

Technical complementary directive to the LEX 1.5.1: Directive on the storage of gas cylinders

June 2013, 1st August 2026

Version

2.2

1. Preamble

There are different types of gases: inert, flammable, toxic, corrosive, and/or oxidizing, Figure 1. This directive dictates the storage guidelines and emergency measures to be taken in the event of an accident.



Figure 1: Common hazard pictograms associated with gases.

2. Scope of Application

The provisions of this directive apply to laboratories and workshops. According to [the safety standardization guide for laboratories and workshops](#) of EPFL, the term laboratory refers to a workspace where research activities are carried out. This includes conducting experiments, process controls, quality controls, tests, calibrations, or measurements as well as material processing in the fields of chemistry, biology, and physics. The term workshop refers to a workspace that involves the manufacture, maintenance, and repair of products, objects, and scientific equipment, even on a small scale. This definition includes service platforms.

The laboratories and workshops of EPFL are classified according to the types of activities and hazards present, by the users of the respective spaces in collaboration with the DSE-OHS and DSE-SIS. In addition to this classification, the emissive or non-emissive nature of the activities carried out in these spaces is crucial for determining certain technical specifications of the workspace.

Only the stock of cylinders (new and empty) and mobile welding stations are addressed here. Technical information on gas installations and distribution is specified in [the cylinder gas installation standardization guide](#).

3. Organization and Allocation of General Safety Responsibilities at EPFL

The responsibilities of the direction, schools, heads of units, the Occupational Health and Safety (OHS) Service, and all users with respect to occupational health, safety, and security at EPFL are defined in the [LEX 1.5.1 Directive Concerning Occupational Health, Safety, and Security at EPFL](#).

Compliance with this directive is mandatory. All personnel are required to familiarize themselves with its content and to apply it within the scope of their activities.

Regarding compressed gas safety, the OHS Service is responsible for:

- Participating in the systematic identification of hazards and risk assessments related to compressed gas installations and infrastructure;
- Providing technical advice and recommendations regarding procedures for the installation and replacement of compressed gas cylinders in gas cabinets;
- Providing expertise and making recommendations on risk control measures associated with laboratory activities, including technical, organizational, and procedural controls;
- Requiring the suspension or cessation of activities that have not been adequately risk assessed or that do not comply with applicable OHS requirements.

The OHS Service **does not perform** the physical installation or replacement of compressed gas cylinders. These operations do not fall within its mandate.

Responsibility for carrying out these tasks' rests with the relevant research units, platforms, or faculties, which must ensure that the personnel involved are appropriately trained and competent.

4. Gas Safety Guidelines

4.1. General Storage Safety Measures

- All pressurized gas cylinders must be stored in an EI90 gas cabinet certified according to EN 14470-2, secured vertically at 2/3 of their height with a rack and a safety chain.
- The installation of gas cabinets and gas detection must be requested through a work request (demande d'intervention, DI) opened by the concerned unit.
- The cabinet must be installed in the concerned ventilated room or a gas distribution central, as close as possible to the point of consumption. The location must be validated by the DSE.

- When handling and storing gas, the safety data sheet (SDS) must always be consulted and considered. If you have any questions, contact the OHS service via the [Support OHS](#) web page.
- All the associated pictograms must be considered when storing compressed gas bottles. Incompatibilities must always be respected (Diagram 1).

- Not compatible: Store in separated fire retardant (EI 90) gas cabinets.
- Check the safety data sheet (SDS) for additional information.
- Compatible: They can be stored in the same EI 90 gas cabinet.



		Oxidizing	Flammable	Corrosive	Toxic
Hazard	Oxidizing				
	Flammable				
	Corrosive				
	Toxic				

Diagram 1. Table of incompatibilities for gas storage

- For the storage of flammable, toxic, oxidizing, and corrosive gases, the gas cabinets must be ventilated and a detection system specific to the type of gas (considering all associated pictograms) must be present in the cabinet and the (ventilated) room where the gas is distributed.
- For the storage of inert gases and CO₂, the cabinets do not require extraction ventilation provided that the room is ventilated. An analysis evaluating the necessity of gas detection must be carried out by contacting the OHS service via the [Support OHS](#).
- If the room is not ventilated, the installation of the cabinet and gas detection must be requested through a dispensation request opened by the concerned unit via the [Support OHS](#).
- Empty or unused cylinders shall be returned to the supplier as soon as possible.
- Compressed gas cylinders have an expiration date applicable both to the gas and to the cylinder itself. Beyond this date, the quality of the gas can no longer be guaranteed. The gas cylinder should be replaced with a new one whenever gas quality is critical to the application. If the gas is used infrequently, a smaller cylinder should be selected.

