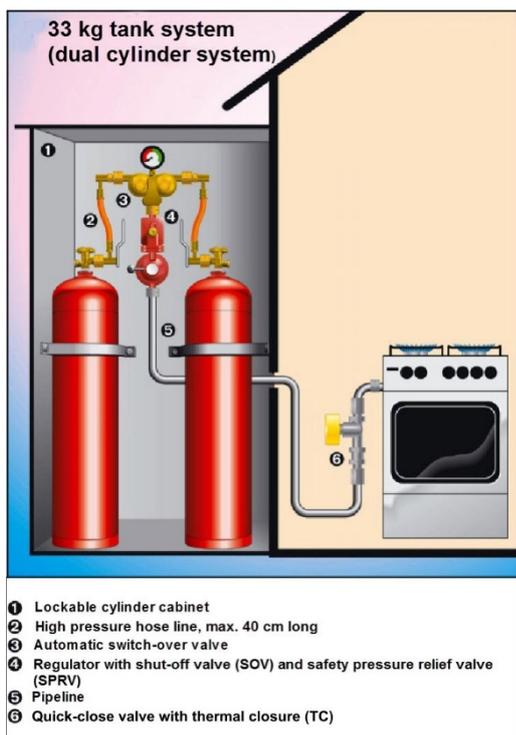
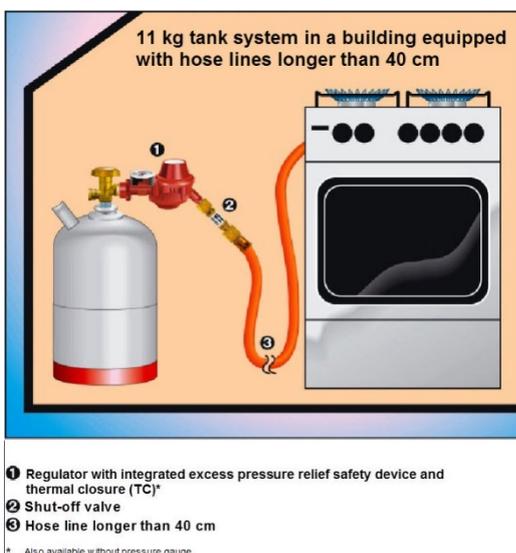
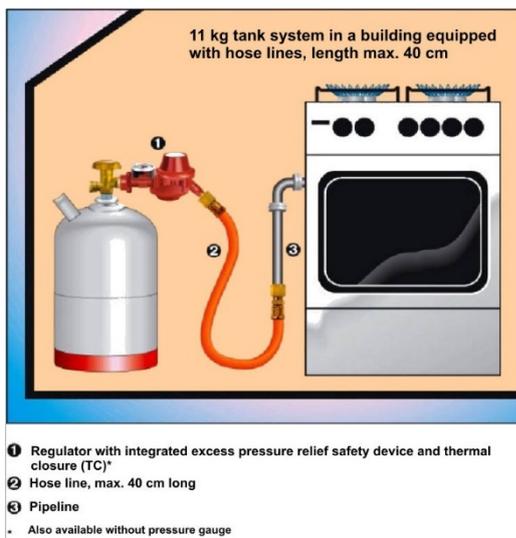


“Safe Use of Liquefied Gas in Stationary Installations“



The following requirements are a summary of the most important points listed in the relevant German national and Berufsgenossenschaft (Employers' Liability Insurance Association) regulations. They lay no claim to completeness. At any rate the requisite local measures should be matched to the liquefied gas installation in question.

Further extensive information can be found in

- ASI 8.04 "Safe use of liquefied gas at markets, fairs and in stationary operations"

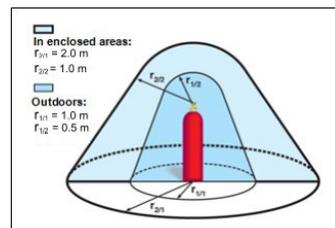
1. Organisation

Risk assessment carried out and documented
Zoning carried out and explosion-prevention document drawn up

Instruction manual available at the workstation
Employee training carried out and documented
Use only certified liquefied gas systems
Fire extinguishers with appropriate contents (e.g. fire classes A, B, C) available

