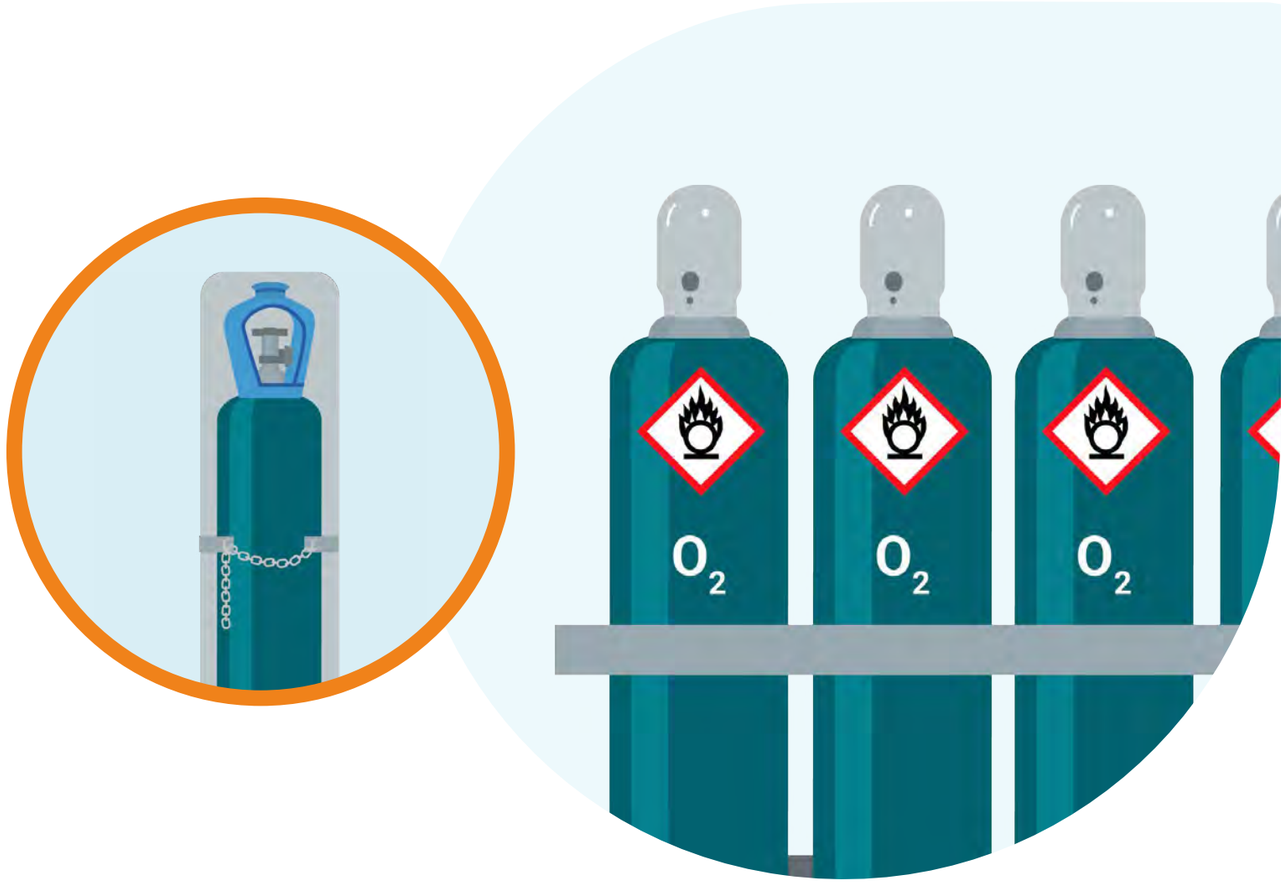
Always remember to wear the appropriate Personal Protective Equipment (PPE) when using cylinders. Depending on the gas, this may include respirators, eyewear, gloves and specialized clothing.

Ensure that equipment such as fire extinguishers, eyewash stations and showers are located nearby and properly maintained, where required. In addition, ambient air monitors with alarms that detect gas are essential safety devices, especially when dealing with highly toxic gases.