4.2. Outdoor Storage

Temporary storage of gas cylinders can be carried out in external gas warehouses authorized by EPFL. Empty or unused cylinders must be returned to the supplier as soon as possible. Up to that point, empty cylinders can be stored with full cylinders of the same category. Empty cylinders must be easily identifiable.

4.3. Exceptions and Dispensations

The installation of gas cylinders outside an EI90 cabinet may only be permitted when integration into a cabinet is not feasible or when the use is temporary as part of an experiment with a duration of less than one year. In all cases, the requirements defined in Sections 4.3.1 and 4.3.2 apply and must be complied with.

Any gas cylinder used under these exceptions must be connected directly to the laboratory instrument in which it will be used. When the cylinder is no longer in use, it must be stored in an EI90 gas cabinet without the pressure regulator attached and with the protective valve cap fitted or returned to the supplier.

For all cases that do not comply with the conditions set out in Sections 4.3.1 and 4.3.2, please contact the [OHS Service](#), which will assess whether the conditions are met for an exemption from this directive to be granted.

4.3.1. Use of cylinders outside EI90 gas cabinet for welding, cutting and sealing

Gas cylinders used for welding operations (argon, argon/CO₂ mixtures), oxy-fuel cutting (e.g., oxy-acetylene or oxygen), or sealing may be used in a laboratory outside a ventilated gas cabinet provided that:

- The room volume exceeds 50 m³;
- The room is ventilated at a rate of at least 4 air changes per hour;
- The cylinders are connected to the equipment in which they are used;
- The installation using the cylinders is properly maintained;
- The gas cylinder volume is less than or equal to 10 L. Installations using gas cylinders with a volume greater than 10 L are only permitted in ventilated workshops.

The installation of welding equipment must comply with the occupational safety and health requirements set out in the directive [CFST 6509](#), concerning the safety and health protection of workers.

4.3.2. Use of gas cylinders outside an EI90 cabinet, other than in the cases specified in Section 4.3.1

The storage of gas cylinders outside an EI90 cabinet is permitted under certain conditions, summarized in Table 1. The following general rules apply:

- The conditions specified in Table 1 are no longer valid if the room volume is less than 50 m³. No 50 L gas cylinder shall be present in the room outside an EI90 cabinet;
- A cylinder stored outside a cabinet may only be used with a pressure regulator having a maximum service pressure of 5 bar;
- For gas cylinders displaying multiple hazard pictograms, the hazard category presenting the highest level of danger (see Figure 1) shall be used when applying the criteria for storage outside an EI90 cabinet in Table 1;
- In accordance with [Fire Protection Directive FPD 26-15](#), Section 6, oxidizing gases shall be stored at least 2.5 m away from flammable gases and flammable chemicals;
- The conditions specified in Table 1 do not apply to liquefied flammable gas cartridges containing 500 g or less of liquid, used for Bunsen burners. These cartridges may be stored in a ventilated room, up to a maximum of eight units. Storage shall be away from oxidizing substances, heat sources, and direct exposure to sunlight. These cartridges shall not be stored in cabinets intended for chemical products;
- No corrosive, toxic, and/or liquefied oxidizing gas cylinder (e.g., nitrous oxide, N₂O) is permitted outside an EI90 cabinet.

Table 1. Limits for gas quantities stored outside an EI90 cabinet, applicable only to ventilated laboratories with a room volume exceeding 50 m³.

Type of gas	Cylinder volume (L)	Gas mass (kg)	Number of cylinders
Non-liquified inert (Ex. Nitrogen, Helium, Argon)	≤ ¹ 10	-	1
Liquified inert (Ex. refrigerant gas R-134a)	-	≤ 12	1
CO ₂	-	≤ ² 7.5	1
Not-liquified flammable (Ex. hydrogen, methane)	≤ ¹ 4	-	1
Liquified flammable (Ex. ethane, propane, butane)		≤ 1	1
Not liquified oxidiser (Ex. O ₂)	≤ ¹ 10	-	1

¹ The pressure of the cylinder should not be higher than 200 bar.

