COMPRESSED GAS SAFETY:
Storage & Handling

PART 2 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

Depending on the product contained within the cylinder, compressed gases are capable of creating environments that are reactive, explosive, flammable, oxidizing, oxygen-deficient, extremely cold, corrosive or otherwise hazardous to health. Therefore, it's essential to wear the appropriate Personal Protective Equipment (PPE) when handling cylinders and compressed gases. All appropriate firefighting, personnel safety and first aid equipment should be available in case of emergencies.

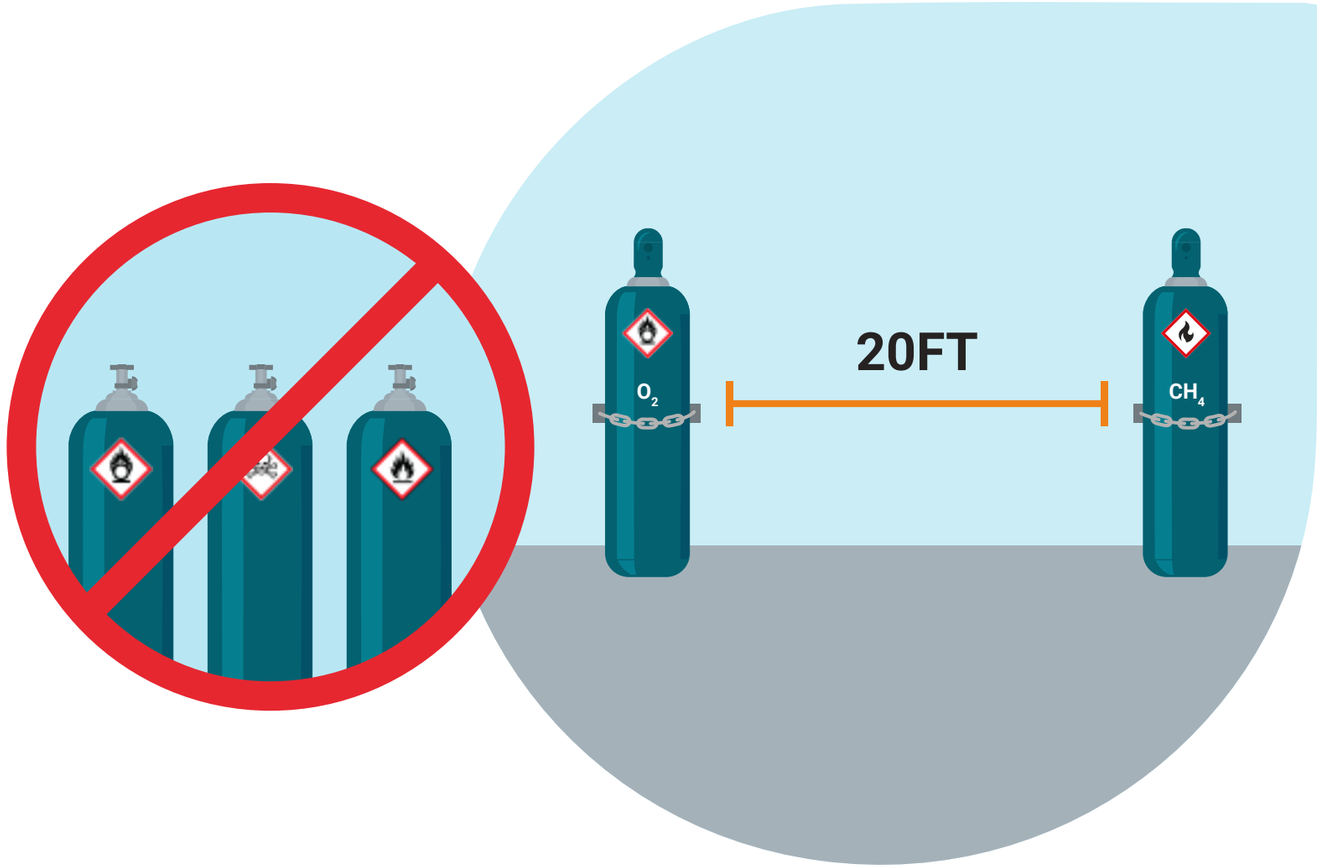
Follow all Federal, State and local regulations concerning the storage of compressed gas cylinders. For further information, refer to the Compressed Gas Association (CGA) for Pamphlet P-1.

Storage area basics

Always separate gases by type and keep them in assigned, clearly identified locations.

- OSHA requires that cylinders containing flammable gases are either stored at least 20 feet (6.1 meters) away from cylinders containing oxygen and other oxidants, or are separated by a fire-resistant wall with a rating of at least 30 minutes that interrupts line of sight.
- Poisonous and toxic gases should also be stored separately.

