
Oprema in pribor za utekočinjeni naftni plin (UNP) - Varnostni ventili za premične, ponovno polnljive jeklenke za UNP

LPG equipment and accessories - Pressure relief valves for transportable refillable cylinders for Liquefied Petroleum Gas (LPG)

Flüssiggas-Geräte und Ausrüstungsteile - Sicherheitsventile für ortsbewegliche, wiederbefüllbare Flaschen für Flüssiggas (LPG)

Équipements et accessoires GPL - Soupapes de sécurité des bouteilles transportables et rechargeables pour gaz de pétrole liquéfiés (GPL)

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**LPG equipment and accessories - Pressure relief valves for
transportable refillable cylinders for Liquefied Petroleum
Gas (LPG)**

Équipements et accessoires GPL - Soupapes de sécurité
des bouteilles transportables et rechargeables pour gaz
de pétrole liquéfiés (GPL)

Flüssiggas-Geräte und Ausrüstungsteile -
Sicherheitsventile für ortsbewegliche,
wiederbefüllbare Flaschen für Flüssiggas (LPG)

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 286.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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prEN 13953:2019 (E)**European foreword**

This document (prEN 13953:2019) has been prepared by Technical Committee CEN/TC 286 “Liquefied petroleum gas equipment and accessories”, the secretariat of which is held by NSAI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13953:2015.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document has been submitted for reference into the technical annexes of the ADR [1].

NOTE These regulations take precedence over any clause of this document. It is emphasized that ADR is regularly at intervals of two years which may lead to temporary non-compliances with the clauses of this document.

The major changes to this revision include:

- addition of water capacity range in the scope;
- addition of requirements for rubber material;
- change to the nominal set pressure;
- clarification to discharge capacity test;
- clarification to endurance test

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Introduction

This document calls for the use of substances and procedures that may be injurious to health and/or the environment if adequate precautions are not taken. It refers only to technical suitability. It does not absolve the user from their legal obligations at any stage.

Protection of the environment is a key political issue in Europe and elsewhere around the world. Protection of the environment in this document is understood in a very broad sense. The phrase is used, for example, in relation to the total life-cycle aspects of a product on the environment, including expenditure of energy, and during all phases of its existence, from mining of raw materials, to fabrication, packaging, distribution, use, scrapping, recycling of materials, etc.

It is essential that provisions be restricted to a general guidance. Limit values are specified in national laws.

Protection of the environment is a key political issue in Europe and elsewhere, for CEN/TC 286 this is covered in CEN/TS 16765 [2], *LPG equipment and accessories – Environmental considerations for CEN/TC 286 standards*, and this Technical Specification should be read in conjunction with this standard.

It has been assumed in the drafting of this document that the execution of its provisions is entrusted to appropriately qualified and experienced people.

All pressures are gauge pressures unless otherwise stated.

NOTE This document requires measurement of material properties, dimensions and pressures. All such measurements are subject to a degree of uncertainty due to tolerances in measuring equipment, etc. It may be beneficial to refer to the leaflet “measurement uncertainty leaflet” SP INFO 2000 27 [3].

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1 Scope

This document specifies the design, testing and marking requirements for spring loaded pressure relief valves (PRV), for use in liquefied petroleum gas (LPG) cylinders of water capacity of 0,5 l up to and including 150 l.

These PRVs can be either an integral part of a cylinder valve (see EN ISO 14245 [4] and EN ISO 15995 [5]) or a separate device.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment*

EN 751-1, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water – Part 1: Anaerobic jointing compounds*

EN 751-2, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water – Part 2: Non-hardening jointing compounds*

EN 751-3, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water – Part 3: Unsintered PTFE tapes*

EN 837-1, *Pressure gauges – Part 1: Bourdon tube pressure gauges – Dimensions, metrology, requirements and testing*

EN 12164, *Copper and copper alloys – Rod for free machining purposes*

EN 12165, *Copper and copper alloys – Wrought and unwrought forging stock*

EN 12420, *Copper and copper alloys – Forgings*

EN 13906-1, *Cylindrical helical springs made from round wire and bar – Calculation and design – Part 1 : Compression springs*

EN ISO 11114-1, *Gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 1: Metallic materials (ISO 11114-1)*

EN ISO 11114-2, *Gas cylinders – Compatibility of cylinder and valve materials with gas contents – Part 2: Non-metallic materials (ISO 11114-2)*

ISO 2859-1:1999, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1**liquefied petroleum gas**

LPG

low pressure liquefied gas composed of one or more light hydrocarbons which are assigned to UN 1011, UN 1075, UN 1965, UN 1969 or UN 1978 only and which consists mainly of propane, propene, butane, butane isomers, butene with traces of other hydrocarbon gases

3.2**pressure relief valve**

PRV

self-closing valve which automatically, without the assistance of any energy other than that of the vapour concerned, discharges vapour at a predetermined pressure

Note 1 to entry: This is known as a "safety valve" in ADR.

