

# **USER'S MANUAL OF STAKO LPG CYLINDER MANUFACTURED ACC. TO 2014/68/EU; 2010/35/EU DIRECTIVE AND PN-EN 1442 STANDARD**

<b>Revision no</b>	<b>Date</b>	<b>Change description</b>
00	20.10.2021	Starting revision
01	13.01.2022	Label changed
02	19.01.2022	Label changed



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## 1. FOREWORD

Before start installation of the cylinder read this manual first. User's manual for LPG cylinders has been prepared by the Design-Technology Department of company Stako to ensure safe use and proper technical awareness of people operating Stako LPG cylinders. All information included in this guidebook has been based on the experience, engineering knowledge of the technical staff of company Stako as well as standards and guidelines regarding the construction and tests of LPG cylinders. This document is intended to present the rules of proper operation, cylinder assembly and its fittings assembly. The document includes majority of cases encountered by company Stako. This document is only a guide and not an instruction manual and company Stako cannot be held responsible for any damage aroused from following the described operations by not qualified and not authorised personnel. In case of any situations, incidents, damages not described in this document, it is necessary to contact the company Stako, nearest TDT authority or other governmental authority approving pressure equipment proper for the country. The guidelines in this document can only be applied to the cylinders produced by Stako Sp. z o.o. They should not be applied to the cylinders manufactured by other producers.



## 2. MANUFACTURER

STAKO Sp. Z o.o.  
 ul. Poznańska 54  
 76-200 Słupsk  
 POLAND

Manufacturer of pressure cylindrical tanks and cylinders intended for storage and transport of a liquid propane-butane mixture. The LPG cylinders are designed and made according to 2014/68/EU; 2010/35/EU Directive and EN 1442 Standard.

## 3. LPG CYLINDER TECHNICAL DATA

Technical specifications	Data
Official Type Certificate	acc. To 2014/85/EU; 2010/35/EU Directive and EN 1442 Standard
Test pressure (PT) [MPa]	3
Maximum allowable pressure (PS) [MPa]	2
Min. bursting pressure [MPa]	6,75
Min. temperature (T min)	-20°C
Max. temperature(T max)	+65°C
Materials	acc. to EN 10120
Maximum filling level	80%

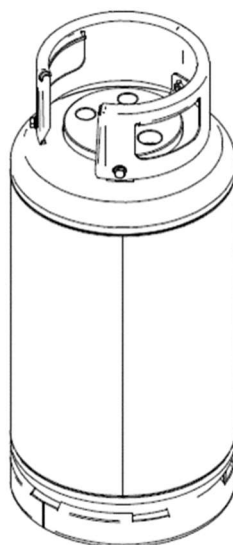


Figure 1. LPG cylinder

## 4. DEFINITION OF LPG CYLINDER MARKING

Each cylinder shall bear a nameplate with clearly reading data that cannot be obscured or erased.

**CAUTION:**

Locate the cylinder in an orientation which permits easy reading of its identification data and approval markings.

