



SLOVENSKI STANDARD
SIST EN 13785:2005+A1:2009
01-januar-2009

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Regulators with a capacity of up to and including 100 kg/h, having a maximum nominal outlet pressure of up to and including 4 bar, other than those covered by EN 12864 and their associated safety devices for butane, propane or their mixtures

STANDARD PREVIEW

Druckregelgeräte mit einem höchsten Ausgangsdruck von < 4 bar und einem Durchfluss < 100 kg/h, die nicht in EN 12864 (standard) geregelt sind, für Butan, Propan oder deren Gemische sowie die dazugehörigen Sicherheitseinrichtungen

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Détendeurs de débit inférieur ou égal à 100 kg/h, à pression de détente nominale maximale inférieure ou égale à 4 bar, autres que les détendeurs relevant de l'EN 12864, et leurs dispositifs de sécurité associés pour butane, propane ou leurs mélanges

Ta slovenski standard je istoveten z: EN 13785:2005+A1:2008

ICS:

23.060.40 V|æ } ã^* ~ |æf |lã Pressure regulators

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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November 2008

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Supersedes EN 13785:2005

English Version

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having a maximum nominal outlet pressure of up to and
including 4 bar, other than those covered by EN 12864 and their
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Détendeurs de débit inférieur ou égal à 100 kg/h, à pression de détente nominale maximale inférieure ou égale à 4 bar, autres que les détendeurs relevant de l'EN 12864, et leurs dispositifs de sécurité associés pour butane, propane ou leurs mélanges

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This European Standard was approved by CEN on 1 July 2004 and includes Corrigendum 1 issued by CEN on 14 February 2007 and Amendment 1 approved by CEN on 27 September 2008.

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

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Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 13785:2005+A1:2008) has been prepared by Technical Committee CEN/TC 181 "Dedicated liquefied petroleum gas appliances", the secretariat of which is held by AFNOR.

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 May 2009, and conflicting national standards shall be withdrawn at the latest by May 2009.

This document includes Amendment 1, approved by CEN on 2008-09-27 and Corrigendum 1 issued by CEN on 2007-02-14.

This document supersedes EN 13785:2005.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 and A1.

The modifications of the related CEN Corrigendum have been implemented at the appropriate places in the text and are indicated by the tags AC and AC1.

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.

This standard covers only type testing.

Items relating to quality assurance systems, production testing and particularly certificates of conformity are not covered in this standard.

This standard is the second part of a series of standards covering different applications of LPG Regulators. The two complementary standards are:

- EN 12864: Low pressure, non adjustable regulators having a maximum regulated pressure of less than or equal to 200 mbar, with a capacity of less than or equal to 4 kg/h, and their associated safety devices for butane, propane or their mixtures;
- EN 13786: Automatic change-over valves having a maximum outlet pressure of up to and including 4 bar with a capacity of up to and including 100 kg/h, and their associated safety devices for butane, propane or their mixtures

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

¹⁾ Only applicable to the German version.

EN 13785:2005+A1:2008 (E)**1 Scope**

This document defines the constructional and operational characteristics, the safety requirements, test methods and the marking of regulators having a capacity of less than or equal to 100 kg/h, other than the regulators covered by EN 12864, for butane, propane or their mixtures, in the gaseous phase.

Regulators for caravans up to 1,5 kg/h are covered by EN 12864.

NOTE 1 bar = 10⁵ Pa.

This document also applies to the safety devices which are included within regulators covered by this document. The characteristics of these devices are given in annexes A and B.

The requirements apply generally to regulators used in locations where the temperature likely to be reached during use is between -20 °C and +50 °C. When the regulators are used at temperatures below -20 °C it is essential that they comply with special requirements which are defined in annex C.

This document does not include the installation rules for regulators. Reference should be made to national regulations in force in the member countries.

This document only covers type testing.

WARNING NOTICE: The figures in annexes G and H show the types of connections used according to the country of use of the regulators.

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The top part of these figures (above the horizontal line) applies to the regulator and is normative.

The bottom part of these figures (below the horizontal line) applies to the part to be connected to the regulator. This is given as a guide for the tests and is not normative.

