

SICHERHEITSEMPFEHLUNGEN

Industriegaseverband Schweiz



(Sicherheitsempfehlungen – Safety recommendations)

A03 Gas cylinders in emergencies

General information

Each gas cylinder that is exposed to a fire or extreme heat can explode and cause destruction over a wide area. Dangers result from a shock wave, flying container parts and any flammable, toxic or corrosive cylinder content.

Caution: In the event of an emergency, cylinders with unknown content are generally to be classified as highly dangerous and the maximum safety precautions are to be taken.

Measures in an emergency

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| * 1. Alert the fire department and notify them of the gas cylinders |
| * 2. Warn persons, evacuate the endangered area immediately and then cordon off / set up warning signs |
| 3. Close valves if possible |
| 4. If possible, remove gas cylinders from the danger area as long as they are not affected by the fire and can still be touched with bare hands |
| 5. Cool warmed up or hot cylinders that cannot be removed from safe cover with lots of water |
| 6. Only extinguish burning gas if the flames could lead to a dangerous situation |
| 7. When the whole fire has been extinguished, interrupt cooling for a short time <ul style="list-style-type: none">• If the cylinders dry quickly or steam forms on the cylinder surface, the cooling process is to be resumed immediately |
| * 8. Upon arrival of the emergency services, hand over the inventory of gas cylinders and their contents and specify the time that the fire broke out |
| * 9. Take into consideration additional important information (see the information on the following pages) |

* these points are to be observed for toxic and corrosive gases only

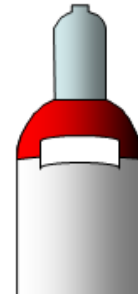
Important information on cylinder bundles:

- The bundle contents can only be clearly identified via a label in the lid area of the bundle
 - Only close the central bundle shut-off valve



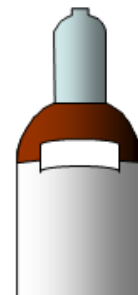
Important information on flammable gases:

- Escaping gas that is not burning can lead to room explosions
 - All ignition sources are to be kept away



Important information on acetylene

- Acetylene air gas mixtures are explosive in a large concentration range. (Attention: required ignition energy is very small).
- The gas content of the cylinder can corrode through flashback if a sooty / smoky flame burns at the cylinder or reducing valve. In the event of a flashback, the reaction takes place unnoticed inside the cylinder – the cylinder becomes hot of its own accord (which is to be established with bare hands).
 - Only retrieve cylinders if their surface remains wet after a 10 minute cooling interruption, otherwise they must be cooled further
 - Cylinders that are still cold and wet can be retrieved, they must however be laid in a water bath for at least 12 hours
 - The behaviour of the cylinders lying in the water bath must be observed, if necessary for up to 24 hours
 - Never approach a hot acetylene cylinder before it has passed the water test, i.e. it remained wet



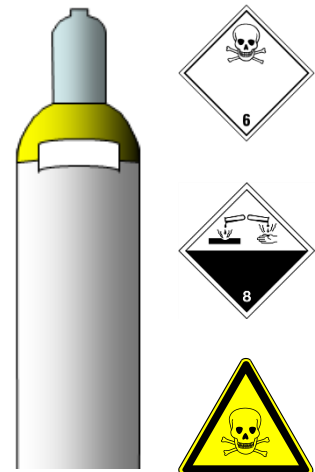
Important information on acetylene bundles

- Since the cylinders in a bundle are in close contact and bump into each other, an effective cooling with water cannot be guaranteed.
 - In case of flashback, only close the bundle shut-off valve
 - Bundles are to be cooled from the moment when the cylinders have stayed cold and wet for at least 30 minutes and are to be cooled for at least 24h with a water jacket
 - During the entire cooling time, the area is to be widely cordoned off






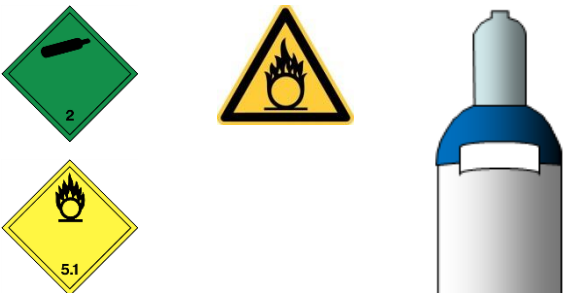
Important information for poisonous and corrosive gases (e.g. gas cylinders with zinc yellow shoulder colour):

- The danger potential comes from the properties of the gases involved
 - Generally, only points 1, 2, 8 and 9 of the above mentioned emergency measures apply – if necessary, notify the chemical emergency unit instead of the fire department
 - Ensure good ventilation
 - Further actions may only be decided upon and instructed by well trained persons:
 - Gas cylinders with poisonous / corrosive gases are only to be handled with full protection
 - If it is possible to do so safely, bring gas cylinders outside and to a safe location
 - Check gas cylinder valves for leaks



Important information on gases liquefied under pressure:

- Escaping liquid gases vaporise upon very large volume increases and mist formation. Depending on the gas type, there is a significant risk of suffocation, poisoning and / or explosion, especially in lower lying rooms.
 - Store cylinders upright and ensure that they do not fall over when cooling
 - Cool cylinder with substantial quantities of water
 - Particularily easily transportable and undamaged cylinders are to be removed from the danger area
- Examples of liquefied gases under pressure:

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| <p>Propane (C₃H₈) / Butane (C₄H₁₀): flammable</p>  | <p>Ammoniac (NH₃): toxic, corrosive</p>  |
| <p>Carbon dioxide (CO₂): suffocating, narcotising</p>  | <p>Nitrous oxide (N₂O): flammable, narcotising</p>  |

Concluding remark

Each emergency situation requires the careful assessment of the associated risks and dangers by the persons affected. This IGS [Industrial Gas Association Switzerland] safety recommendation is to be considered solely as an aid for this assessment.

The safety data sheets (SDS) provide information on the safety-relevant properties of the gases. For further queries regarding the handling of pressure gas containers, the gas suppliers are available to provide you with assistance.

The safe operation of pressure gas containers is only possible if the specific properties of the gases are taken into consideration and the safe handling of the pressure gas containers is ensured.

Scope / Demarcation

This document replaces the existing IGS safety recommendations "Acetylene cylinders in case of fire IGS-TS-010/03", "Information for the fire department: handling of gas cylinders in emergencies IGS-TS-011/03", "Handling of gas cylinder in emergencies IGS-TS-012/04" and "Information for the fire department: acetylene cylinders in case of fire IGS-TS-013/03".

The applicability of this safety recommendation encompasses pressure gas containers (gas cylinders) and pressure gas cans that are used as transportation and storage containers for gases. This documentation cannot be applied to gas tanks or cryogenic containers (vessels for cryogenic liquefied gases).

Further documentation (not exhaustive)

- The respective safety data sheets of the encountered substances
- German Chemicals Act (ChemG)
- VKF (Association of Cantonal Fire Insurers) fire protection guidelines
- EKAS (Federal Commission for Occupational Safety FCOS) guidelines 1941 and 1942: liquid gas part 1 and part 2
- SUVA data sheet 2153: Explosion protection principles
- SUVA publication 66122: Gas cylinders

Do you have any questions?
We hold further documents ready.



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