SLOVENSKI STANDARD
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Equipping of Liquefied Petroleum Gas (LPG) road tankers

Ausrüstung von Straßentankwagen für Flüssiggas (LPG)

Equipements des camions citernes pour GPL

Ta slovenski standard je istoveten z: **EN 12252:2000**

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43.080.10 Tovornjaki in priklopniki Trucks and trailers

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EUROPEAN STANDARD
NORME EUROPÉENNE
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English version

Equipping of Liquefied Petroleum Gas (LPG) road tankers

Equipements des camions citernes pour GPL

Ausrüstung von Straßentankwagen für Flüssiggas (LPG)

This European Standard was approved by CEN on 25 June 2000.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 286 "Liquefied petroleum gas equipment and accessories", the secretariat of which is held by NSAI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2001, and conflicting national standards shall be withdrawn at the latest by January 2001.

The standard has been submitted for reference into the RID and/or in the technical annexes of the ADR (European agreement on the International Carrage of Dangerous Goods).

Therefore the standards listed in the normative references and covering basic requirements of the RID/ADR not addressed within the present standard are normative only when the standards themselves are referred to in the technical annexes of the ADR.

Annexes A and B are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies equipment and accessories for road tankers used for the transport of Liquefied Petroleum Gas (LPG) and identifies the equipment that is considered necessary to ensure that filling, transportation and discharge operations can be carried out safely.

The standard also identifies additional equipment and accessories that may be used on road tankers carrying LPG.

> NOTE This European Standard should not exclude the use of alternative designs, materials and equipment testing which provide a similar level of safety.

This standard does not apply to "tank-containers" and "battery-vehicles" used for the transportation of LPG.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 837-2 Pressure gauges – Part 2: Selection and installation recommendations for pressure gauges.

EN 1012-1 Compressors and vacuum pumps - Safety requirements - Part 1: Compressors

EN 1762 Rubber hoses and hose assemblies for liquefied petroleum gas, LPG (liquid or gaseous phase) and natural gas up to 2,5 MPa (25 bar) – Specification

prEN 12493:1996 Design and manufacture of welded steel tanks for LPG road tankers

3 Terms and definitions

For the purposes of this standard the following terms and definitions apply:

3.1
primary shut-off system
valve or a series of valves attached to the tank which provides a method of closing the tank.

3.2
vehicle LPG equipment
equipment and pipework on the vehicle which is in contact with LPG and forms part of the LPG operating system, shut-down system or safety system, but which is not directly connected to the tank and is not part of the LPG fuel system.

3.3
tank
pressure vessel containing the LPG, connecting nozzles and welded attachments.

3.4
accessories
fittings connected to the tank.

3.5
thermowell
permanently sealed pocket in the tank / pipework for the temperature gauge.

4 General requirements

Construction and equipment shall be of such a nature that they withstand the anticipated mechanical, chemical and thermal stresses and remain tight. In particular they shall

- be manufactured of materials which give the finished component the required mechanical properties; in particular, where components are subject to the low temperatures that may be caused by filling, suitably ductile material shall be used;

- have items fit for purpose; equipment shall be protected against accidental damage where such damage could lead to a dangerous escape of LPG.

5 Tank

5.1 Design, calculation, material, manufacture and testing

The tank shall be designed and manufactured in accordance with prEN 12493:1996.

5.2 Mounting of tank on vehicle

5.2.1 General

Design and construction shall ensure that the tank and its fastenings to the structure of the vehicle absorb safely the stresses from normal use such as surge, vibration, braking action etc.

5.2.2 Mounting

5.2.2.1 The fixing of the tank to the vehicle shall be designed in accordance with a calculation based on the forces given in table 1 below.

Table 1 - Forces for fixing the tank to the vehicle

Direction of force	Force N
In the driving direction	2g x total mass of tank
Horizontal, at 90° to the driving direction	g x total mass of tank
Vertical, upwards	g x total mass of tank
Vertical, downwards	2g x total mass of tank
The total mass of the tank shall be taken as the tare mass plus the maximum allowable mass of the contents. g = gravitational acceleration.	