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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 437:2003, *Test gases - Test pressures - Appliances categories.*

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

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

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

EN 60695-11-10, *Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods (IEC 60695-11-10:1999).*

EN ISO 75, *Plastics - Determination of temperature of deflection under load.*

EN ISO 178, *Plastics - Determination of flexural properties (ISO 178:2001).*

EN ISO 180, *Plastics - Determination of Izod impact strength (ISO 180:2000).*

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads - Part 1: dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 527, *Plastics - Determination of tensile properties.*

EN ISO 3166-1, *Codes for the representation of names of countries and their subdivisions - Part 1: Country codes (ISO 3166-1:1997).*

EN ISO 4892-3, *Plastics - Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps (ISO 4892-3:1994).*

EN ISO 8434-1; *Metallic tube connections for fluid power and general use - Part 1: 24° compression fittings (ISO 8434-1:1994).*

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

ISO 301, *Zinc alloy ingots intended for casting.*

ISO 565, *Test sieves - Metal wire cloth, perforated metal plate and electroformed sheet - Nominal sizes of openings.*

ISO 7005-2, *Metallic flanges - Part 2: Cast iron flanges.*

ISO 9227, *Corrosion tests in artificial atmospheres - Salt spray tests.*

3 Terms and definitions

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

3.1 General terms and definitions

3.1.1 regulator

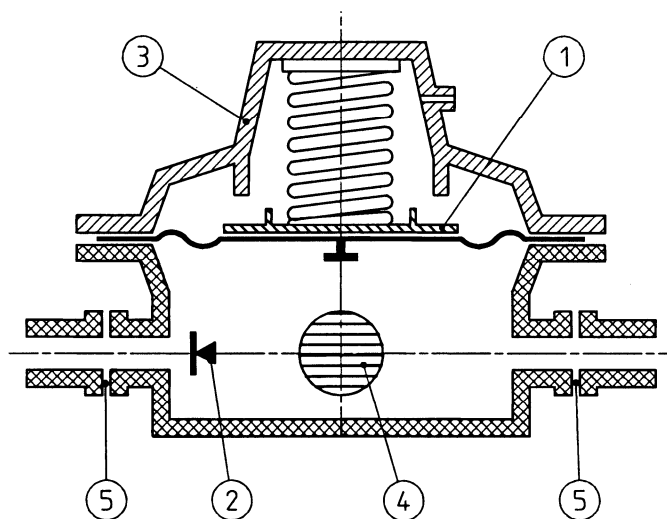
device which maintains a regulated pressure within preset limits, whatever the upstream pressure, rate and temperature. The regulator can have fixed, variable or adjustable regulated pressure.

The terminology given is that shown in Figure 1. The diagram is given as information; no other method is excluded

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Key

1 Pressure sensing subassembly

2 Regulation subassembly

3 Back pressure subassembly

4 Mechanical connection subassembly

5 Connection subassembly

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Figure 1 - Principal parts of a regulator

3.1.2**fixed regulator**

regulator whose regulated pressure is adjusted by the manufacturer and fixed and whose adjustment cannot be modified by the user

3.1.3**variable regulator**

regulator whose regulated pressure may be modified by the user with simple manipulation between two fixed limits

3.1.4**adjustable regulator**

regulator whose regulated pressure may only be modified by a competent person at the time of installation; it is then fixed

3.1.5**quick coupling**

A1 connection system which allows the fitting of the regulator to the cylinder valve without a threaded connection and without using tools **A1**

A1 3.1.6**tap (manual closing device)**

device for closing the gas flow which requires an intentional manual action (for example on a lever, a knob) **A1**

3.1.7**self closing valve**

A1 device allowing the automatic shut off of the gas flow, by simple disconnection of the regulator from the cylinder valve **A1**

3.1.8**valve**

component part of the regulation subassembly which ensures soundness between the part of the regulator at supply pressure and the part of the regulator at regulated pressure, when this one is higher or equal to the closing pressure

3.1.9**sealing**

any arrangement of any device, for example an adjuster, such that any interference likely to change its setting causes the breaking of the device or sealing material making the interference apparent

3.1.10**nominal diameter**

DN

numerical designation common to all the components of a same pipework other than those named by their external diameter or by the size of the thread. It is a whole number used as a reference and related approximately to the manufacturing dimensions

[EN 88]