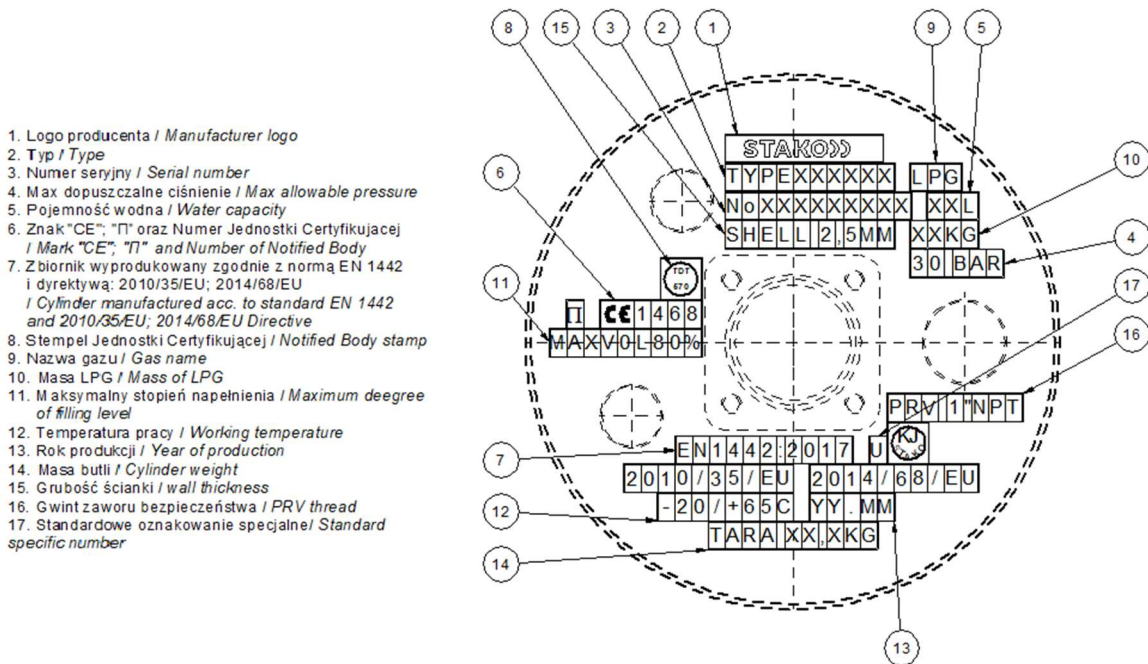


Figure 2. Content of the LPG cylinder nameplate – variant 1

## 5. CHARACTERISTICS OF LPG CYLINDER EQUIPMENT

Each LPG cylinder shall feature the following accessories:

- 80% stop valve,
- Level gauge,
- Safety relief valve,
- Service valve: Manual service valve or remotely controlled service valve.

<p><b>CAUTION:</b> The selection of cylinder accessories shall conform to the LPG cylinder type and diameter</p>	<p><b>CAUTION:</b> All accessories installed on the LPG cylinder shall be protected from damage by special protection collar of the valve plate.</p>
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## 80% STOP VALVE

The 80% stop valve ensures that the cylinder is filled up to a maximum of 75-80%. The stop valve shall be selected for a particular cylinder, which means the valve shall be selected according to the diameter of a cylinder. The valve shall be installed in a proper orientation specified in the valve manufacturer's instruction manual to ensure proper indication.



Picture 1. Example of a 80% stop valve

## LEVEL GAUGE

Means a device for checking the liquid level in the LPG cylinder (shows the actual contents in percentages). The fuel level gauge shall be selected according to the LPG cylinder type/size. The device shall be installed on the LPG cylinder as required in the manufacturer specification.



Picture 2. Example of a level gauge

## SAFETY RELIEF VALVE

Means a device which restricts the increase of pressure in the LPG cylinder. The device shall be installed in the LPG cylinder so that the device bore is open to the gas evaporation space (the gaseous fraction) and the device is capable of venting excess gas to the atmosphere or the gas-tight housing with a vent opened to the atmosphere.



Picture 3. Example of a safety relief valve

## SERVICE VALVE

Device may be operated either manually or electromagnetically. The manually service valve should be operated as indicated by the arrow on the tap. The electric tap operates automatically. The device shall be installed on the LPG cylinder as required in the manufacturer specification.



Picture 4. Example of a remotely controlled service valve



Picture 5. Example of a manual service valve

## 6. SELECTION AND INSTALLATION OF CYLINDER ACCESSORIES

Before attempting to install the accessories, verify that they have been selected accordingly to the concerned LPG cylinder in consideration to the following:

- Cylinder type,
- Cylinder diameter D,
- Cylinder position (working position) .

**CAUTION:**

Install the accessories according to the relevant manufacturer's installation manual(s). Use the installation openings as shown in the figures below.

**CAUTION:**

The accessories in the cylinder may not show any damages. Damaged accessories may not be used.

The accessories shall be installed only by suitably licensed installers, who are required to carry out a leak test of the LPG cylinder complete with its accessories.

The accessories shall be installed in the right hole of the valve plate in accordance with the supplier's assembly instruction. Before assembly the accessories installer should check if the valve thread corresponds to the thread in the cylinder valve plate and if both threads don't show damages. Examples of installation are shown in Figure 3 and 4.