² 7.5 kg of CO₂ are typically contained in a 10 L cylinder at 57 bar.

5. General Provisions for the Handling of Gases in Laboratories

- **Gas Safety Training:** All personnel required to handle gases shall complete and comply with EPFL's online [gas safety training](#) prior to any gas-related activities.
- **Installation and Modification Requests:** Any installation, modification, or adjustment of gas cabinet distribution systems shall be requested and approved in coordination with the OHS Service via the official work request platform: <https://cristal.epfl.ch/archibus/portal/Portal>.
- **Prohibition on Unauthorized Modifications:** No user shall perform any modifications, repairs, or adjustments to gas cabinet distribution systems. For troubleshooting or operational issues, users shall contact the 34000.
- **Reference to Operating Procedures:** Use of gas cabinet distribution systems shall comply with the operating procedures provided inside the EI90 cabinets or as available on the supplier's official documentation.
- **Gas Cylinder Replacement:** Replacement of gas cylinders shall only be performed by trained and competent personnel. This requirement is especially critical for toxic, corrosive, or flammable gases. This operation does not fall within the mandate of the OHS Service. Users shall receive training appropriate to the type of gas from the supplier or from an experienced, authorized member of the research group.
- **Compliance with Supplier Instructions:** All gas handling activities shall strictly follow the supplier's installation and operational instructions, including specifications for gas pressure, temperature, piping, fittings, O-rings, and valves.
- **Approval for Hazardous Gas Installations:** Any installations involving CO₂, flammable, toxic, or corrosive gases shall be coordinated and approved by the OHS Service via <https://go.epfl.ch/support-ohs> before commencement.
- **Use of Fume Hoods:** CO₂, flammable, toxic, and corrosive gases shall be manipulated in fume hoods.
- **Support and Guidance:** For any questions regarding the safe use of gases, users shall contact the OHS Service via <https://go.epfl.ch/support-ohs>.

6. Compressed Gas Cylinder Transportation

- The pressure regulator must be removed, and the safety cap placed on the cylinder during transport.
- The cylinder must be transported using an appropriate cart (a 3-wheel cart is preferable). Never drag, pull, or roll a gas cylinder.
- The cylinder must be secured to the cart before transport. The cylinder should be held with one hand on the safety cap while the other hand pulls the cart to transport the cylinder.

7. Behavior to Adopt in Case of an Accident

- Close the valve if possible.
- Evacuate the area and take shelter.
- If possible, evacuate unconscious persons without putting yourself in danger.
- Immediately alert 115 (021 693 30 00 from a mobile phone). Try to gather relevant information about the gas or mixture involved in the accident.
- Report the incident or accident via <https://go.epfl.ch/incident-management>.

8. Literature

Directive sur les **Laboratoires chimiques** (CFST 1871)

Cahier de normalisation sécuritaire des laboratoires et des ateliers

Cahier de normalisation des installations de gaz en cylindre

Feuillet d'information **Cylindres à gaz – utilisation et entreposage sûrs** (SUVA # 66122)

Directive de protection incendie (AEAI DPI 26-15).

Directive sur le soudage, coupage et techniques connexes appliquées à l'usinage des matériaux métalliques (CFST 6509).

9. Final provision

9.1. Enter into force

This supplementary technical directive, which came into force on June 10, 2013, was revised on August 1st, 2026 (version 2.2).

Version	Modifications	Validation OHS	Validation DSE	Date
1.0	LEX 1.5.6 (abrogé)	–	E. Du Pasquier	10.06.2013
2.0	Directive Complémentaire – A. Olaya	S. Karlen	E. Du Pasquier	11.07.2024
2.1	Total volume liquified gases - A. Olaya, E. Ripiccini	S. Karlen	E. Du Pasquier	03.02.2025
2.2	Organization and Allocation of General Safety Responsibilities at EPFL. General requirements for the handling of gases in laboratories A. Olaya, E. Ripiccini	S. Karlen	E. Du Pasquier	01.08.2026