A1 3.1.11**freely rotating outlet connection**

integral outlet connection designed to fully rotate **A1**

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EN 13785:2005+A1:2008 (E)**3.2 Terms and definitions concerning gas****3.2.1****butane**

mixture of third family gases whose vapour pressure (p_v) at 50 °C is greater than or equal to 4,3 bar and at most equal to 7,5 bar, of mean volumic mass in the gas phase equal to 2,4 kg/m³

3.2.2**propane**

mixture of third family gases whose vapour pressure (p_v) at 50 °C is greater than or equal to 7,5 bar or at most equal to 16 bar, of mean volumic mass in the gas phase equal to 1,85 kg/m³

3.2.3**LPG**

mixture of third family gases whose vapour pressure (p_v) at 50 °C is greater than or equal to 4,3 bar or at most equal to 16 bar, of mean volumic mass in the gas phase equal to 2,12 kg/m³

3.3 Terms and definitions concerning pressures

The values of pressures given in the text are to be considered as gauge pressure and are expressed in bar (bar) or millibar (mbar).

3.3.1**supply pressure** p

value of the gas pressure measured at the regulator inlet or at the self closing valve's inlet

3.3.2**regulated pressure**

value of the gas pressure measured at the regulator outlet

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3.3.3**nominal regulated pressure** p_d

value of the regulated pressure corresponding:

- either to the normal pressure for appliances as defined in 3.6 of EN 437:2003;
- either to the normal pressure for appliances operating outside the scope of EN 437:2003;
- or to an intermediate pressure allowing for the supply of a second or third stage regulator under the conditions fixed

3.3.4**lock up pressure** p_o

the maximum pressure obtainable at no flow for all values of the supply pressure given in 6.1.2

3.3.5**pressure loss coefficient**

multiplication factor equal to 0,85 for a pressure loss of 15 % and 0,5 for a pressure loss of 50 %

3.3.6**minimum admitted pressure** p_{Mg}

minimum value of the regulated pressure supplied by the regulator for all values of the supply pressure and all values of the flow rate

3.3.7 maximum admitted pressure

p_{Mp}

maximum value of the regulated pressure supplied by the regulator for all values of the supply pressure and all values of the flow rate between the closing area and the guaranteed rate

3.4 Terms and definitions concerning rates

3.4.1 guaranteed rate

M_g

the mass flow of gas that can be obtained at the minimum allowed regulated pressure, whatever the value of the supply pressure

NOTE The guaranteed rate is expressed in grams per hour (g/h) or kilograms per hour (kg/h).

3.4.2 pilot rate

M_p

for regulators up to 4 kg/h and for pressures complying with EN 437, gas flow (15 g/h) necessary for the supply of the ignition system of the appliance, generally called pilot

NOTE The pilot rate is expressed in grams per hour (g/h).

3.4.3 closing area

for regulators over 4 kg/h or for pressures not complying with EN 437, range between 0 and 5 % of the guaranteed flow rate

3.4.4 operational area

rate range between the pilot rate or the maximum of the closing area and 100 % of the guaranteed rate

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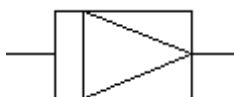
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4 Types of regulators

4.1 Introduction

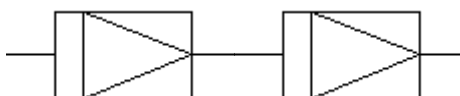
There are typically three types of pressure reduction:

1 – Single stage:



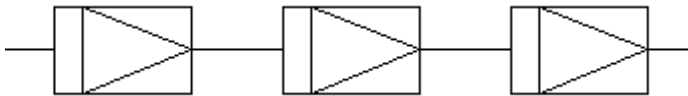
- the supply pressure of the regulator is equal to the pressure of the LPG supply container(s);
- the regulator supplies a gas appliance.

2 – Two stages



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- the supply pressure of the first regulator is equal to the pressure of the LPG supply container(s);
- the supply pressure of the second regulator depends on the regulated pressure of the first regulator and on the pressure losses in the intermediate line;
- the second regulator supplies a gas appliance.