### LAYOUT OF ACCESSORIES

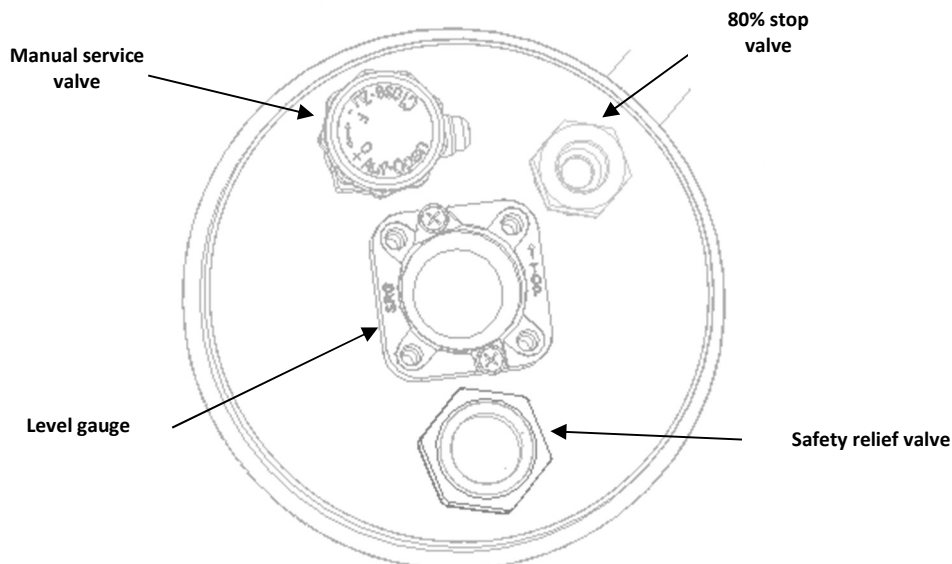


Figure 3. Layout of accessories in LPG cylinders with the valve plate



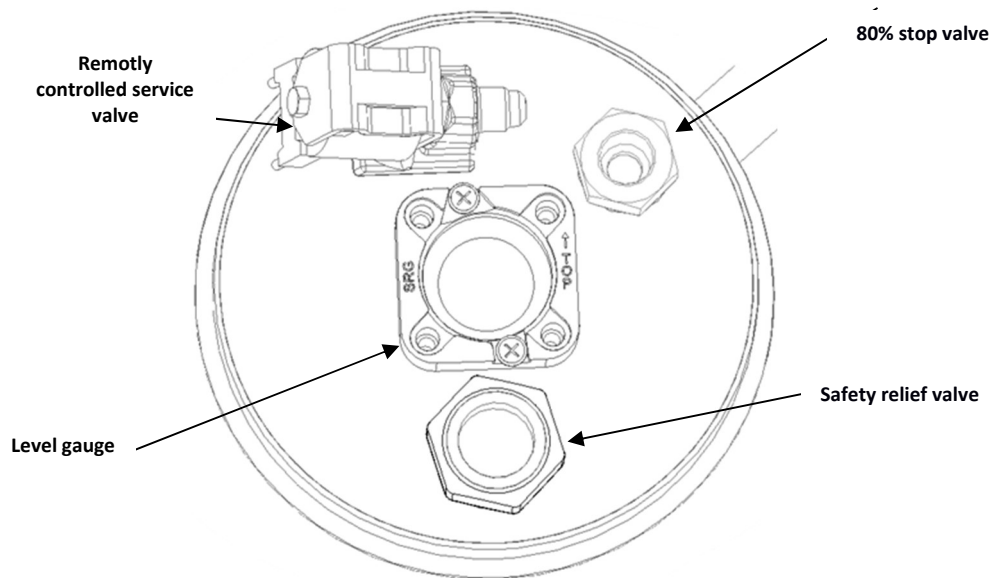
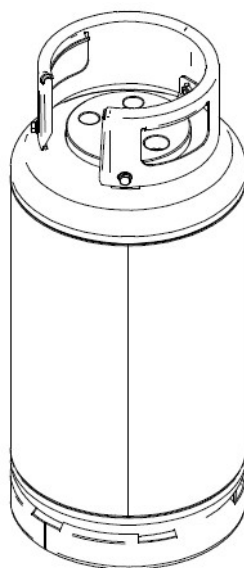


