



**SLOVENSKI STANDARD**  
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Pressure relief valves for LPG tanks - Ancillary equipment

Sicherheitsventile für Flüssiggas-(LPG)-behälter - Zubehör

Soupapes de sureté des réservoirs de gaz de pétrole liquéfié (GPL) - Equipement  
auxiliaire

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English version

## Pressure relief valves for LPG tanks - Ancillary equipment

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liquéfié (GPL) - Equipement auxiliaire

Sicherheitsventile für Flüssiggas-(LPG)-behälter - Zubehör

This European Standard was approved by CEN on 20 October 2004.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
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## Foreword

This document (EN 14071:2004) 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of an identical text or by endorsement, at the latest by June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This document includes a Bibliography.

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

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## 1 Scope

This document specifies the design, testing and inspection requirements for pressure relief valve isolating devices, valve manifolds, vent pipes and system assemblies which are, where necessary, used with pressure relief valves for use in tanks for Liquefied Petroleum Gas (LPG) service.

Pressure relief valves for LPG tanks are specified in EN 14129.

## 2 Normative references

The following referenced documents are indispensable for the application 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 1092-1, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 1: Steel flanges.*

EN 1503-1, *Valves - Materials for bodies, bonnets and covers - Part 1: Steels specified in European Standards.*

EN 1503-2, *Valves - Materials for bodies, bonnets and covers - Part 2: Steels other than those specified in European Standards.*

EN 1503-3, *Valves - Materials for bodies, bonnets and covers - Part 3: Cast irons specified in European Standards.*

EN 1503-4, *Valves - Materials for bodies, bonnets and covers - Part 4: Copper alloys specified in European Standards.*

EN 1563, *Founding - Spheroidal graphite cast irons.*

EN 10088-1, *Stainless steels - List of stainless steels.*

EN 10088-3, *Stainless steels - Technical delivery conditions for semi-finished products, bars, rods and sections for general purposes.*

EN 10204:2004, *Metallic products — Type of inspection documents.*

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

EN 12420, *Copper and copper alloy – Forgings.*

EN 13480-3, *Metallic industrial piping - Part 3: Design and calculation.*

EN 13906 (all parts), *Cylindrical helical springs made from round wire and bar – Calculation and design*

EN 14129, *Pressure relief valves for LPG tanks.*

EN ISO 11114-2, *Transportable gas cylinders - Compatibility of cylinder and valve materials with gas contents – Part 2: Non-metallic materials (ISO 11114-2:2000).*

ANSI/ASME B1.20.1 – 1983, *Pipe threads, general purpose (inch) issued by American National Standards Institute on 1983.*

### 3 Terms and definitions

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

#### 3.1

##### **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, and operates with a pop action

#### 3.2

##### **pressure**

NOTE 1 Terms used with LPG PRVs are described graphically in EN 14129.

NOTE 2 All pressures are gauge pressures unless otherwise specified.

#### 3.2.1

##### **nominal set pressure**

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

#### 3.2.2

##### **start to discharge pressure**

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

#### 3.2.3

##### **overpressure**

pressure increase between the nominal set pressure and the flow rating pressure, usually expressed as a percentage of nominal set pressure

#### 3.2.4

##### **flow rating pressure**

inlet pressure at which the discharge capacity is measured

#### 3.2.5

##### **maximum allowable pressure**

maximum pressure for which the valve is designed, as specified by the manufacturer

#### 3.3

##### **blowdown**

difference between start to discharge and reseal pressures, usually expressed as a percentage of the nominal set pressure

#### 3.4

##### **lift**

actual travel of the sealing disc away from the closed position

#### 3.5

##### **discharge capacity**

capacity at the flow rating pressure of a pressure relief valve expressed in cubic metres per minute of free air at STP

#### 3.6

##### **coefficient of discharge (Kd)**

ratio of the actual measured flow capacity divided by the calculated theoretical capacity for the same fluid at the same operating conditions



**3.7****sealing element**

non-metallic moveable resilient component which effects a seal by contact with the pressure relief valve seat

**3.8****valve seat**

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

**3.9****pressure relief valve system**

pressure relief valve(s) for use on the tank complete with isolating device or manifold, and vent pipe where appropriate

**3.10****pressure relief valve isolating device**

device fitted between the storage tank and the external pressure relief valve, which permits the replacement of the pressure relief valve without de-pressuring the tank

**3.11****manifold**

device fitted to a storage tank permitting two or more pressure relief valves to be fitted, only one of which can be isolated at a time, which permits replacement of the isolated pressure relief valve without depressurising the tank

**3.12****vent pipe**

open-ended pipe, fitted with a protection cap and attached to the pressure relief valve outlet, to direct discharged fluid away from the protected tank surface

**3.13****design signal flow**

limited flow of LPG intended to:

- equalise pressures so that a replacement PRV can be properly fitted to an isolating device;
- indicate the effectiveness of the internal shut off in an isolating device before the PRV is completely removed; and
- produce an acoustic signal