3 – Three stages

- the supply pressure of the first regulator is equal to the pressure of the LPG supply container(s);
- the supply pressure of the second and the third regulator depends on the regulated pressure of the upstream regulator and on the pressure losses in the intermediate upstream line;
- the third regulator supplies a gas appliance.

4.2 Regulators for installations where the final regulator supplies a pressure specified in EN 437

The last regulator, which supplies a gas appliance for pressures specified by EN 437 shall be a fixed regulator (see 3.1.2).

It is recommended that all the other regulators of the installation are fixed regulators.

For interchangeability the recommended nominal value of intermediate regulated pressures (p_d) are the following:

3 – 1,5 – 1 – 0,75 – 0,5 – 0,4 – 0,3 – 0,15 bar

These settings accommodate pressure losses in the interstage pipe work. In general systems are designed with a pressure loss of up to 15 %. However in some cases where additional equipment (i.e limiter) is fitted, pressure losses of 50 % are found.

4.3 Other regulators

To supply appliances with pressures which are different from those specified by EN 437 fixed, variable or adjustable regulators are used.

5 Constructional characteristics**5.1 General**

Regulators shall be designed, manufactured and assembled in such a way that their operation is satisfactory under the installation and service conditions specified by the manufacturer.

The safety devices, if incorporated in or onto the regulators covered by this document shall be designed and constructed in accordance with the provisions of annexes A and B.

All the parts of a regulator shall be free from sharp corners or edges capable of causing damage, deterioration, injury or faulty operation.

Parts shall be clean internally and externally.

Holes for screws, pins, etc., intended for the assembly of the regulators components and for their fixing shall not open into the gas ways. The thickness of the wall between these holes and the gas ways shall be at least 1 mm.

Holes necessary for machining which join gas ways to the atmosphere, but which have no influence on the operation of the regulator, shall be permanently closed metallically. Appropriate additional sealing compounds may be used.

Where pressure tight joints are made on threads they shall be in accordance with ISO 7-1 or with ENPT.

Devices capable of modifying the operation of the regulator shall not go out of adjustment and shall be sealed. In particular, the regulator body and cover shall be assembled in such a way that separation is not possible without permanent damage to these parts or the sealing.

For variable regulators the adjustment range shall be limited by two fixed stops. It shall not be possible to reduce the regulated pressure below 5 mbar.

The operation of mobile parts, for example diaphragms or bellows, shall not be impaired by other parts.

So as to reproduce the adjustment, a marking device using numbers may be used (the larger figures corresponding to the higher pressures) or a gauge may be installed to indicate the regulated pressure.

It shall not be possible to remove the adjuster unless it is in the position giving the minimum pressure. When adjustment is carried out by rotation, the higher regulated pressures shall be obtained by rotation clockwise ^(A1) *deleted text* ^(A1).

Any tap shall close clockwise.

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5.2 Materials

SIST EN 13785:2005+A1:2009

The quality of materials, the dimensions used and the means of assembling the various components shall be such that the construction and performance characteristics are secure. Performance characteristics shall not alter significantly during the life expectancy declared by the manufacturer when the regulator is installed and used in accordance with the manufacturer's instructions. Under these conditions all components shall withstand the mechanical, chemical and thermal conditions to which they may be submitted during their use, when operating under normal conditions of use.

The regulator shall withstand the action of organic substances, either of vegetable or animal origin.

The body shall be made of metallic material. However for regulators having a regulated pressure of up to 200 mbar and of a rate smaller than 4 kg/h, directly fitted onto the cylinder using a quick coupling with self closing valve and non threaded outlet connection, non metallic (thermoplastic or thermal setting) materials may be used if the characteristics meet the requirements of this document as well as the complementary special requirements defined in annex E.

Internal parts and parts of the cover not relating to pressure (except for connections, see Figure 2) may be made of non metallic (thermoplastic or thermal setting) materials provided that they meet the following requirements:

- the materials used shall meet the requirements of annex E;
- the whole regulator shall withstand the various tests specified in the body of the document;
- the regulator, with non metallic parts removed, shall resist a pressure test as in 7.2.2.3 remaining sound in the sense of 5.5 and without causing any danger.

^(A1) Zinc alloys shall only be used if they are of the Zn Al4 or Zn Al4 Cu1 quality, in accordance with ISO 301. Brass alloys shall comply with EN 12164 or EN 12165.