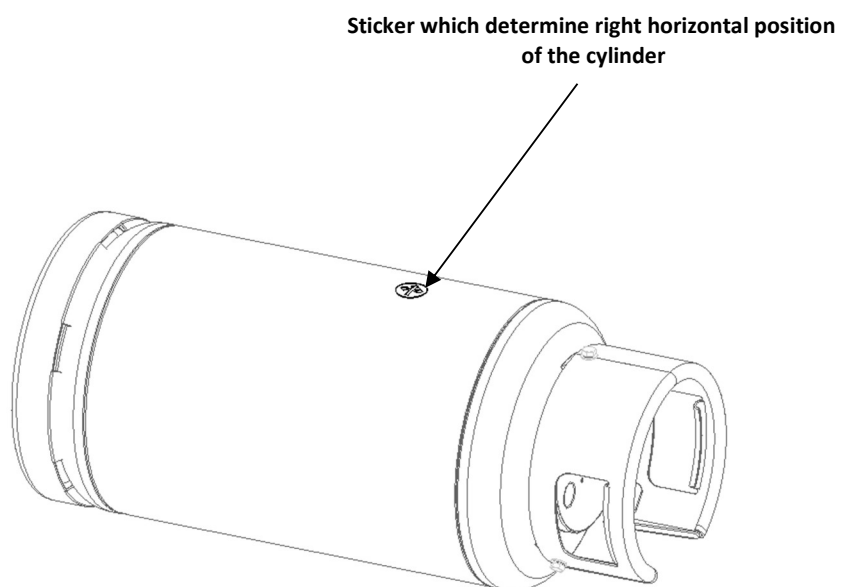
Figure 4. Layout of accessories in LPG cylinders with the valve plate

## 7. PRINCIPLES FOR LPG CYLINDER INSTALLATION

- The LPG cylinder shall be installed in horizontal or vertical position as shown in Figure 5 and 6.
- The LPG cylinder should be filled in the prescribed position and placed for use in a system in such a way that the cylinder is always used in the correct position.
- In case of installing in the vehicle cylinder should be stable, robust and secured permanently at the appropriate position.
- During LPG cylinder installation, operator should use the correct safety provisions.
- The LPG cylinder shall be positioned to facilitate:
  1. Reading the filling level;
  2. Reading the data on the identification markings and the approval markings.
- The LPG cylinders shall be installed in a way which provides maximum protection against effects of impact.
- The cylinders should be permanently secured to prevent damage and injury.
- No rigid parts with sharp edges shall be in proximity of the LPG cylinder.
- On the upper surface of the cylinder there is a white sticker with a cross, which is used to determine the horizontal position of the cylinder as shown in the Figure 6.



**Figure 5. Vertical position of cylinder**



**Figure 6. Horizontal position of cylinder - view of the white sticker with the cross on the upper surface of the cylinder**

## 8. OPERATION AND MAINTENANCE

- Pressure cylinders are intended for storage of a liquid propane-butane mixture.
- Fill the LPG cylinder with LPG fuel only.
- LPG cylinder is design for operating temperature between -20°C and +65°C. It's not allowed to place cylinder in temperature exceeding specified by manufacturer.
- The cylinder may only be filled with clean LPG that doesn't have negative influence on the functionality of the accessories.
- Cylinder must be placed in a well-ventilated space at all times.
- Cylinder should be protected against temperatures higher than +65°C.
- Cylinder should be protected against temperatures lower than -20°C.
- Cylinder must be handled carefully to avoid damaging.
- Use of any accessories other than those approved by the Official Type Certification of the LPG cylinder is prohibited.
- Install the accessories according to the relevant manufacturer's installation manuals.
- The selection of cylinder accessories shall conform to the LPG cylinder type and diameter.
- Check that the LPG cylinder is free from leaks and other defects before each use. Any discovered non-conformities (deformation, leaks, etc.) prevent the LPG cylinder from further operation.
- The accessories installed on the LPG cylinder shall be protected from damage special protection collar of the valve plate.
- The accessories in the cylinder may not show any damages. Damaged accessories may not be used again.
- The LPG cylinder with its accessories shall be maintained and periodically inspected according to the European legislation and laws in the country of operation.
- Fill the LPG cylinder according to the readings of the stop valve.
- Unauthorised adjustment of the LPG cylinder accessories is prohibited.
- LPG cylinder installation can only carry out by an authorized facility.
- The safety relief valve outlet must be open to the atmosphere.
- Do not carry out any work, also unauthorized work, on the LPG cylinder or its accessories.

