

Protocol handling gas cylinders

1 Objective

As working with gas cylinders does involve special risks, certain guidelines have been drawn up for the procurement, storage, transport, use and disposal of gases that have been compressed, liquefied or dissolved under pressure.

The aim of said guidelines is to control all possible risks to health, safety, and the environment.

To help realise this objective, specific authorised¹ personnel have been appointed in the context of using these gases. These individuals shall be authorised once they have received instructions. They shall be reinstructed every 4 years.

2 Legal framework

Pressurised equipment is subject to special legal provisions. Formally speaking, pressurised equipment can be divided into two categories, namely Steam and Vapour Equipment and Pressure Tanks. The first type of equipment is subject to the Dutch 'Stoomwet' or Steam Act, and the second, which includes gas cylinders, are subject to the Dutch 'Ontwerp Drukhoudersbesluit' or Draft Pressure Tank Resolution.

Gas cylinders

Definition:

'Gas cylinder' refers to a usually cylindrical metal canister, usually with a water capacity ranging from 10 to 50 litres, in which gases can be transported at a pressure that exceeds 100kPa absolute (1 bar).

The compressed gas in the cylinder may take any one of the following forms:

- a. Solely in gaseous state (such as air, nitrogen, oxygen, hydrogen);
- b. In both gaseous *and* liquid state (such as ammonia, butane, propane, chlorine, carbon dioxide, propylene);
- c. In dissolved state (such as acetylene in acetone).

A gas cylinder consists of a cap, a cylinder with a shoulder, and a foot. They range in capacity from 0.25 L to up to 150L under varying pressures. As such, the size (height/width/diameter) of gas cylinders also varies.

Because of the wide range of different gases and mixtures of gases, gas cylinders are labelled with special colours, in accordance with European norms; these colours indicate the contents of the cylinder. However, the determining factors are the gas type (opening clockwise or counter-clockwise) and/or the gas code label.

3 Organisation and regulations

Procurement

Procurement of gas cylinders must be carried out in accordance with the relevant procedures in place at the UT. To view these procedures, please visit the [Chemical Procurement website](#).

The supplier is responsible for inspecting the gas cylinders, while the user is obligated to regularly check the inspection date on the gas cylinders currently in use.

Delivery and check

The supplier reports to the Central Reception of Goods department, where the gases are logged and a check is performed to ensure that the gases have been correctly delivered.

The supplier then delivers the gases to the right buildings' gas storage areas.

¹ Authorised personnel are those who have undergone the internal UT instruction on 'Working safely with gases' (or its predecessor, the so-called 'Gasaansluiting' or gas connector) and are in the possession of a resulting 'Working safely with gases' certificate or a 'Gasaansluiting' certificate. Authorised personnel:

- are capable of independently and adequately connect a pressure regulator to and disconnect it from a gas cylinder;
- are authorised to connect and disconnect gas cylinders at the UT, after having received instructions and obtained the necessary certificate;
- have sufficient background knowledge regarding the organisation and regulations regarding gas cylinders, pressure regulators and the dangers involving gas cylinders and pressure regulators.

Internal storage and transport of gas cylinders at the UT

- The storage and use of gas cylinders in UT buildings must be limited to the smallest number of cylinders as possible. If storing gas cylinders cannot be avoided, this may only be done using the intended storage areas (gas cabinets);
- Gas cylinders may not be placed close to heat sources;
- Gas cylinders may not be placed in close proximity to flammable substances (i.e. a minimum of 2 metres apart), and in no way be allowed to come into contact with corrosive chemicals or fumes;
- Gas cylinders with similar danger characteristics must be stored with one another (PGS 6.2.13²);
- The municipal regulations regarding gas storage and use have been included in the UT environmental permit (to read it, contact your HSE coordinator (HSEc)³);
- Gas cylinders standing upright must be protected from falling over by proper clamps/brackets/braces, bars or chains, which are level with the top half of the cylinder;
- Flammable, corrosive and/or toxic gases must always be stored in a space with an extractor hood or sufficient ventilation;
For more information, please view this regulation on the storage of hazardous substances:
https://www.utwente.nl/hr/vgm/veiligheid/gevaarlijke_stoffen/opslag-gevaarlijke-stoffen.pdf
- Any transport of cylinders from the location they are delivered to by the supplier to workstations and transport within buildings must take place using the gas cylinder transportation carts intended for this use, and may be done by authorised personnel only. The gas cylinder that is being transported must be fitted with a safety cap.
- Gas cylinders may not be transported if a pressure-reducing valve has been attached;
- In all cases of defects to pressure-reducing valves and all other appendages, action must be taken immediately.

