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Regulatorji tlaka plina za vstopne tlake do 10 MPa (100 bar)

Gas pressure regulators for inlet pressure up to 10 MPa (100 bar)

Gas-Druckregelgeräte für Eingangsdrücke bis 10 MPa (100 bar)

Régulateurs de pression de gaz pour des pressions amont jusqu'à 10 MPa (100 bar)

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ICS:

23.060.40

Tlačni regulatorji

Pressure regulators

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**Gas pressure regulators for inlet pressure up to 10 MPa
(100 bar)**

Régulateurs de pression de gaz pour des pressions
amont jusqu'à 10 MPa (100 bar)

Gas-Druckregelgeräte für Eingangsdrücke bis 10 MPa
(100 bar)

This European Standard was approved by CEN on 23 April 2019.

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-CENELEC Management Centre or to any CEN member.

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

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European foreword

This document (EN 334:2019) has been prepared by Technical Committee CEN/TC 235 “Gas pressure regulators and associated safety devices for use in gas transmission and distribution”, the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by February 2020, and conflicting national standards shall be withdrawn at the latest by February 2020.

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

This document supersedes EN 334:2005+A1:2009.

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.

In comparison with the previous edition, the following technical modifications have been made:

- normative references have been updated;
- terms and definitions have been added;
- flange ratings as per the available European Standards both with PN and class designations have been included: PN 20 and PN 50 flanges, as per ISO 7005-2, concern spheroidal graphite cast iron only, because at the time of writing, there was no EN standard available for class designation;
- minimum requirements for elastomeric materials following the approach already have been adopted for metallic materials;
- “fail open” and “fail close” characteristics have been improved as per the CEN rules i.e. implementing for each characteristics, where originally missed, the relevant requirement/test method/ acceptance criteria;
- provisions for surveillance in use have been included, as already done for SSDs in EN 14382;
- closing force for stand-by monitor when classified as safety accessory to PED as already done for SSD when classified as safety accessory to PED;
- antistatic characteristics;
- statistical strength test on the basis of PED provisions;
- definition of C_g flow coefficient and an improvement of K_G flow coefficient by adding the definition/test method/notice of its limits;
- improvement of the functional performance classification;
- Annex G – Materials has been updated;

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- requirements/test procedure and acceptance criteria for non-metallic materials have been updated;
- vent limiter as possible fixture to be assembled in the pressure regulators;
- integration of environmental requirements;
- alignment of Normative references (Clause 2), Annex G, Annex ZA and its relevant clauses to CEN rules;
- the standard has been editorially revised.

This document can be used as a guideline for gas pressure regulators outside the ranges specified in this standard. This edition has introduced the application of statistical strength testing for series produced pressure and safety accessories on the basis of EU Directive 2014/68/EU, Annex I, Article 3.2.2 and Guideline H-14. Gas pressure regulators dealt with in this document are considered as standard pressure equipment in accordance with Clause 2 a) of Art. 1 of Pressure Equipment Directive 2014/68/EU (PED).

Gas pressure regulators according to this European Standard do not have their own source of ignition. However, the manufacturer is responsible to identify any potential ignition sources of his product which could be effective during the intended use¹⁾.

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

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1) Therefore gas pressure regulators are usually not within the scope of ATEX European legislation on equipment and protective systems intended for use in potentially explosive atmospheres. Any additional component (e.g. proximity switch, travel transducer etc.) should be independently considered in the framework of assemblies as per ATEX 2014/34/EU Guidelines – 2nd Edition - December 2017 clauses § 44 “Combined equipment (assemblies)”, § 46 “Components” and § 94 “Written attestation of conformity for components”.

1 Scope

This document specifies constructional, functional, testing, marking, sizing and documentation requirements of gas pressure regulators:

- for inlet pressures up to 100 bar and nominal diameters up to DN 400;
- for an operating temperature range from $-20\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$,

which operate with fuel gases of the 1st and 2nd family as defined in EN 437:2018 [1], used in the pressure control stations in accordance with EN 12186 or EN 12279, in transmission and distribution networks and also in commercial and industrial installations.

“Gas pressure regulators” hereafter will be called “regulators” except in the titles.

For standard regulators when used in pressure control stations complying with EN 12186 or EN 12279, the Annex ZA lists all applicable essential safety requirements of the European legislation on pressure equipment except external and internal corrosion resistance for applications in corrosive environment.