Labels, decals and other cylinder content identification should not be obscured or removed from the gas cylinder. In addition, cylinder storage should be in a place protected from tampering by unauthorized personnel. **Do not store cylinders (empty or otherwise) in hand trucks or cylinder carts.**



Storage area conditions

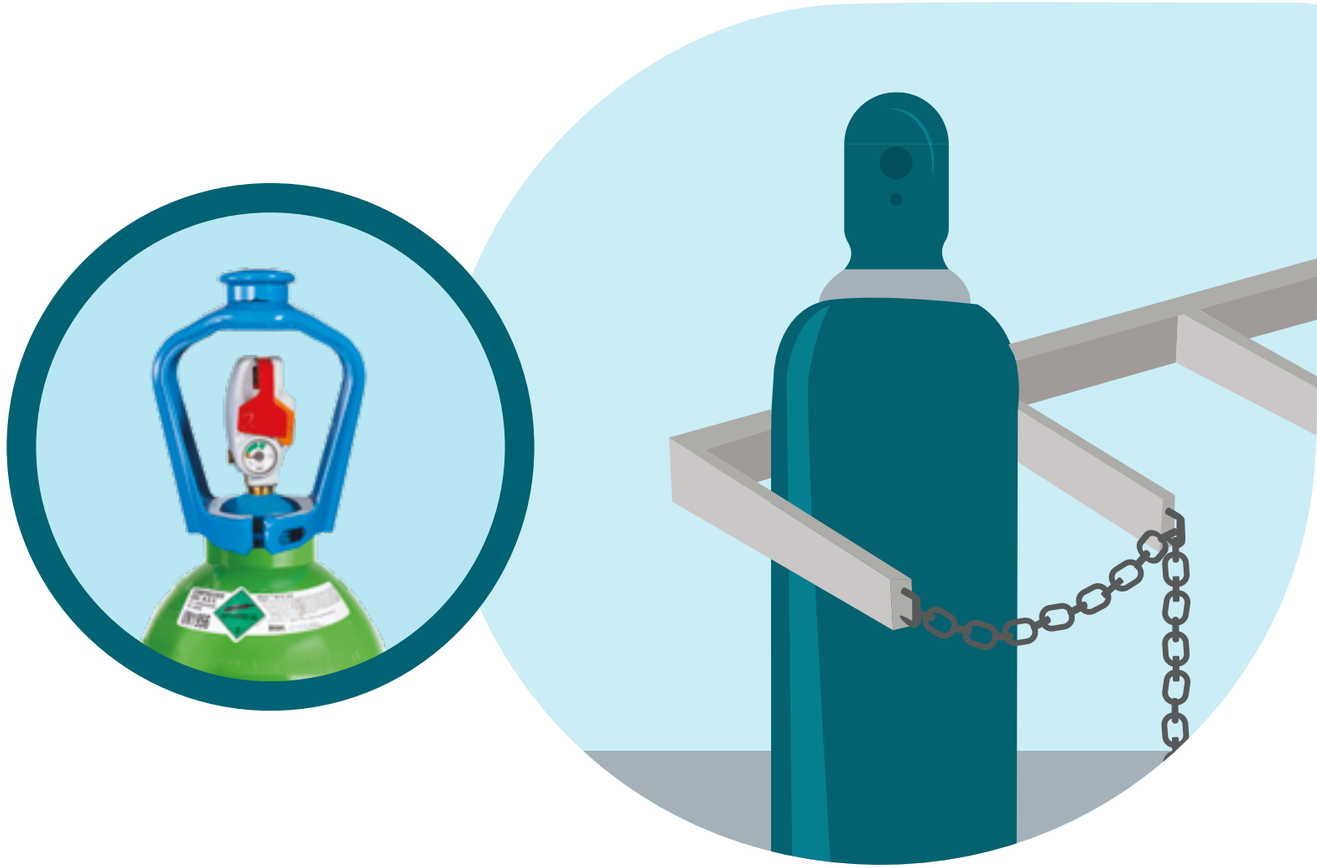
You should only store gas cylinders in areas that are well-ventilated and properly illuminated. Compressed gas storage areas should be identified using proper signage and located away from sources of excess heat, open flame or ignition, and electrical circuits. They should not be located in enclosed or subsurface areas. Outdoor storage areas should be above grade, dry and protected from the weather. The area should also be free from vehicle traffic and protected from physical damage due to striking or falling objects.