Safety aspects

- In case of malfunctions that represent an immediate danger, such as leakage of toxic/flammable gases, a damaged cylinder, or excessive pressure: immediately call +31 (0)53-489 2222 and tell the person responding where you are and what the nature of the calamity is.
Depending on the situation, suitable measures will be decided upon in consultation with the working unit's authorised person, the HSE contact and/or the HSE coordinator and the Emergency Response Team.
- In case of malfunctions to the appendages that do not represent an immediate danger: warn the authorised person in your working unit, who will handle the replacement and/or any repairs.
- Accidents or near-accidents with gas cylinders must always be reported as soon as possible according to the procedure in place for (near) accidents.
https://www.utwente.nl/hr/formulieren_webapplicaties/ongevallenformulier.doc/

Use of gas cylinders

- Use of gas cylinders is only allowed if the standard RI&E procedure has been completed;
- One is only permitted to work with gas cylinders under the following conditions:
 - Whenever possible, make use of the permanent gas distribution system;
 - If this is not possible, make use of gases from gas cylinders that have been placed in suitable gas cabinets (in doing so, also bear in mind any combinations of gases that do not react well together);
 - If the above is not possible, one must contact the HSE coordinator.
- Gas cylinders may only be handled by those authorised individuals who have been given clearance;
- Connecting, changing, etc. of gas cylinders, pressure-reducing valves and needle valves may only be carried out by authorised personnel;
- For all gas cylinders, a safety information sheet must be present within the working unit (digital copies thereof are also allowed);
- Before a gas cylinder is connected, one must make sure one is aware of the specific properties of that particular gas;

² The aim of storing gas cylinders with similar danger characteristics together is to minimise the chance of accidentally switching gases, and to ensure that effective measures can be taken in the event of a calamity. Gas cylinders with the same shoulder colour code must be stored together.

³ The terms HSEc (i.e. coordinator) and HSE contact are explained in the [additional notes on tasks, responsibilities and authorities with regard to health, safety and environment](#) (pages 11 and 12).

- One may never use wrenches or pliers on manual-control gas cylinder valves;
- Any cylinders that are standing upright must be protected properly so that they cannot fall over;
- If no gas is being tapped from a gas cylinder that's equipped with a pressure-reducing valve or needle valve, the cylinder closure must be closed and the pressure-reducing valve must be depressurised;
- Cold gas cylinders must be brought up to room temperature before use. Forcibly heating up or cooling down gas cylinders is not permitted;
- Gas hoses must always be attached to hose nozzles using proper hose clamps;
- Gas cylinders with contents that are in the gaseous or liquid phase or in a dissolved state can only be used upright (for example, carbon dioxide and acetylene);
- Before a pressure-reducing valve or needle valve is used, one must determine whether the valve is suitable for being used in combination with the type of gas in question. So-called special fine-tuning pressure-reducing valves may only be attached on top of a regular pressure-reducing valve.

Returning cylinders

All empty or surplus gas cylinders must be sealed and returned to the temporary storage areas outside of the buildings as soon as possible. From there, they will be taken back by the supplier.

Appendages

- Users may not replace gases, make any alterations or repairs to pressure-reducing valves or needle valves; for such matters, one must instead turn to whoever the authorised individual is;
- Transition pieces to different screw thread between cylinder valves and pressure-reducing valves may not be used.

4 Supervision and responsibility

The HSE contacts of each working unit (department, chair, faculty, etc.) along with the authorised personnel and the HSE coordinator ensure that the storage, transport, use and disposal of gas cylinders are carried out in accordance with the regulations.

The faculty will appoint 1 or more people to provide the theoretical and practical instruction regarding gases, gas cylinders and pressure-reducing valves (the so-called 'Working safely with gases' course, previously known as the 'Gasaansluiters' or 'Gas connector' course).

Those individuals who have demonstrably and properly undergone the instruction, may then connect cylinders and pressure-reducing valves independently for the next 4 years. These individuals are referred to as 'authorised personnel' in this protocol.

The course instructor will provide the UT safety expert with the dates of the instruction sessions and the participants' names, so that a decent record of these proceedings can be kept. The awarded certificates are stored in each person's personnel file.