2. Installation

- Gas installation is of adequate dimensions for the gas supply required
- This area should not be open to the public, or must be protected against unauthorized third party access, e.g. by means of a locked cylinder cabinet or sealed safety cover
- Cylinders to be connected in an upright position
- Cylinders must be stable, e.g. level installation surface and protected against accidents
- They must be protected against over-heating (>40 °C)
- Minimum distance of 0.7 m to heating elements, fireplaces etc.
- Cylinder shut-off valve must be within easy reach and access
- No ignition sources, no lower-lying areas and no inflammable substances within the safety zone



Additional requirements when installing cylinders in cabinets for use outdoors:

- cabinet made of non-combustible material (e.g., galvanized sheet steel)
- cabinet with ventilation openings of at least 100 cm² in floor and ceiling areas
- lockable cylinder cabinet
- Additional requirements when installing cylinders in working areas:
- two cylinders maximum, each with a net weight of up to 14 kg per 500 m³ room volume, or only one canister of up to 33 kg net weight per 500 m³ room volume

3. Regulators

- Operating pressure set to match gas device, as a rule 50 mbar, using regulator,
- Safety device available to prevent excessive increases in pressure e.g.
 - a) Regulator with integrated excess pressure safety device

(use up to maximum flow rate of 1.5 kg/h, e.g. for 11 kg cylinder systems)



- b) Regulator with shut-off valve (SOV) and safety pressure relief valve (SPRV)

(use primarily for flow rates exceeding 1.5 kg/h, e.g. for 33 kg canister systems)



When installing a regulator with SOV and SPRV in rooms, vent line is laid outdoors.

4. Thermal Shut-off Device

- Already present in gas pipelines in enclosed spaces (e.g. integrated in regulator or in quick-close valve)

5. Supply Lines (Pipe and Hose Lines), Hose Anti-Rupture Devices

- Preferably use of pipelines instead of hose lines
- Protection of laid pipe and hose lines against external damage (chemical, thermal, mechanical)

Additional requirements when using hose lines and hoses:

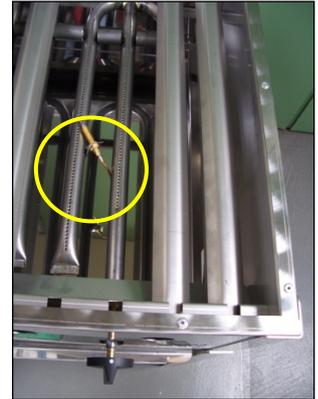
- in principle 0.4 m maximum length
- if longer than 0.4 m, safety precautions necessary (e.g. appropriate hose anti-rupture device)



- Do not lay through walls, ceilings and the like and, as a general rule, not across floors in working areas

6. Gas Appliances

- Labeled with CE mark (for gas appliances in operation since Jan. 1, 1996)
- Only use gas appliances with inlet pressure of 50 mbar
- With functioning safety pilot if used in enclosed spaces
- Comply with device-specific manufacturer's instructions when using e.g. patio heaters, infrared radiators, catalytic ovens



7. Combustion Air Supply, Flue Gas Evacuation

- Ensure a sufficient combustion air supply and safe flue gas evacuation, e.g. by technical ventilation or into the atmosphere through sufficiently large apertures
- Follow gas appliance manufacturer's instructions

8. Exchanging Cylinders

- Test the connection for leakage under operating pressure after exchanging cylinders, e.g. using leak detection spray (operating pressure: cylinder shut-off valve open and regulator isolation valve closed)



9. Storing Liquefied Gas Cylinders

- Preferably tamper-proof outside or in a storeroom with sufficient ventilation
- Cylinder valves protected, e.g. using cap nut and protective cap
- Storage areas not accessible to the general public
- No storage in thoroughfares (e.g., stairs, hallways)
- Storage strictly only above ground level
- No ducts or outflows without liquid seals in storerooms and no cellar accesses
- Safety zones complied with (cf. section 2)

10. Replacing System Components

- Parts subject to wear and tear (e.g. regulators, hose lines, hose anti-rupture devices) must either be replaced after eight years, or certified as in good condition by a *Qualified Person* (specialist)

11. Testing

- Testing of liquefied gas installations by a *Qualified Person* (stationary units at least every four years, portable units, such as radiant heaters, every two years at least)

and

- Testing documented in the DGUV (German Social Accident Insurance), Principle 310-005 "Test certificate on the testing of liquid gas for heating purposes..." (hitherto: BGG (German Employer's Liability Insurance Association) Inspection Certificate 937