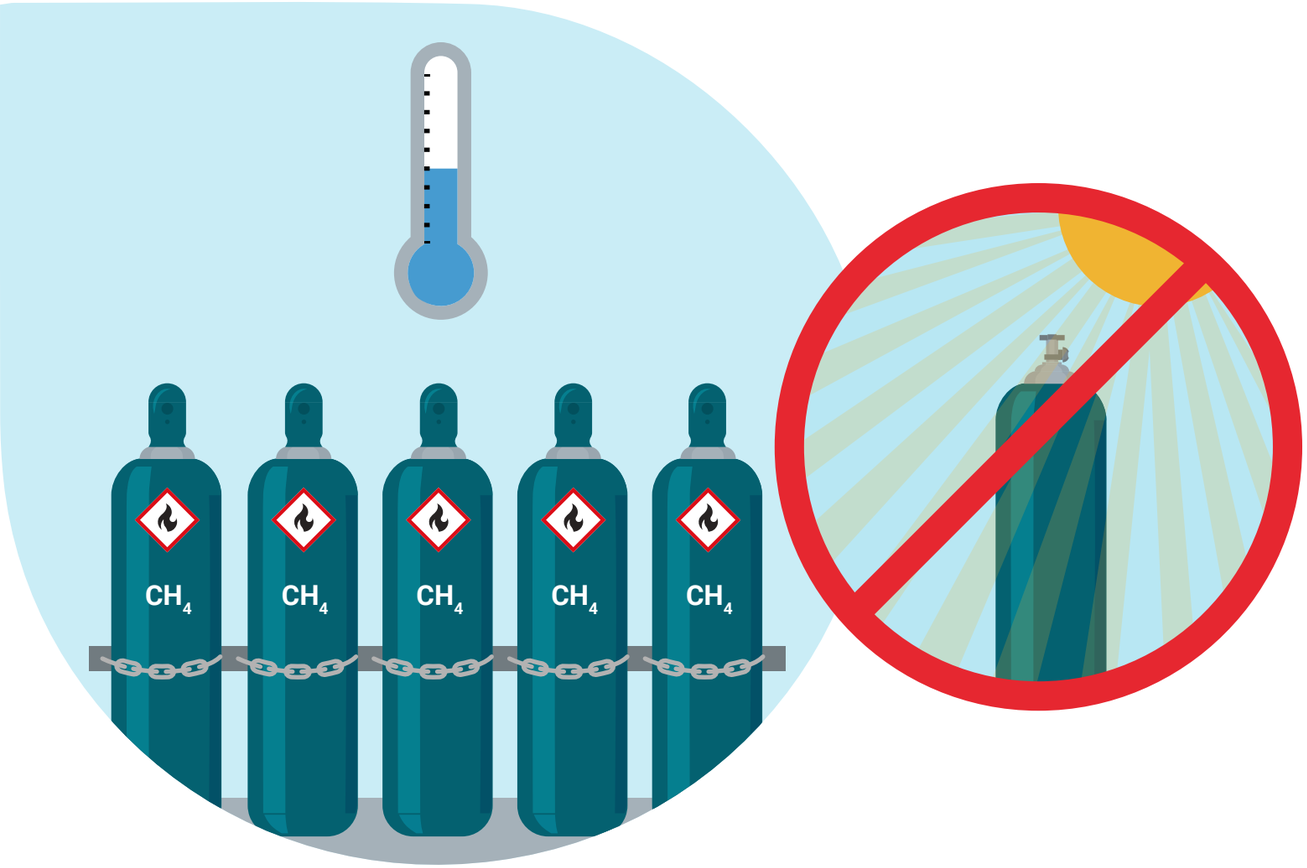
Vent hoods are not a safe storage area except for when a cylinder is actually in use.

Securing cylinders in storage

The risk of a cylinder falling over and possibly shearing off its valve demands that a cylinder always be held in place with a chain or another type of fastener such as a bench or wall clamp.

While in storage, cylinders without permanently configured valve protection MUST have cylinder valve protection caps firmly in place.





Temperature exposure

Compressed gas cylinders typically come in two types of materials: steel and aluminum.

- **Steel cylinders** are generally used for more corrosive products. While they are more durable than aluminum cylinders, they should not be stored near steam pipelines or exposed to direct sunlight.
- **Aluminum cylinders** are used to increase the stability of gas mixtures containing specific components. They can be damaged by exposure to temperatures in excess of 350°F (177°C).