## 9. ATTENTION

- If any non-conformity is found or LPG odor is sensed in the operating area of the LPG cylinder, immediately close the service valve (if it's safe to do). Personnel must be fully equipped with the protective clothing, gloves and safety glasses. If the leak continues, keep your hands and face away from the escaping LPG. Isolate it from power and try to move the cylinder to an open space away from buildings, people, drains and source of ignition. Stand the cylinder upright with the valve at the top. Disperse the leaking LPG by spraying with water.
- If the case of a fire on the device on which the LPG cylinder is installed or in the room of the LPG installation, try to remove the LPG cylinder clear of the fire. Keep clear of the LPG



gas outflow from the safety relief valve. The safety relief valve release may intensify the flames.

Do not attempt to extinguish the fire if there is not in contact with the cylinder or does not threaten the immediate environment. Instead, ensure the following control measures are allowed:

- Keep the cylinder and fittings cool with water spray,
- Keep people away from the area,
- Remove any other cylinders and/or flammable material from the area,
- Call the fire brigade,
- If the flame touches the cylinder, spray with a dry powder extinguisher,
- Cool the cylinder with a water spray,
- Make sure no one smokes.

## 10. FILLING

Before filling the LPG cylinder check that:

- the markings on the LPG cylinder show it has been properly examined by a relevant inspection body and is still within its due test data,
- it shows no sign of damage, external corrosion, or prohibited repairs that may affect integrity,
- it is suitable for the gas with which it is to be filled,
- the markings on the LPG cylinders show the safe operating limits are established,
- valves, fittings and regulators (where fitted) are:
  - correctly fitted and not leaking,
  - not damaged and in good working condition,
  - suitable for their intended purpose,
  - not contaminated, e.g. with incompatible lubricants.
- the cylinder is in the correct vertical or horizontal position.

**If any of the above conditions are not met, then the cylinder must not be filled.**

After filling a LPG cylinder check that:

- it is within its safe operating limits,
- it is not overfilled or over pressurized. In the event of inadvertent overfilling, any excess gas must be removed in a safe manner and the cylinder checked for further fitness for service,
- the cylinder's valves, fittings and regulators are not leaking, for example by using special equipment such as 'sniffers' or manometers.

## 11. TRAINING

Anyone who examines, fills or uses a gas cylinder should be suitably trained and have the necessary skills to carry out their job safely. They should understand the risks associated with the gas cylinder and its contents.

- new employees should receive training and be supervised closely;
- users should be able to carry out an external visual inspection of the LPG cylinders, and any attachments (e.g. valves), to determine whether they are damaged.



## 12. TRANSPORT, PACKAGING AND STORAGE

- In empty cylinders fit suitable protective caps for threaded holes intended for valves.
- For cylinder with assembled accessories fit suitable valve caps before transporting. Caps help prevent moisture and dirt from gathering in the thread and valve of the cylinder, in addition to providing protection during transport.
- It is necessary to prevent cylinder from moving or falling during transport. It will protect cylinder before damage.
- Transported cylinder can be filled with LPG fuel.
- Packaging of the LPG cylinder should protect it against damage of its surface and threaded holes intended for valve assembly.
- Store LPG cylinders in a dry, safe place on a flat surface. Avoid storing LPG cylinders so that they stand or lie in water.
- Protect LPG cylinders from external heat sources that may adversely affect their mechanical integrity.
- LPG cylinders should be stored away from sources of ignition and other flammable materials.
- Ensure the threaded holes and valves are protected by special caps on empty cylinders to prevent contaminants getting in.
- Store cylinders where they are not vulnerable to hazards caused by impact, e.g. from vehicles such as fork-lift trucks.

## 13. REPAIR

The law prohibits modifications/work and carry out self-repair any on the LPG cylinders or its accessories.

## 14. LPG CYLINDER LIFE TIME

LPG cylinder is designed for a life time not longer than 20 years. Users of cylinder are responsible for periodic examination and test carry out by relevant inspection body, in accordance with relevant regulation and at the appropriate intervals in accordance with the law in the country of operating.