This document considers the following temperature classes/types of regulators:

- temperature class 1: operating temperature range from $-10\text{ }^{\circ}\text{C}$ to $60\text{ }^{\circ}\text{C}$;
- temperature class 2: operating temperature range from $-20\text{ }^{\circ}\text{C}$ to $60\text{ }^{\circ}\text{C}$;
- type IS: (integral strength type);
- type DS: (differential strength type);

This document applies to regulators which use the pipeline gas as a source of control energy unassisted by any external power source.

The regulator may incorporate a second regulator, used as monitor, complying with the requirements in this document.

The regulator may incorporate a safety shut off device (SSD) complying with the requirements of EN 14382.

The regulator may incorporate a creep (venting) relief device, complying with the requirements in Annex E and/or a vent limiter, complying with the requirements in Annex I.

This document does not apply to:

- regulators upstream from/on/in domestic gas-consuming appliances which are installed downstream of domestic gas meters;
- regulators designed to be incorporated into pressure control systems used in service lines²⁾ with volumetric flow rate $\leq 200\text{ m}^3/\text{h}$ at normal conditions and inlet pressure $\leq 5\text{ bar}$;
- regulators for which a specific document exists (e.g. EN 88-1 and EN 88-2, etc.);
- industrial process control valves in accordance with EN 1349.

2) The services lines are those defined in EN 12279.

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The informative Annex G of this document lists some suitable materials for pressure bearing parts, inner metallic partition walls, auxiliary devices, integral process and sensing lines, connectors and fasteners. Other materials may be used when complying with the restrictions given in Table 5.

Continued integrity of gas pressure regulators is ensured by suitable surveillance checks and maintenance. For periodic functional checks and maintenance it is common to refer to national regulations/standards where existing or users/manufacturers practices.

This document has introduced the reaction of the pressure regulators to the specified reasonable expected failures in terms of “fail close” and “fail open” pressure regulator types, but it should be considered that there are other types of failures whose consequences can bring to the same reactions (these risks are covered via redundancy as per EN 12186) and that residual hazards will be reduced by a suitable surveillance in use / maintenance.

In this document, both pressure regulators that can be classified as “safety accessories” by themselves (monitors) according to European legislation on pressure equipment as well as regulators that can be used to provide the necessary pressure protection through redundancy (e.g. pressure regulator with integrated safety shut-off device, pressure regulator + in-line monitor, pressure regulator + safety shut off device) are considered.

The provisions in this document are in line with the state of art at the moment of writing.

This document does not intend to limit the improvement of actual provisions (materials, requirements, test methods, acceptance criteria, etc.) or the developing of new provisions for gas pressure regulators where they are suitable to ensure an equivalent level of reliability.

Some clauses of this standard should be re-considered at the time when characteristics for non-conventional gases will be available.

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2 Normative references

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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 549:1994, *Rubber materials for seals and diaphragms for gas appliances and gas equipment*

EN 1092-1:2018, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 1: Steel flanges*

EN 1092-2:1997, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 2: Cast iron flanges*

EN 1092-3:2003, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 3: Copper alloy flanges*

EN 1092-4:2002, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 4: Aluminium alloy flanges*

EN 1349:2009, *Industrial process control valves*

EN 1759-1:2004, *Flanges and their joint - Circular flanges for pipes, valves, fittings and accessories, Class designated - Part 1: Steel flanges, NPS 1/2 to 24*

EN 1759-3:2003, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, Class designated - Part 3: Copper alloy flanges*

EN 1759-4:2003, *Flanges and their joint - Circular flanges for pipes, valves, fittings and accessories, class designated - Part 4: Aluminium alloy flanges*

EN 10204:2004, *Metallic products - Types of inspection documents*

EN 10226-1:2004, *Pipe threads where pressure tight joints are made on the threads - Part 1: Taper external threads and parallel internal threads - Dimensions, tolerances and designation*

EN 10226-2:2005, *Pipe threads where pressure tight joints are made on the threads - Part 2: Taper external threads and taper internal threads - Dimensions, tolerances and designation*

EN 12186:2014, *Gas infrastructure - Gas pressure regulating stations for transmission and distribution - Functional requirements*

EN 12279:2000/A1:2005, *Gas supply systems - Gas pressure regulating installations on service lines - Functional requirements*

EN 12516-1:2014+A1:2018, *Industrial valves - Shell design strength - Part 1: Tabulation method for steel valve shells*

EN 12516-2:2014, *Industrial valves - Shell design strength - Part 2: Calculation method for steel valve shells*

