

# **USER'S MANUAL OF STAKO LPG TANKS MANUFACTURED ACC.TO 2014/68/EU DIRECTIVE AND PN-EN 12805 STANDARD**

| <b>Revision no</b> | <b>Date</b> | <b>Change description</b>  |
|--------------------|-------------|--|
| 01                 | 02.08.2019  | Pictures 1 and 2, page 5 were changed<br>Information about gas tight housing was removed, page 8<br>Informations about threads were added in point 6 , page 8<br>Informations in point 8, page 10 were corrected<br>Point 20, page 16 was modified |
| 02                 | 22.08.2019  | Point 20, page 16 was removed  |
| 03                 | 08.03.2021  | Point 8, page 10 was changed - information about using tanks only for forklift was removed   |
| 04                 | 07.11.2024  | Provisions in point 10 were added, page 12 - Assistance in case of problems with LPG filling   |



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## 1. FOREWORD

Before start installation of the tank read this manual first.

User Manual for LPG tanks has been prepared by the Design-Technology Department of company Stako to ensure safe use and proper technical awareness of people operating Stako LPG tanks. 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 tanks. This document is intended to present the rules of proper operation, tanks 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 tanks produced by Stako SP. z o.o.

They should not be applied to the tanks manufactured by other producers



## 2. MANUFACTURER

STAKO Sp. z o.o.  
 ul. Poznańska 54  
 76-200 Słupsk  
 Poland

Manufacturer of pressure cylindrical tanks intended for storage of a liquid propane-butane mixture being a fuel for forklift. The LPG tanks are designed and made according to 2014/68/EU Directive and EN 12805 Standard.

## 3. FORKLIFT LPG FUEL TANK TECHNICAL DATA

| Technical specifications              | Data   |
|---------------------------------------|--|
| Official Type Certificate             | acc. to 2014/68/EU Directive and PN-EN 12805 Standard. |
| Test pressure (PT) [MPa]              | 3.9  |
| Maximum allowable pressure (PS) [MPa] | 2.7  |
| Min. bursting pressure [MPa]          | 8.78   |
| Min. temperature (T min)              | -20°C  |
| Max. temperature (T max.)             | +65°C  |
| Materials                             | acc.to EN 10120  |
| Maximum filling level                 | 80%  |

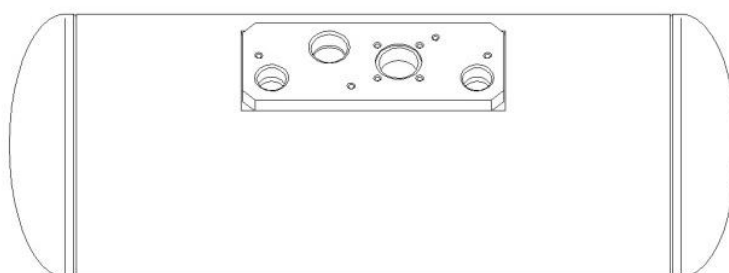


Figure 1.

## 4. DEFINITION OF LPG TANK MARKING

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

**CAUTION:**

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

1. Logo producenta (Manufacturer logo)
2. Numer seryjny (Serial number)
3. Ciśnienie próbne PT i data (Test pressure PT and date)
4. Pojemność wodna (Water capacity)
5. Znak CE i Numer Jednostki Certyfikującej (Mark CE and Number of Notified Body)
6. Zbiornik wyprodukowany zgodnie z normą EN 12805 i dyrektywą 2014/68/EU (Cylinder manufactured acc. to standard EN 12805 and 2014/68/EU Directive)
7. Stempel Jednostki Certyfikującej (Notified Body stamp)
8. Nazwa gazu (Gas name)
9. Masa LPG (Mass of LPG)
10. Masa butli z osprzętem (Weight cylinders with accessories)
11. Maksymalny stopień napełnienia (Maximum degree of filling level)
12. Max. dopuszczalne ciśnienie PS (Max. allowable pressure PS)
13. Temperatura pracy TS (Working temperature TS)