Example of periodic examination carried out on LPG cylinder:

- Visual inspection and, if possible internal inspection of the cylinder,
- Hydraulic pressure test with test pressure 3 MPa,
- Measurements of the cylinder walls thickness,
- Other tests defined by relevant inspection body which carried out the tests depending on the technical condition of the cylinder and its construction.

LPG cylinder which have to be periodic examined should be dismantling.

- Operations must be carried out in a safe place by suitable trained and competent people using appropriate equipment.
- Before dismantling cylinder should be emptying. After emptying any remains from the cylinder shall be removed.



## 15. SCRAPPING

### End life procedure for vehicle equipped with STAKO LPG cylinder.

1. Base of requirements: 2000/53/WE Directive,
2. Place of recycling: according to 2000/53/WE Directive Annex I paragraph 2,
3. The cylinder is made with materials different that specified 2000/53/WE Directive article 4 paragraph 2a ( carbon steel P310NB acc. to EN 10120),
4. Removal of LPG from cylinder: according to 2000/53/WE Directive Annex I paragraph 3,
5. Disassemble the cylinder equipment (valves) – material segregation, 2000/53/WE Directive Annex II,
6. Cylinder disassembly from the vehicle,
7. Cylinder should be destructed, crushed or shredded.

Cylinder which should be scrapping:

- Cylinder after 20 years from manufacturing date or cylinder which doesn't pass periodic examination and test carry out by relevant inspection body, in accordance with relevant regulation.
- Cylinder from accident.
- Cylinder after a fire.

## 16. ENVIRONMENT SAFETY

- Environment safety requirements are guaranteed during whole lifecycle of LPG cylinder.
- Material acquisition, production process, installation, maintenance, removal and disposal are conducted with respect to environment safety requirements.
- Materials used for cylinder and assembly meet REACH legislation requirement and STAKO standards.

## 17. THE MAIN CAUSES OF ACCIDENTS

- Inadequate training and supervision,
- Poor examination and maintenance,
- Faulty equipment and / or design ( e.g. badly fitted valves and regulators, wrong selection of the cylinder accessories),
- Poor handling,
- Poor storage,
- Inadequately ventilated working conditions,
- Hidden damage.



## 18. THE MAIN HAZARD

Hazard	Result
Cylinder filling process – filling / cut-off valve malfunction - overfilling	<ul style="list-style-type: none"> <li>• Safety valve response at designed max. operation pressure – pressure reduction</li> </ul>
Cylinder filling process – filling valve and safety (pressure release) valve malfunction – overfilling	<ul style="list-style-type: none"> <li>• Both safety protection malfunction can cause cylinder damage, loss of tightness or cylinder burst</li> </ul>
Cylinder exposure to a fire	<ul style="list-style-type: none"> <li>• Internal pressure increase causing safety valve response, resulting in pressure reduction</li> <li>• Explosion of the cylinder</li> </ul>
Long period cylinder exposure to a sun	<ul style="list-style-type: none"> <li>• 80% filling safety threshold allow for gas expansion caused by inc. temperature, safety valve allow decrease of excess of pressure in case of abnormal amount of heat</li> </ul>
Introducing holes, cuts or welds and other hot work on an operating cylinder	<ul style="list-style-type: none"> <li>• Any mechanical operation on shell or armature of pressurized cylinder may result in rapid loss of pressure that can cause damage to the surroundings and flammable gas ignition.</li> <li>• Lost of tightness</li> <li>• Explosion of the cylinder</li> </ul>
Filling cylinder with media other than LPG	<ul style="list-style-type: none"> <li>• Using other media than LPG can cause unpredicted behavior of armature, leakage or even burst.</li> </ul>
Cylinder leakage	<ul style="list-style-type: none"> <li>• If any loss of tightness of pressurized cylinder occurs, concentrated vapour may ignite</li> </ul>
Scraping cylinder filled with propane or containing remains of propane	<ul style="list-style-type: none"> <li>• In case of scrapping pressurized cylinder, burst damage may occur and ignition of dispersed air – propane mixture.</li> </ul>
Using cylinder with damage thread	<ul style="list-style-type: none"> <li>• Lost of tightness</li> <li>• Valve effaced in cylinder's thread</li> </ul>