EN 12516-4:2014+A1:2018, *Industrial valves - Shell design strength - Part 4: Calculation method for valve shells manufactured in metallic materials other than steel*

EN 13445-4:2014/A1:2016, *Unfired pressure vessels - Part 4: Fabrication*

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

EN 13906-2:2013, *Cylindrical helical springs made from round wire and bar - Calculation and design - Part 2: Extension springs*

EN 13906-3:2014, *Cylindrical helical springs made from round wire and bar - Calculation and design - Part 3: Torsion springs*

EN 14382:2019, *Safety devices for gas pressure regulating stations and installations – Gas safety shut-off devices for inlet pressures up to 10 MPa (100 bar)*

EN 60534-2-1:2011, *Industrial-process control valves - Part 2-1: Flow capacity - Sizing equations for fluid flow under installed conditions*

EN 60534-2-3:2016, *Industrial-process control valves - Part 2-3: Flow capacity - Test procedures (IEC 60534-2-3:2016)*

EN 60534-3-1:2000, *Industrial-process control valves - Part 3-1: Dimensions - Face-to-face dimensions for flanged, two-way, globe-type, straight pattern and centre-to-face dimensions for flanged, two-way, globe-type, angle pattern control valves*

EN ISO 148-1:2016, *Metallic materials - Charpy pendulum impact test - Part 1: Test method (ISO 148-1:2016)*

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EN ISO 175:2010, *Plastics - Methods of test for the determination of the effects of immersion in liquid chemicals (ISO 175:2010)*

EN ISO 9606-1:2017, *Qualification testing of welders - Fusion welding - Part 1: Steels (ISO 9606-1:2012 including Cor 1:2012 and Cor 2:2013)*

EN ISO 9606-2:2004, *Qualification test of welders - Fusion welding - Part 2: Aluminium and aluminium alloys (ISO 9606-2:2004)*

EN ISO 9606-3:1999, *Approval testing of welders - Fusion welding - Part 3: Copper and copper alloys (ISO 9606-3:1999)*

EN ISO 9606-4:1999, *Approval testing of welders - Fusion welding - Part 4: Nickel and nickel alloys (ISO 9606-4:1999)*

EN ISO 9712:2012, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712:2012)*

EN ISO 12156-1:2018, *Diesel fuel - Assessment of lubricity using the high-frequency reciprocating rig (HFRR) - Part 1: Test method (ISO 12156-1:2018)*

EN ISO 14732:2013, *Welding personnel - Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732:2013)*

EN ISO 15607:2003, *Specification and qualification of welding procedures for metallic materials - General rules (ISO 15607:2003)*

EN ISO 15609-1:2004, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 1: Arc welding (ISO 15609-1:2004)*

EN ISO 15610:2003, *Specification and qualification of welding procedures for metallic materials - Qualification based on tested welding consumables (ISO 15610:2003)*

EN ISO 15611:2003, *Specification and qualification of welding procedures for metallic materials - Qualification based on previous welding experience (ISO 15611:2003)*

EN ISO 15612:2018, *Specification and qualification of welding procedures for metallic materials - Qualification by adoption of a standard welding procedure (ISO 15612:2018)*

EN ISO 15613:2004, *Specification and qualification of welding procedures for metallic materials - Qualification based on pre-production welding test (ISO 15613:2004)*

EN ISO 15614-1:2017, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1:2017, Corrected version 2017-10-01)*

EN ISO 15614-2:2005/AC:2009, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 2: Arc welding of aluminium and its alloys (ISO 15614-2:2005/Cor 2:2009)*

EN ISO 17637:2016, *Non-destructive testing of welds - Visual testing of fusion-welded joints (ISO 17637:2016)*

ISO 1817:2015, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 3419:1981, *Non-alloy and alloy steel butt-welding fittings*

ISO 7005-2:1988, *Metallic flanges — Part 2: Cast iron flanges*

MSS SP 55:2011, *Quality standard for steel castings for valves, flanges and fittings and other piping components (Visual method)*

Recommended Practice N. SNT-TC-1A:2016, *Personnel Qualification and Certification in Nondestructive Testing*

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 General terms and definitions of types of gas pressure regulators

3.1.1

gas pressure regulator

device whose function is to maintain the value of the controlled variable (see 3.3.4.1) within its tolerance field irrespective of disturbance variables

3.1.2

direct acting gas pressure regulator

regulator in which the net force required to move the control member is supplied directly by the controlled variable

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Note 1 to entry: See Figure 1, for example.