SLOVENSKI STANDARD
SIST EN 14129:2014

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Oprema in pribor za utekočinjeni naftni plin (UNP) - Varnostni ventili za tlačne posode za utekočinjeni naftni plin (UNP)

LPG Equipment and accessories - Pressure relief valves for LPG pressure vessels

Flüssiggas-Geräte und Ausrüstungsteile - Sicherheitsventile für Druckbehälter für Flüssiggas (LPG)

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Équipements pour GPL et leurs accessoires - Soupapes de sécurité pour réservoirs de GPL sous pression

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23.020.30	Tlačne posode, plinske jeklenke	Pressure vessels, gas cylinders
23.060.40	Tlačni regulatorji	Pressure regulators

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2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

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LPG Equipment and accessories - Pressure relief valves for LPG pressure vessels

Équipements pour GPL et leurs accessoires - Soupapes de sécurité pour réservoirs de GPL sous pression

Flüssiggas-Geräte und Ausrüstungsteile - Sicherheitsventile für Druckbehälter für Flüssiggas (LPG)

This European Standard was approved by CEN on 30 November 2013.

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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 CEN-CENELEC Management Centre has the same status as the official versions.

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Foreword

This document (EN 14129:2014) 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of an identical text or by endorsement, at the latest by August 2014, and conflicting national standards shall be withdrawn at the latest by August 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14129:2004.

This European Standard has been submitted for reference into:

— the RID [9]; and

— the technical annexes of the ADR [10].

NOTE These regulations take precedence over any clause of this European Standard. It is emphasised that RID/ADR/ADN are being revised regularly at intervals of two years which may lead to temporary non-compliances with the clauses of this European Standard.

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The major changes to this revision include the addition of:

— pilot operated pressure relief valve;

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— an ageing test, see 7.9 and Annex C;

— an endurance test, see 7.10; and

— a stress cracking test, see 7.11.

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.

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

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Introduction

This European Standard 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.

NOTE 1 Annex D comprises an environmental checklist which highlights the clauses of this European Standard that address environmental aspects.

Provisions have to be restricted to a general guidance. Limit values are specified in national laws.

It is recommended that manufacturers develop an environmental management policy. For guidance see the EN ISO 14000 series [6], [7] and [8].

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

All pressures are gauge pressures unless otherwise stated.

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Valves designed in accordance with this standard are specifically for use in LPG applications. Valves manufactured in accordance EN ISO 4126-1 may also be used in certain LPG applications.

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NOTE 2 This European Standard 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 [13].

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1 Scope

This European Standard specifies the requirements for the design and testing of spring loaded pressure relief valves and thermal expansion valves for use in:

— static LPG pressure vessels,

NOTE The pressure vessels can be situated above ground, underground or mounded.

— LPG pressure vessels on road tankers, rail tankers, tank-containers or demountable tanks.

This document does not address production testing.

Normative Annex B prescribes testing with conditioning at - 40 °C for valves for use under extreme low temperature conditions.

The requirements for pressure relief valve accessories such as isolating devices, changeover manifolds and vent pipes are specified in EN 14071.

EN 14570 identifies the requirements for the pressure relief valve capacities for static pressure vessels.

EN 12252 identifies the requirements for the pressure relief valve capacities for road tankers.

Valves designed in accordance with this standard are specifically for use in LPG applications. Valves manufactured in accordance with EN ISO 4126-1 may also be used in certain LPG applications.

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Terms used with LPG pressure relief valves are described graphically in Annex A.

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2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 549:1994, *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 1092-1:2007+A1:2013, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 1: Steel flanges*

EN 1503-1:2000, *Valves - Materials for bodies, bonnets and covers - Part 1: Steels specified in European Standards*

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EN 1503-2:2000, *Valves - Materials for bodies, bonnets and covers - Part 2: Steels other than those specified in European Standards*

EN 1503-3:2000, *Valves - Materials for bodies, bonnets and covers - Part 3: Cast irons specified in European Standards*

EN 1503-4:2002, *Valves - Materials for bodies, bonnets and covers - Part 4: Copper alloys specified in European Standards*

EN 1563:2011, *Founding - Spheroidal graphite cast irons*

EN 10204, *Metallic products - Types of inspection documents*

EN 10270-3:2011, *Steel wire for mechanical springs - Part 3: Stainless spring steel wire*

EN 12165:2011, *Copper and copper alloys - Wrought and unwrought forging stock*

EN 12420:1999, *Copper and copper alloys - Forgings*

EN 13906-1:2013, *Cylindrical helical springs made from round wire and bar - Calculation and design - Part 1 : Compression springs*

EN 14071:2004, *Pressure relief valves for LPG tanks - Ancillary equipment*

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

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ISO 6957:1988, *Copper alloys — Ammonia test for stress corrosion resistance*

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ANSI/ASME B1.20.1–1983, *Pipe Threads, General Purpose (Inch)*

3 Terms and definitions

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

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 vessel
assembly of the pressure-retaining envelope (including the openings and their closures) and non-pressure-retaining parts attached directly to it

3.3
pressure relief valve
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

3.4
thermal expansion valve
self-closing valve which automatically, without the assistance of any energy other than that of the fluid concerned, discharges fluid at a predetermined pressure

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3.5
spring loaded pressure relief valve
valve in which the loading due to the vapour pressure underneath the sealing element is opposed only by the force of a spring

3.6
external pressure relief valve
pressure relief valve which when fitted to the LPG pressure vessel has the spring external to the pressure envelope

Note 1 to entry: See Figure 1.