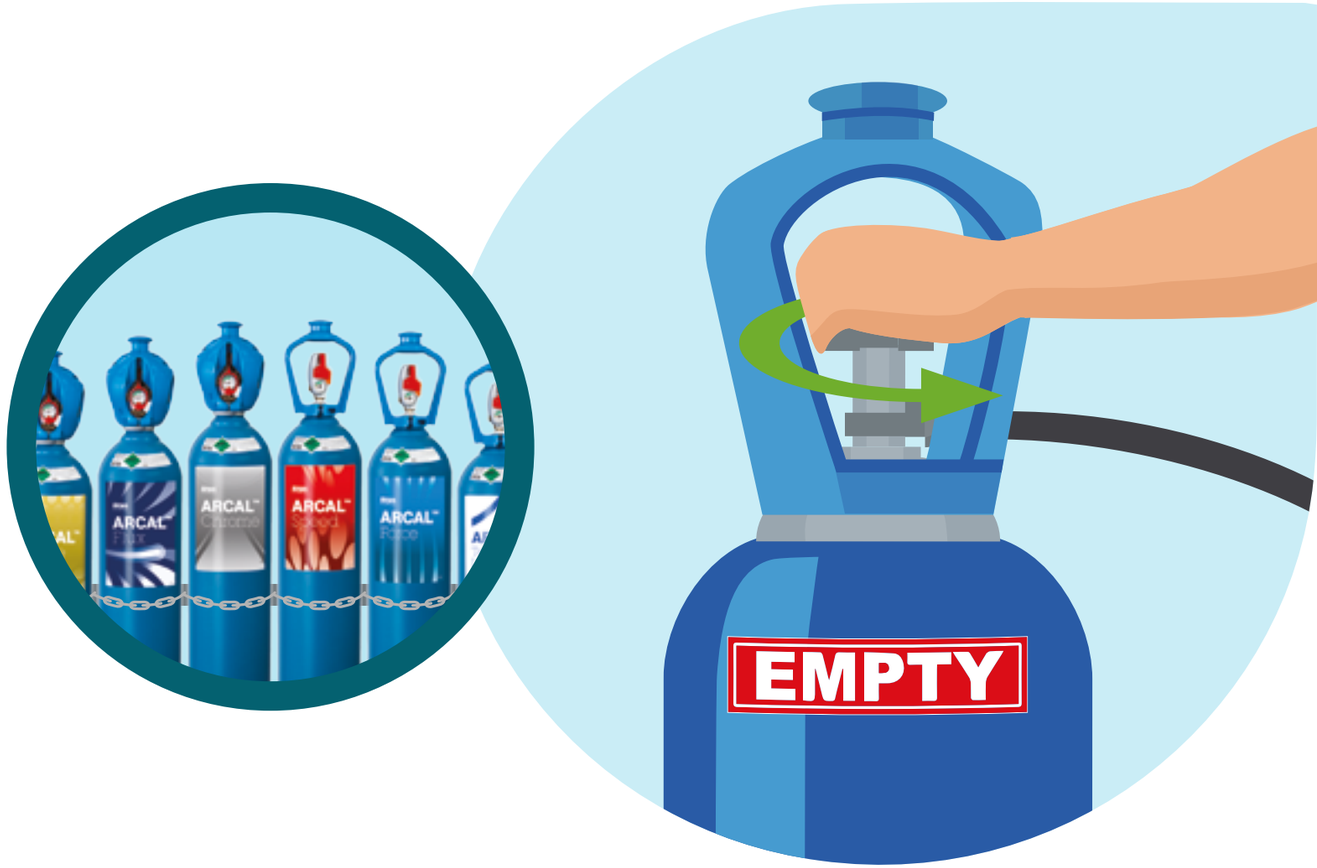
No matter the material, extreme temperatures weaken cylinder walls and may result in a rupture. **Do not permit cylinder temperatures to exceed 125°F (52°C) or apply devices that will heat any part of the cylinder above this temperature.**

Storing and returning empty cylinders

Arrange your cylinder storage area so older stock is used first. **Remember, cylinder carts and hand trucks are not suitable storage places for any cylinder.**

Empty cylinders should be stored separately, clearly identified and promptly returned. When storing depleted cylinders, leave some pressure to prevent backflow that would allow moisture and other contaminants into the cylinder. Ensure that all valves are closed and cylinder caps and/or guards are securely installed.

For further instructions on returning empty cylinders, contact your local Airgas representative.



Handling compressed gas cylinders

Most gas cylinders are very heavy, and remain so whether they are empty or filled, as their contents are in gaseous form and weigh very little. Even "empty" cylinders are considered hazardous and are still regulated by the Department of Transportation due to the small amount of residual gas they contain. The safest way to move cylinders is using a hand truck or cylinder cart specifically designed for this purpose.

Avoid lifting cylinders by their caps or guards or with lifting magnets or slings which can damage the valve. Use proper cradles if using a crane.

Before road transport, disconnect all equipment and ensure all valves are closed and caps or guards are securely installed. Additionally, make sure the cylinder is in a well-ventilated area of the vehicle for road transportation. Never load cylinders into an enclosed vehicle such as a car or van, and do not smoke in any vehicle transporting cylinders.

During transportation, ensure that all cylinders are properly secured in an upright position with restraints to prevent them from falling or striking each other. Always keep both hands on the hand truck or cylinder cart during transportation.

Conclusion: Safe storage and handling of 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 three parts of our ebook series!

PART 1: Compressed Gas Basics

PART 2: Storage & Handling

PART 3: Usage

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