Securing cylinders before and after use

Whenever a cylinder is in use, it must be properly secured with a fastening device. **Floor or wall brackets are ideal for cylinders** that are stationary and will not be moved while in use. For cylinders that must be moved around, it's recommended to secure them with portable bench brackets. Stands are available for all sizes of cylinders, including the smaller ones like lecture bottles.

If you have questions regarding securing your compressed gas cylinders during use, your local Airgas representative can assist you in determining which type of fastener best meets your needs.



Valve outlet connections and fittings

Before using compressed gas cylinders, it's essential to check that all fittings and connection threads meet properly. Never force them or turn threads the wrong way, as this can cause damage and produce metal particles that might get caught in the poppet. Additionally, do not cross-thread or use adapters between non-mating equipment and cylinders.

Most valve outlet connections are designed with metal-to-metal seals; only use washers where indicated. Never use pipe dope on pipe threads, and do not use Teflon® tape on valve threads to prevent leaking as it may become powdered and get caught on the regulator poppet, causing full pressure downstream.

You should also dedicate your regulator to a single valve connection, even if it is designed for different gases.

Check that your gas regulator is compatible with the gas type being used and rated for the appropriate cylinder pressure. It's also important to inspect, maintain and replace your pressure equipment regularly.

For additional information on valve outlet connections, fittings and regulators, reach out to your local Airgas representative.