**3.14****LPG**

mixture of light hydrocarbons, gaseous under standard atmospheric conditions which can be liquefied by increased pressure or decreased temperature. The main components are propane, propene, butane and butene isomers

**3.15****STP**

Standard Temperature and Pressure [15,6 °C (288,7 K), 1,013 bar absolute (0,1013 MPa absolute)]

**4 Operating conditions**

Equipment designed in accordance with this document shall be suitable for the following conditions:

- the minimum operating temperature to which they are expected to be exposed during normal use is minus 20 °C. Temperatures below this may be encountered during short periods, for example, during discharge;

- the maximum operating temperature to which the device is expected to be exposed during normal operation is 65 °C;
- the minimum pressure to which the equipment is normally exposed is 0 bar. Vacuum conditions on the device, arising from butane at low temperature or evacuation of the tank may expose the device to a vacuum of 50 mbar absolute.

## 5 Materials

### 5.1 General

**5.1.1** All materials in contact with LPG shall be physically and chemically compatible with LPG under all normal operating conditions for which the device is intended to be used.

**5.1.2** Material for components shall be selected for adequate strength in service. The material shall resist atmospheric corrosion, brass dezincification, stress corrosion, impact or material failure. Where stress corrosion could be present in a material, stress relieving heat treatment shall be carried out where necessary.

**5.1.3** The components exposed to atmosphere shall be manufactured from corrosion resistant materials or suitably protected against corrosion.

**5.1.4** Alternative materials to those listed in 5.2 are not precluded, providing they comply with a standard or specification that ensures control of chemical and physical properties and quality appropriate to the end use.

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### 5.2 Metallic materials

**5.2.1** Equipment shall be made from steel, stainless steel, copper alloys or other suitable materials.

**5.2.2** For pressure containing components steel and stainless steels shall comply with EN 1503-1 or EN 1503-2, cast iron shall comply with EN 1503-3 and copper alloys shall comply with EN 1503-4.

**5.2.3** Components made from stainless steel shall contain not less than 17 % chromium, and not less than 7 % nickel.

**5.2.4** Springs shall be manufactured from stainless steel in accordance with EN 10088-1 and EN 10088-3 or material with an equivalent resistance to corrosion.

**5.2.5** Hot stamped brass shall be non-porous and shall be suitable for machining or other processes. Leaded brass shall be CW614N or CW617N in accordance with EN 12420 or EN 12165. Sand-cast brass shall not be used. Cold drawn brass rods shall only be used for machining after adequate testing for internal cracking, porosity or other inclusions and shall be heat treated if required. Components produced from stamping brass shall not exhibit cold shuts, also known as folds, or surface defects.

**5.2.6** Spheroidal graphite cast iron shall comply with EN 1563, with an elongation at fracture of more than 18 %. Other ductile irons or cast irons shall not be used.

**5.2.7** Castings shall be free from inclusions and surface defects, which could adversely affect the strength, leak tightness or performance of the device.

### 5.3 Non-metallic components

All non-metallic materials in contact with LPG shall not distort, harden or adhere to the body or seat face to such an extent as to impair the function of the device.

All rubber materials shall also comply with the requirements of EN 549. The ozone test in EN 549 shall only be carried out where gaskets/seals are exposed to atmosphere.

For guidance on the selection of non-metallic materials, see EN ISO 11114-2.

#### 5.4 Lubricants, sealants, and adhesives

When in contact with LPG, lubricants, sealants and adhesives shall be compatible with LPG, and shall not interfere with the normal operation of the device. Sealants shall comply with the requirements of EN 751-1.

#### 5.5 Certification

The main metallic pressure-bearing parts shall be provided with a material manufacturers certificates conforming to EN 10204:2004 certificate 3.1 B.

Springs and other metallic parts shall have certificates conforming to EN 10204:2004 certificate type 2.2.

Non-metallic parts shall be provided with certificates confirming their conformance with the specification stated on the purchase order.

### 6 Design

#### 6.1 Introduction

This section identifies essential requirements for the design of ancillary equipment.

The design shall allow the equipment to operate with the flow characteristics as identified in 7.7.

Equipment components shall be designed with adequate strength and clearances to ensure correct operation in service.

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#### 6.2 Pressure relief valve isolating devices

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##### 6.2.1 General

Pressure relief valves intended for use with these isolating devices shall be in accordance with EN 14129.

If interchangeability of pressure relief valves of diverse manufacturers is required the requirements of 6.2.6 shall be fulfilled.

##### 6.2.2 Actuation

Isolating devices shall only be actuated by the fitting or removal of the pressure relief valve. The check disc shall be spring actuated.

The seal shall preferably be metal to metal.

##### 6.2.3 Indication of closure

Isolating devices shall have positive means to determine that closure has occurred when the PRV has been removed. This shall be achieved by:

- the use of two tell-tale holes in the pressure relief valve which shall be visible above the combination seal, when 3 full turns of engagement remain;
- a noticeable audible change in the release of gas which shall have taken place when removing the pressure relief valve indicating closure of the isolating device while a minimum of 3 threads remain engaged.