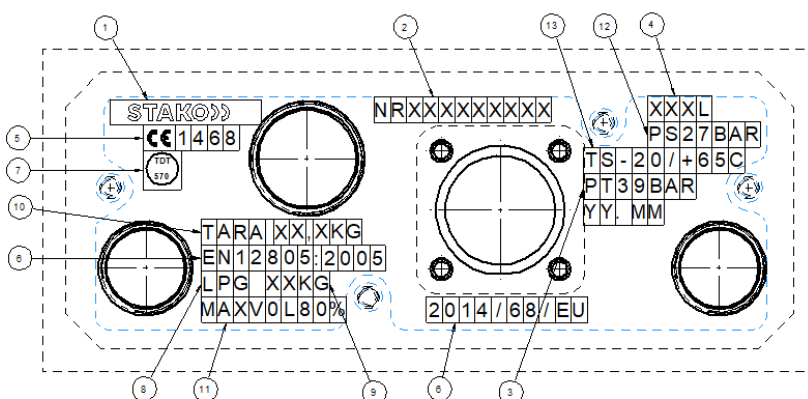


Figure 2. Content of the LPG tank nameplate

## 5. CHARACTERISTICS OF LPG TANK EQUIPMENT

Each LPG tank shall feature the following accessories:

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

**CAUTION:**

The selection of tank accessories shall conform to the LPG tank type and diameter

**CAUTION:**

All accessories installed on the LPG tank shall be protected from damage by gas-tight housing or special protection collar of the valve plate

## 80% STOP VALVE

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



Picture 1. 80% stop valve Rotarex, 3/4"

## LEVEL GAUGE

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



Picture 2. Level gauge Rotarex

## SAFETY RELIEF VALVE

Means a device which restricts the increase of pressure in the LPG tank. The device shall be installed in the LPG tank 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. Safety relief valve:  
Rotarex, 1"

## 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 on 12V or 24 V. The device shall be installed on the LPG tank as required in the manufacturer specification.



Picture 4. Remotely controlled service  
valve: 3/4"



Picture 5. Manual service valve: 3/4"

## 6. SELECTION AND INSTALLATION OF TANK ACCESSORIES

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

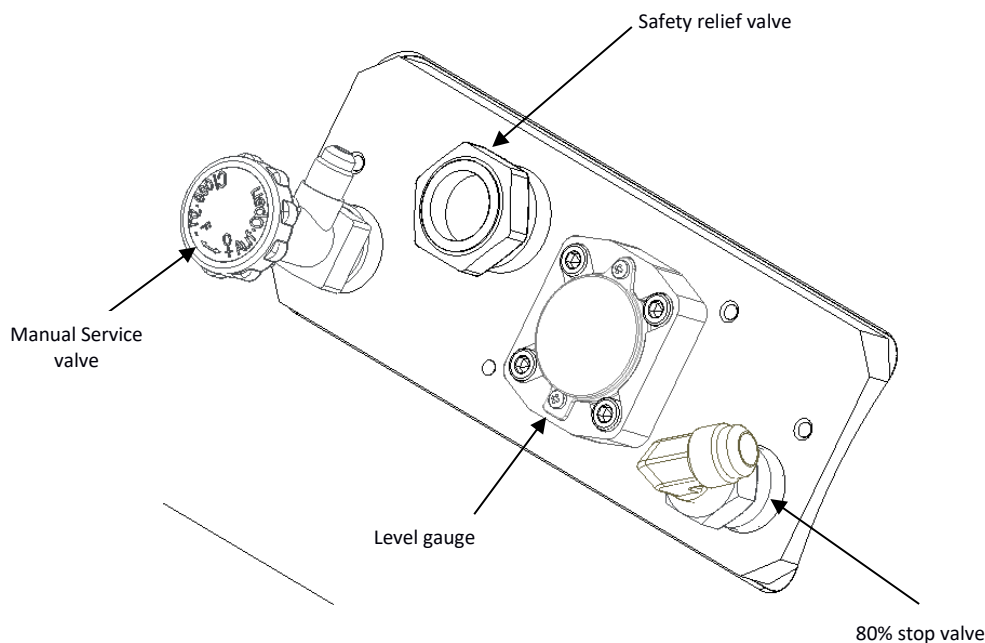
- LPG tank type (cylindrical)
- LPG tank diameter D (200 to 450)

|  |   |
|--|---|
| <p><b>CAUTION:</b><br/>Install the accessories according to the relevant manufacturer's installation manual(s). Use the installation openings as shown in the figures below.</p> | <p><b>CAUTION:</b><br/>The accessories in the tank may not show any damages. Damaged accessories may not be used.</p> |
|--|---|