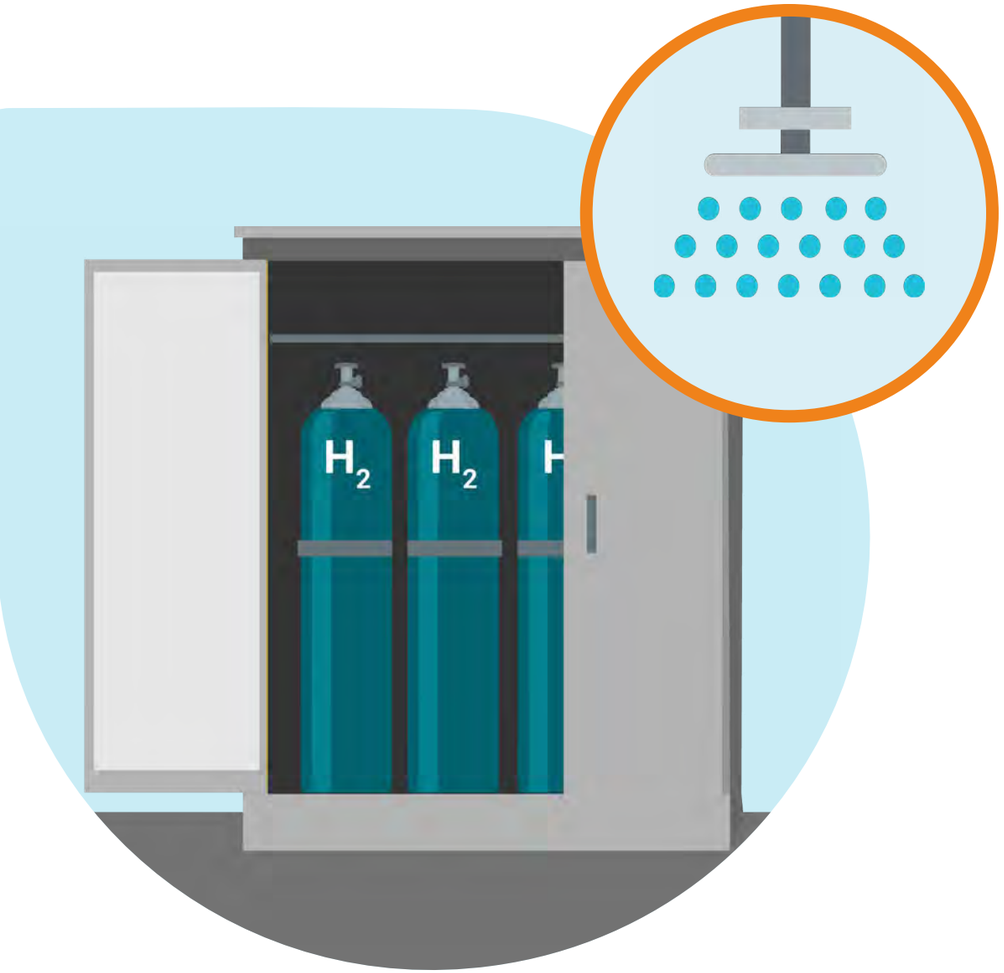
Initiating and terminating gas service

Secure the cylinder before removing the valve protection cap. Inspect the cylinder valve for damaged threads, dirt, oil, grease, etc., and remove any dust or dirt with a clean cloth. **Do not attempt to use a cylinder containing oxygen or another oxidant if oil or grease is present on the valve, as combustible substances like these can become explosive upon contact with an oxidant.** In this case, notify the nearest Airgas facility and identify the cylinder to prevent usage.

If your cylinder cap is stuck, **never insert an object into the valve cap to try to loosen it**. This could open or break the valve, resulting in a gas leak. Use an appropriate cylinder cap wrench to safely remove the cap (such as Airgas Part #Y99CW1-AG) or return the cylinder to your supplier.

Adjust out the regulator before opening the cylinder valve. Open the cylinder pressure slowly, making sure to stand away from the front of the regulator. Once open, immediately check for any leaks in hoses or connections using a compatible leak detection solution. Adjust delivery pressure using the regulator. Never tighten any fittings while under pressure.

To terminate gas service when not in use for long periods of time, close the valve, disconnect equipment from the cylinder, and return the cylinder valve protection cap to the cylinder.



Gas cabinets

When using hazardous gases in an enclosed location, it is highly recommended to provide an extra degree of protection for your team. Gas cabinets are an efficient and cost-effective means to provide this peace of mind by safely organizing gas distribution equipment. They help:

- Mitigate hazardous gas in the event of a leak
- Automatically shut off gas in the event of a failure
- Allow cylinder connections to be properly purged before and after cylinder changeouts
- Maintain gas integrity

NFPA 55 states that a gas cabinet's exhaust system should allow air ventilation through the cabinet at a rate of 150 feet per minute at access points (including windows). As an added measure of protection, gas cabinets should be equipped with a sprinkler head to keep cylinders cool in the event of a fire. Ask your Airgas representative for more details.

Innovations that protect and improve ease-of-use

Airgas offers innovative SMARTOP and EXELTOP cylinder valves to improve cylinder handling and safety with ergonomic, built-in caps that are designed to protect valves with a durable, shock-absorbing system.

These permanent, reliable tops also allow for immediate gas cut-off via on/off levers. A convenient pressure gauge enables you to check gas content at a glance and minimize gas waste. Residual pressure and nonreturn valves prevent backflow contamination and minimize the exposure to high-pressure gas flow. In addition, EXELTOP has a built-in regulator. **Ask your Airgas representative for more information and availability.**

Conclusion: Using compressed gases

Understanding the types of compressed gases and their individual safety requirements is vital to ensuring workplace safety and protecting yourself and other employees. Knowing how to safely store, handle and transport these gases can mean the difference between a successful project or ending up in the emergency room.That's why it's critical to complete training on any applicable Federal and State regulations along with reading and understanding the Safety Data Sheet (SDS) when using hazardous materials like compressed gases. More resources for your team are listed below.

- Information on specific compressed gases is contained in SDS publications, which provide safety, technical and regulatory information on gas products. These are available from your point of product purchase or can be downloaded from Airgas.com/sds-search.
- The Compressed Gas Association (CGA) offers publications on handling compressed gases such as pamphlet P-1, "Safe Handling of Compressed Gases in Containers," and they also sell videos on compressed gas subject matter.
- Additional information on compressed gases can be found at encyclopedia.airliquide.com.

At Airgas, we want you and your team to be safe — please don't hesitate to contact your Airgas representative for more information on general compressed gas safety or specific products.

To learn more about compressed gas safety, please continue reading all threes parts of our ebook series!

PART 1: Compressed Gas Basics

PART 2: Storage & Handling

PART 3: Usage

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