5.2.2.2 A sample method of calculation for the mountings of the tank to the chassis is contained in Annex B.

5.2.2.3 Tanks shall be electrically continuous with the chassis. The resistance of this electrical path shall not exceed 10 Ohms.

6 Tank accessories

6.1 Required tank accessories

6.1.1 Contents gauge

Tanks shall be equipped with a suitable contents gauge. The requirements of prEN 12493:1996 shall apply.

6.1.1.1 If the contents of the tank are to be measured by volume rather than by weight, then at least two independent systems of measuring the contents shall be fitted, only one of which can be a fixed liquid level gauge.

6.1.1.2 Any gauging device that relies on venting to atmosphere, such as a rotary or fixed level gauge shall be in accordance with **8.1**.

6.1.2 Pressure gauge

Tanks shall be equipped with a pressure gauge conforming to EN 837-2.

6.1.3 Primary shut-off system

6.1.3.1 All connections to the tank in excess of 1,5 mm diameter, other than those for pressure relief valves or those permanently fitted with blank flanges or plugs, shall incorporate a primary shut-off system.

6.1.3.2 The primary valve shut-off system shall be of a design intended to limit the release of the tank's content in the event of external damage.

6.1.3.3 The primary shut-off system required depends upon the purpose of the tank connection as follows:

a) Liquid discharge:
A normally closed internal shut-off valve opened by hydraulic, pneumatic or mechanical power from the vehicle. The valve shall be designed for rapid closure on command by one of at least two manual devices located at convenient remote positions on the vehicle and adequately labelled to indicate their use. The system shall incorporate a thermally sensitive device that will ensure positive closure in the event of a fire and shall incorporate an excess flow valve facility.

b) Other liquid or vapour piped connections, except those for level gauging or pressure gauges :

An internal excess flow valve or internal back-check valve in series combination with a manual shut-off valve shall be provided.

NOTE Where access to the valve handle is restricted, consideration should be given to a shut-off valve with a remote closure facility in accordance with a) above.

6.1.3.4 In the liquid discharge line at least one hand operated or remotely operated valve shall be positioned as close as reasonable to the tank outlet.

6.1.3.5 A shut-off valve is required in the pipework for liquid transfer or vapour balance connections used for routine operations and shall be positioned as close as reasonable to the end of the pipework and/or hose outlet.

6.2 Optional tank accessories

If any of the following accessories are fitted, the following requirements shall apply:

a) Temperature gauges in accordance with **8.3**;

b) Pressure relief valves (PRVs) sized in accordance with **8.9** and Annex A;

c) Sun shields in accordance with prEN 12493:1996.

7 Vehicle LPG equipment

7.1 Required LPG equipment

LPG equipment and pipework shall be protected against mechanical damage, by its design or location and/or by barriers which protect against collision damage.

7.1.1 Pipework

7.1.1.1 The number of pipe joints shall be kept to a minimum. Joints shall be welded or weld flanged. Alternatively, joints for pipework up to and including 50 mm nominal bore, or for proprietary items such as pumps, valves and meters up to 80 mm nominal bore, may be threaded.

7.1.1.2 Mechanical barriers shall not be attached to pipework or valves which they are intended to protect. The pipework shall be installed so as to prevent damage due to vibration.

7.1.2 Emergency shut-down system

The LPG equipment of the vehicle shall include an emergency shut-down (ESD) system initiated by a minimum of two manual devices located on the vehicle, or one manual device located on the vehicle combined with either :

- a rip cord (emergency cord) laid down on the ground beside the LPG road tanker during filling and discharge

or

- remote systems.

The ESD system shall immediately initiate the shut-down of the discharge pump and the primary shut-off valve on the tank.

7.1.3 Hoses

Hoses shall be made of material suitable for LPG service and designed for a pressure at least equal to the design pressure of the pipework. Hoses shall be in one manufactured length without intermediate joints or couplers and shall not exceed 60 m. Hoses shall comply with EN 1762 and the electrical resistance shall not exceed 100 ohms.

Hose end valves shall be protected against inadvertent opening and shall have a suitable secure storage location to prevent movement when the vehicle is in motion.