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

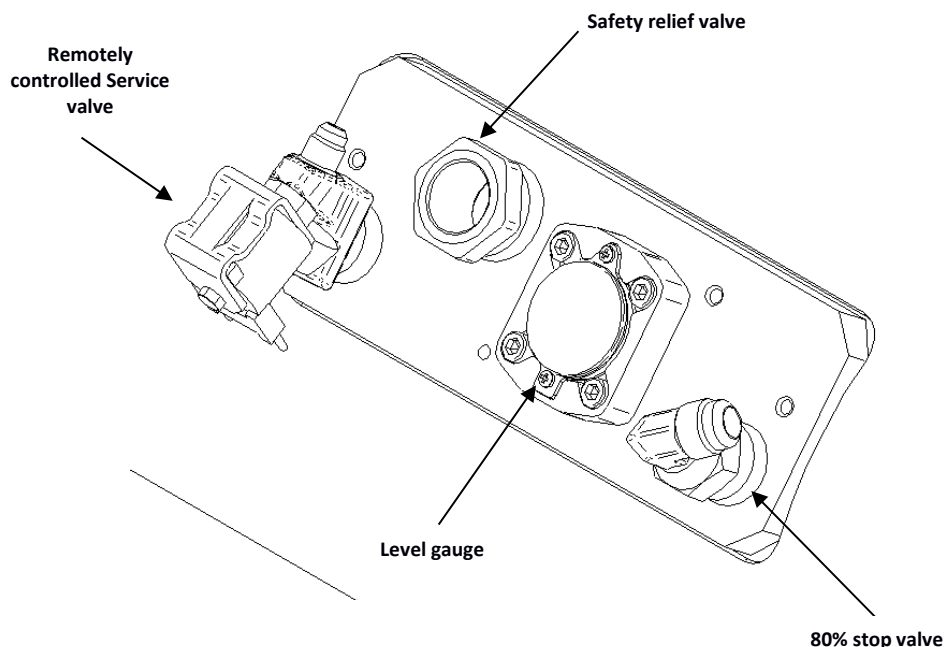
The accessories shall be installed in the right hole of the valve plate in accordance with the supplier's assembly instructions. Before assembly the accessories installer should check if the valve thread corresponds to the thread in the tank valve plate and if the both threads don't show damages. Examples of installation are shown in Figure 4 and 5.

### LAYOUT OF ACCESSORIES



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

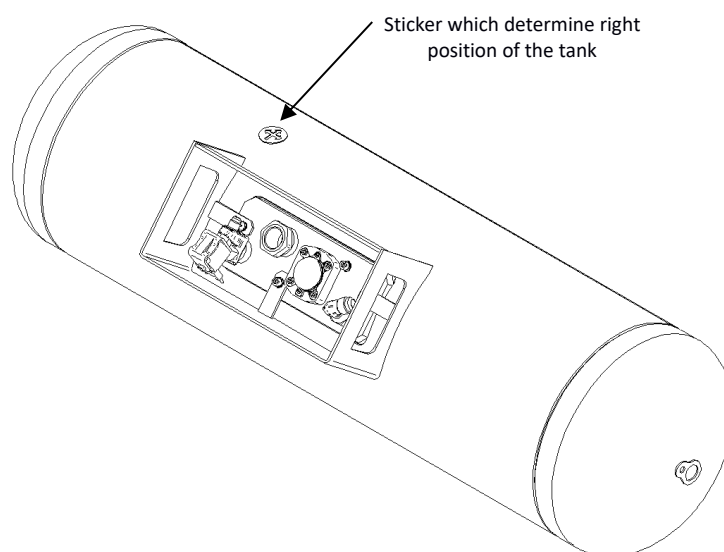




**Figure 5. Layout of accessories in LPG tanks with the valve plate**

## 7. PRINCIPLES FOR LPG TANK INSTALLATION

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



**Figure 6. View of the white sticker with the cross on the upper surface of the tank**

## 8. OPERATION AND MAINTENANCE

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

- LPG tank 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 unauthorised work, on the LPG tank or its accessories.

## 9. ATTENTION

- If any non-conformity is found or LPG odour is sensed in the operating area of the LPG tank, immediately close the service valve (if it's safe to do). Personnel must be fully equipped with protective clothing, gloves and safety glasses. If the leak continues, keep your hands and face away from the escaping LP. Isolate it from power and try to move the cylinder to an open space away from buildings, people, drains and source of ignition and . 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 tank is installed or in the room of the LPG installation, try to remove the LPG tank 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 a 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 a gas cylinder check that:

- the markings on the LPG tank shows it has been properly examined by a relevant inspection body and is still within its due test date,
- 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 tanks shows 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 tank is in the correct position (the angle of the valve plate is correct for mounted valves)

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



After filling a LPG tank check that:

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

Assistance in case of problems with LPG filling:

1. The tank cannot be filled or can be filled with difficulty (slowly):

- the pressure at gas station has to be sufficient. The pressure on the container might be higher than the pressure of the pump.
- make sure that the connection between the nozzle and the filling adapter is fully connected (e.g. not tilted).
- if applicable, the sinter filter at the filling side could be soiled
- if the filling still does not work, please disconnect the connection between the nozzle and the filling adapter and reconnect.