3.3**nominal set pressure**

predetermined pressure of the pressure relief valve at which the valve is set to start to discharge

3.4**start to discharge pressure**

inlet pressure at which a steady stream of bubbles appear at the outlet of a pressure relief valve through a water seal of not more than 50 mm water column, or other equivalent method

3.5**pop action**

rapid opening of the pressure relief valve sealing element so that the pressure relief valve is fully open, resulting from an increase of inlet pressure creating a sudden increase in force and compression of the spring

3.6**overpressure**

pressure increase between the nominal set pressure and the flow rating pressure

Note 1 to entry: Usually expressed as a percentage of nominal set pressure.

3.7**reseal pressure**

inlet pressure at which the sealing element effects a seal with the valve seat after the valve has been subjected to pop action

3.8**flow rating pressure**

inlet pressure at which the discharge capacity is measured

3.9**discharge capacity**

capacity at the flow rating pressure of a pressure relief valve expressed in m³/min of free air at STP

3.10**nominal discharge capacity**

minimum discharge capacity at the flow rating pressure expressed in m³/min of free air at STP rounded down to one decimal place

prEN 13953:2019 (E)**3.11****sealing element**

non-metallic resilient component which affects a seal by contact with the valve seat

3.12**valve seat**

normally raised area of the valve body on to which the sealing element effects a seal

3.13**cylinder valve**

primary shutoff device intended for liquid filling and liquid or vapour service fitted to LPG cylinders

Note 1 to entry: The valve can also include additional devices e.g. liquid level indicator, excess flow device, pressure relief valve, non-return valve and education tube.

3.14**leak tightness**

resistance to leakage to atmosphere across the valve seat or any other pressure containing component when the valve is closed

3.15**Standard Temperature and Pressure**

STP

15,6 °C (288,7 K), 1,013 bar absolute (0,101 3 MPa absolute)

4 Operating Conditions

4.1 Terms used with PRVs are described graphically in Annex A.

4.2 Valves designed in accordance with this document shall be suitable for:

- a minimum operating temperature of –20 °C.
- a minimum operating temperature of –40 °C for those parts of Europe where valves are subject to more severe temperature conditions. The material and design shall be shown to be satisfactory for operations under these conditions and shall meet the requirements of Annex B. Where the PRV is integral with a cylinder valve suitable for temperature of –40 °C, the PRV shall also be designed and tested for a temperature of –40 °C; and
- a maximum operating temperature of 65 °C.

5 Materials**5.1 General**

5.1.1 Materials in contact with LPG shall be physically and chemically compatible with LPG under all normal operating conditions for which the valve is intended and shall meet the requirements for propane and butane in accordance with EN ISO 11114-1 and EN ISO 11114-2.

5.1.2 Materials for valve components shall be selected to give adequate strength in service. Consideration should be given to all modes of failure including atmospheric corrosion, brass dezincification, stress corrosion, impact or material failure.

5.1.3 Alternative materials to those listed in 5.2 are not precluded, providing they can be shown to be equivalent.

5.1.4 Where PRVs are an integral part of a cylinder valve, the material requirements for the cylinder valve standard shall be complied with, e.g. EN ISO 15995 and EN ISO 14245.

5.2 Metallic materials

5.2.1 Hot stamped brass shall be non-porous and shall be suitable for machining or other processes. Sand-cast brass shall not be used.

Leaded brass shall be CW614N, in accordance with EN 12164, or CW617N in accordance with EN 12420 or EN 12165.

Cold drawn brass rods up to 45 mm wide in cross-section shall only be used after heat treatment and testing for internal cracking. Cold drawn brass rods greater than 45 mm wide in cross-section shall not be used.

Components produced from stamping brass shall not exhibit cold shuts, also known as folds, or surface defects such as a crack which may lead to leakage or component failure.

5.2.2 Springs shall be manufactured from stainless steel wire and shall contain not less than 16 % chromium and not less than 6 % nickel.

5.3 Non-metallic components

Non-metallic materials in contact with LPG shall be compatible with LPG and shall not fail during the valve service life. They shall not distort, harden, swell or adhere to the body or seat face to such an extent as to impair the function of the valve.

Non-metallic materials which are exposed to UV shall be UV resistant as confirmed by the material manufacturer.

Rubber materials in contact with LPG, for temperatures of – 20 °C (–40 °C for low temperature applications) to + 65 °C, shall meet the requirements of EN 549 for resistance to:

- a) gas (n-pentane test);
- b) lubricants;
- c) ageing;
- d) compression;
- e) ozone (where the material is exposed to the atmosphere);
- f) condensate/liquid phase of combustible gases (liquid B test).

5.4 Lubricants, sealants and adhesives

Lubricants, sealants and adhesives used on operating threads and seals, shall be compatible with LPG and not interfere with the operation of the valve.

Sealants shall comply with the requirements of EN 751-1, EN 751-2 or EN 751-3.