3.7
pilot operated pressure relief valve
external pressure relief valve where the pressure setting is separate from the discharge function

Note 1 to entry: See Figure 2.

3.8
internal pressure relief valve
pressure relief valve which when fitted to the LPG pressure vessel has the spring internal to the pressure envelope

3.9
semi-Internal pressure relief valve
pressure relief valve which when fitted has the spring inside the pressure envelope and which has some of the working parts and the wrenching section outside the pressure envelope

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Note 1 to entry: See Figure 3.

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3.10
fully internal pressure relief valve
pressure relief valve which, when fitted, has the spring, all working parts and the wrenching section inside the pressure envelope

Note 1 to entry: See Figure 4.

3.11
nominal set pressure
predetermined pressure of the pressure relief valve at which the valve is set to start to discharge

Note 1 to entry: RID [9] and ADR [10] require a capability of automatic opening under a pressure between 0,9 times and 1,0 times the test pressure of the pressure vessel to which they are fitted.

3.12
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

3.13
overpressure
pressure increase between the nominal set pressure and the flow rating pressure, usually expressed as a percentage of nominal set pressure

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3.14
reseal pressure
inlet pressure at which leakage ceases through a water seal of not more than 50 mm water column on the outlet of the valve, after the valve has been subjected to a pressure equal to or above the start to discharge pressure but below the "pop" pressure

3.15
reseat pressure
inlet pressure at which the sealing element effects a seal with the valve seat after the valve has been subjected to pop action

3.16
flow rating pressure
inlet pressure at which the discharge capacity is measured

3.17
maximum allowable pressure
PS
maximum pressure for which the valve is designed, as specified by the manufacturer

3.18
pop action
rapid opening of the valve sealing element to achieve full lift, resulting from an increase of inlet pressure creating a sudden increase in force and compression of the spring

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3.19
pop pressure
pressure at which pop action occurs

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3.20
blowdown
difference between start to discharge and reseat pressures, usually expressed as a percentage of the nominal set pressure

3.21
discharge capacity
capacity at the flow rating pressure of a pressure relief valve expressed in cubic metres per minute of free air at STP

3.22
sealing element
non-metallic resilient component which effects a seal by contact with the pressure relief valve seat

3.23
valve seat
normally raised area of the pressure relief valve body on to which the sealing element effects the seal

3.24
pressure relief valve isolating device
device fitted between the storage pressure vessel and an external pressure relief valve (including pilot operated), which permits replacement of the pressure relief valve without depressurising the pressure vessel

3.25
changeover manifold
device fitted to a storage vessel 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 vessel

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3.26
leak tightness
resistance to leakage to atmosphere across the valve seat or any other pressure containing component when the valve is closed

3.27
Standard Temperature and Pressure
STP
15,6 °C (288,7 K), 1,013 bar absolute (0,1013 MPa absolute)

4 Operating conditions

4.1 The pressure relief valve shall be suitable for a minimum operating temperature of - 20 °C, the temperature to which the valve is expected to be exposed during normal use. Temperatures below this may be encountered during short periods, for example, during discharge.

4.2 In some parts of Europe, and for certain applications, lower minimum operating temperatures are encountered. When equipment is designed for a temperature lower than −20 °C, the pressure relief valve shall meet the requirements of Annex B.

4.3 The pressure relief valve shall be suitable for the maximum operating temperature of 65 °C.

4.4 The pressure relief valve shall be suitable for the minimum pressure a valve or fitting is normally exposed to, which is 1 bar absolute. Vacuum conditions on the valve, arising from butane at low temperature or evacuation of the pressure vessel can expose the valve or fitting to a vacuum of 50 mbar absolute.

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4.5 Pressure relief valves manufactured in accordance with this European Standard are expected to have a useful safe service life expectancy of a minimum of 15 years from the date of manufacture/reconditioning, under normal operating conditions. This requirement does not apply to the protective cap or plug.

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5 Materials

5.1 General

5.1.1 The manufacturer shall endeavour to acquire materials and components from suppliers who have a declared environmental policy; see EN ISO 14021, EN ISO 14024 and EN ISO 14025.

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

5.1.3 Material for components shall be selected for adequate strength in service. The material shall resist brass dezincification, stress corrosion, impact or material failure. If stress corrosion could be present in a material, stress relieving heat treatment shall be carried out as necessary.

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

5.2 Metallic materials

5.2.1 Valves 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 1503-1:2000 or EN 1503-2:2000, cast iron shall comply with EN 1503-3:2000 and copper alloys shall comply with EN 1503-4:2002.