2. Analogue level indicator does not work:

- particles (e.g. from contaminated gas) can jam the gears. The usage of a sinter filter for filling is recommended.

## 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 tanks, and any attachments (e.g. valves), to determine whether they are damaged.

## 12. TRANSPORT AND PACKAGING

- Fit suitable protective caps for threaded holes intended for valves. For tank with assembled accessories fit suitable valve caps and covers to cylinders, before transporting. Caps and covers 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 tank from moving or falling during transport. It will protect tank before damage.
- Transported tank shouldn't be filled LPG fuel.
- Packaging of the LPG tanks should protect it against damage of its surface and threaded holes intended for valve assembly.



## 13. STORAGE

- Store LPG tanks in a dry, safe place on a flat surface. Avoid storing LPG tanks so that they stand or lie in water.
- Protect LPG tanks from external heat sources that may adversely affect their mechanical integrity.
- LPG tanks should be stored away from sources of ignition and other flammable materials.
- Ensure the threaded holes and valves are protected by special cups or covers on empty tanks to prevent contaminants getting in.
- Store cylinders where they are not vulnerable to hazards caused by impact, eg from vehicles such as fork-lift trucks.

## 14. REPAIR

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

## 15. LPG TANK LIFE TIME

LPG tank is design for a life time not longer than 20 years.

Users of the vehicles equipped with a gas supply system 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 tank:

- Visual inspection and, if possible internal inspection of the tank,
- Hydraulic pressure test with test pressure 3.9 MPa,
- Measurements of the tank walls thickness,
- Other tests defined by relevant inspection body which carried out the tests depending on the technical condition of the tank and its construction.

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

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

## 16. SCRAPPING

### End life procedure for vehicle equipped with STAKO LPG tank

1. Base of requirements: 2000/53/WE Directive,
2. Place of recycling: according to 2000/53/WE Directive Annex I paragraph 2,
3. The tank is made with materials different than specified 2000/53/WE Directive article 4 paragraph 2a,( carbon steel P310 acc.to EN 10120),



4. Removal of LPG from tank: according to 2000/53/WE Directive Annex I paragraph 3
5. Disassemble the tank equipment (valves) – material segregation, 2000/53/WE Directive Annex II,
6. Tank disassembly from a vehicle,
7. Tank should be destroyed, crushed or shredded.

Tank which should be scrapping:

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

## 17. ENVIRONMENT SAFETY

- Environmental safety requirements are guaranteed during whole lifecycle of LPG tank.
- Material acquisition, production process, installation, maintenance, removal and disposal are conducted with respect to environment safety requirements.
- Materials used for tank manufacturing and assembly meet REACH legislation requirement and STAKO standard.
- Locate the tank in an orientation which permits easy reading of its identification data and approval markings.

## 18. 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 tank accessories),
- Poor handling,
- Poor storage,
- Inadequately ventilated working conditions,
- Hidden damage.

## 19. THE MAIN HAZARD

| Hazard   | Result  |
|--|---|
| Tank filling process - filling / cut-off valve malfunction - overfilling                           | • Safety valve response at designed max. operation pressure – pressure reduction            |
| Tank filling process - filling valve and safety (pressure release) valve malfunction - overfilling | • Both safety protection malfunction can cause tank damage, loss of tightness or tank burst |
| Tank exposure to a fire  | • Internal pressure increase causing safety valve   |

| Hazard   | Result   |
|--|--|
|  | <ul style="list-style-type: none"> <li>response, resulting in pressure reduction</li> <li>• Explosion of the tank</li> </ul>   |
| Long period tank 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 tank | <ul style="list-style-type: none"> <li>• Any mechanical operation on shell or armature of pressurized vessel may result in rapid lost of pressure that can cause damage to the surroundings and flammable gas ignition.</li> <li>• Lost of tightness</li> <li>• Explosion of the tank</li> </ul> |
| Filling tank with media other than LPG                                   | <ul style="list-style-type: none"> <li>• Using other media than LPG can cause unpredicted behaviour of armature, leakage or even burst.</li> </ul>   |
| Tank leakage   | <ul style="list-style-type: none"> <li>• If any loss of tightness of pressurized vessel occurs, concentrated vapour may ignite</li> </ul>  |
| Scraping tank filled with propane or containing remains of propane.      | <ul style="list-style-type: none"> <li>• In case of scrapping pressurised vessel, burst damage may occur and ignition of dispersed air - propane mixture.</li> </ul>   |
| Using tank with damaged thread   | <ul style="list-style-type: none"> <li>• Lost of tightness</li> <li>• Valve effaced in tank's thread</li> </ul>  |