06

POCKET GUIDE
SAFETY

Storage of gas cylinders

MESSER
Gases for Life

Dear users of Messer gases

Messer produces and supplies a broad portfolio of products and cylinder gases. Handling gases is safe - as long as you pay attention to their special properties.

The gas in gas cylinders is under high pressure of up to 300 bar. It can also be flammable, combustible, inert, toxic or highly reactive. It is therefore essential that you familiarize yourself with the properties of the gas in your compressed gas cylinder. The same applies to the associated hazards.

This pocket guide gives you tips and advice on the safe storage of compressed gas cylinders. The relevant national legal regulations must always be observed. We recommend that you keep the Pocket Guide within reach at all times.

Important
You will receive a safety data sheet with all important safety instructions for each product. Please familiarize yourself with this information.

Your Messer team

Overview of common gases and their properties

	Shoulder color (according to DIN EN 1089-3)	Density ratio to air	Properties	Effect on animals and humans
Acetylene	Maroon	lighter	flammable	non-toxic, asphyxiating effect
Argon	Dark green	heavier	inert	non-toxic, asphyxiating effect
Argon mixed gases	Light green	heavier	inert	non-toxic, asphyxiating effect
Oxygen	White	heavier	oxidizing	toxic in high concentrations
Forming gas	Red	lighter	from 5.2 % H_2, flammable	non-toxic, asphyxiating effect
Carbon dioxide	Grey	heavier	inerting	Occupational exposure limit 0.5 %* narcotic from approx. 3 %, asphyxiating from approx. 8 %

* in accordance with TRGS 900

Safety is also a question of position

Compressed gas cylinders are generally used for small to medium gas requirements and are stored at a fixed location on the company premises. These are both full compressed gas cylinders, which serve as a supply, and empty compressed gas cylinders, which are waiting to be removed.

Such customer-owned storage facilities for pressurized gas cylinders should meet general requirements for safe operation:

- **Regular instruction/training** of storage personnel in the handling of pressurized gas cylinders as well as the contents of gas cylinders and the associated potential hazards.
- Use **signs/warning signs** to inform unauthorized persons of the access ban.
- Prevent hazards from vehicles (e.g. by means of **collision protection**).
- Store pressurized gas cylinders safely on a level floor and **secure** them **against falling over** (e.g. storage in gas cylinder pallets, set up in groups).
- Always **store** pressurized gas cylinders with liquefied gas **upright.**
- Provide **sufficient space** for handling compressed gas cylinders.
- **Close cylinder valves** tightly and protect them with the **valve protection** provided (e.g. cylinder caps or cage).
- Maintain a **minimum distance** of 0.5 m from heat sources and radiators.
- **Fire extinguisher** and **telephone** (with emergency numbers) must be **easily accessible.**
- Do **not store** pressurized gas cylinders **in critical areas** (e.g. social rooms, stairwells, corridors, escape routes, garages, passageways and thoroughfares).

Check whether a risk assessment is required for this workplace. Never carry out refilling or repair work on gas cylinders!

Storage of pressurized gas cylinders outdoors and indoors

Essentially, warehouses that are open on one or two sides are considered outdoor warehouses. Enclosed warehouses are covered, usually enclosed on all sides and have only one door or entrance gate. In addition to the safety aspects mentioned above, we recommend:

- **Protect** pressurized gas cylinders from **excessive heat.**
- A **safety distance** of at least five meters from neighboring facilities that may pose a hazard (e.g. storage facilities with flammable substances).

- A **protective wall** two meters high and made of non-combustible building materials can replace the safety distance.
- **Fire-retardant exterior walls** or walls to adjacent buildings.
- **Roof covering** sufficiently **resistant** to flying sparks and radiant heat.
- **Flame-retardant floor covering** that allows compressed gas cylinders to stand safely.
- **No pits, ducts or drains** to sewers without a liquid seal and **no cellar entrances** or other open connections to cellar rooms.
- **No cleaning or other openings** in chimneys.
- Adequate **ventilation** (ventilation area at least one percent of the floor area).
- **No storage of other flammable materials** (e.g. flammable liquids, wood, paper, cardboard boxes) in the same room.

If the stored gases are flammable gases, the following must also be observed:

- Walls of the storage room adjacent to **public traffic routes** must **not have any doors or windows** (exception: self-closing and fire-retardant doors).
- The **distance** between **pressurized gas cylinders containing oxidizing gases** and **pressurized gas cylinders containing flammable gases** must be at least two meters.

Areas with potential hazards

Hazardous gas concentrations can occur in some areas. For example, due to operational gas leaks or when connecting/disconnecting pipe connections. In order to avoid the associated potential hazards, it is important to:

- Use **warning signs** to indicate areas with potential hazards.
- Eliminate **ignition sources.**
- Access only for **vehicles** required to **operate the warehouse.**
- **Electrical installations** must be **explosion-proof.**
- Areas with potential hazards must **not extend into neighboring buildings** or **public traffic areas.**

Prohibition sign (red)
• Warning of dangerous behavior

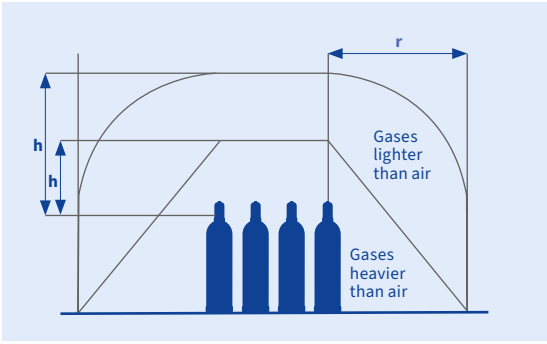
Warning sign (yellow or amber)
• Advice on cautious behavior/ precautionary measure

Mandatory sign (blue)
• Advice on safe behavior/safe action

Safety distances at a glance

When storing pressurized gas cylinders with flammable gases, we recommend the following safety distances (in accordance with TRGS 510):

	Indoor storage		Outdoor storage	
	Gases			
	lighter than air	heavier than air	lighter than air	heavier than air
Height h	2 m	1 m	1 m	0.5 m
Radius r	2 m	2 m	1 m	1 m



You can access further **Pocket Guides Safety** on our website or obtain them directly from our experts.

Important
This pocket guide only contains general information. It does not replace training and is not intended as such. Messer accepts no liability for the information contained in this brochure.

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