Hoses shall have a minimum burst pressure of 100 bar.

Hoses with their couplings shall be tested to a pressure of 1,5 times the design pressure.

The minimum bend radius of the hose shall be less than the bend radius of the hose reel when fitted.

7.1.4 Thermal expansion valves/hydrostatic relief valves

Thermal expansion valves/hydrostatic relief valves shall be provided for all pipe sections where liquid may be trapped unless the system is otherwise protected.

They shall be positioned so that they do not point at the LPG tank nor shall they be placed in the bottom quarter of horizontal pipes.

Hydrostatic relief valves shall be set to discharge at a pressure not above the design pressure of the equipment being protected.

7.1.5 Valves

Valves shall be in accordance with **8.8.**

7.2 Optional LPG equipment

If any of the following equipment is fitted to the vehicle, the following requirements shall apply:

7.2.1 Compressors shall be in accordance with EN 1012-1.

7.2.2 Pumps shall be in accordance with **8.4.**

7.2.3 Hose reels shall be in accordance with **8.5.**

7.2.4 Metering systems shall be in accordance with **8.7**

7.2.5 Earth reels shall be in accordance with **8.6.**

8 Specifications for LPG equipment and accessories

8.1 Gauging systems

The bleed hole maximum opening shall not be larger than 1,5 mm diameter unless it is protected by a shut-off valve and a suitable excess flow valve.

The operational bleed screw shall remain captive at all times.

The gland shall be capable of being replaced without withdrawing the tank from service.

The design of the rotary gauging device shall take account of transport vibrations.

Rotogauges, where used, shall be free to move in both clockwise and anti-clockwise directions.

8.2 Pressure gauge

The pressure gauge shall be located so that it is protected from damage and can be easily monitored.

If a gauge is connected directly to the tank, the requirements of **6.1.3.1** shall apply.

8.3 Temperature gauge

The connection for a temperature gauge to piping or tank shall be made by a thermowell.

The thermowell shall be constructed in accordance with the same design requirements as the tank or pipework into which it is permanently fixed.

8.4 Pump

The rotational speed of the drive shall be variable with controls to prevent the rating of the pump being exceeded.

For a positive displacement pump in addition to any internal pump overload by-pass, the pump or outlet pipework shall be fitted with a separate by-pass valve set at a lower differential pressure to automatically carry any excess liquid back to the tank when the delivery valve is closed. The by-pass valve shall be suitably sized to accommodate the pump discharge flow rate.

If a pump minimum flow by-pass system is not provided, the design and operation shall ensure that cavitation is avoided.

A suitable strainer shall be fitted upstream of the pump inlet, if required by the pump manufacturer. If the strainer does not protect the pump during uplift, provision for a second strainer shall be made.

8.5 Hose reel

The hose-reel shall be fitted with a brake assembly to allow control of the speed of the reel. Roller or spool assemblies may be located at or near the hose-reel to prevent tearing or wear of the hoses by sharp edges.

The hose-reel shall have manual or power rewind. Power rewind shall be designed to prevent damage due to excessive rewinding.

8.6 Earth reel

The earth reel shall have electrical continuity with the tank.

8.7 Metering system

The design and materials of construction shall be suitable for use with liquid LPG and the service conditions.

Cast iron shall not be used unless it has adequate ductility and resistance to brittle failure over the range of pressures and temperatures to which it may be subjected in use. Ductile iron with an elongation at fracture of less than 18% shall not be used.

8.8 Valves

Valves shall comply with the requirements of the relevant European Standards.

8.9 Pressure relief valves (PRVs)

8.9.1 PRVs shall be located in the vapour space of the tank. The number of PRVs shall be sufficient to satisfy the requirements of **8.9.2**.

8.9.2 The sizing of PRVs shall be either :

- such that the cumulative cross-sectional opening area is 20 cm^2 per 30 m^3 capacity or proportion thereof,

or

- in accordance with Annex A.

8.9.3 PRVs shall be sited flush with the tank shell and with the operating mechanism inside the tank, or any protrusion shall be adequately guarded against impact damage and any damage to the guard shall not interfere with the satisfactory operation of the valve.