SLOVENSKI STANDARD
SIST EN 12261:2024

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Nadomešča:
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Plinomeri - Turbinski plinomeri

Gas meters - Turbine gas meters

Gaszähler - Turbinenradgaszähler

Compteurs de gaz - Compteurs de gaz à turbine

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91.140.40 Sistemi za oskrbo s plinom Gas supply systems

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Gas meters - Turbine gas meters

Compteurs de gaz - Compteurs de gaz à turbine

Gaszähler - Turbinenradgaszähler

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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 12261:2024) has been prepared by Technical Committee CEN/TC 237 “Gas meters”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by September 2024, and conflicting national standards shall be withdrawn at the latest by September 2024.

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 12261:2018.

EN 12261:2024 includes the following significant technical changes with respect to EN 12261:2018:

— Harmonization with PED;

— Clause 6 reworked completely;

— Annex G added;

— Annex ZB added.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA and ZB, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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, Türkiye and the United Kingdom

Introduction

In the preparation of this document, the content of ISO 9951:1993, the content of OIML Publication, “International Recommendation 6” and “International Recommendation 32” and the content of member bodies' national standards on turbine meters have been taken into account.

The metrological aspects of this document might be subject to amendments to bring it into line with the Measuring Instruments Directive (MID).

Electronic Indexes are not specifically covered by this document, however, work to produce a standard covering these devices is in progress under CEN/TC 237.

1 Scope

This document specifies the measuring conditions, requirements and tests for the construction, performance and safety of class 1,0 axial and radial turbine gas meters with mechanical indicating devices, hereinafter referred to as a meter(s), having in-line pipe connections for gas flow measurement.

This document applies to turbine gas meters used to measure the volume of fuel gases of the 1st and 2nd gas families, the composition of which is specified in EN 437:2021, at maximum operating pressures up to 420 bar, actual flow rates up to 25 000 m^3/h over a gas temperature of a minimum −40 °C up to 70 °C, with a range of at least 40 K and for a climatic environmental temperature range of at least 50 K.

This document applies to meters that are installed in locations with vibration and shocks of low significance and in:

— closed locations (indoor or outdoor with protection as specified by the manufacturer) with condensing or with non-condensing humidity;

or, if specified by the manufacturer,

— open locations (outdoor without any covering) with condensing humidity or with non-condensing humidity;

and in locations with electromagnetic disturbances.

Unless otherwise specified in this document:

— all pressures used are gauge;

— all influence quantities, except the one under test, are kept relatively constant at their reference value.

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 437:2021, *Test gases - Test pressures - Appliance categories*

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

EN 1092-2:2023, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 2: Cast iron flanges*

EN 1092-3:2003,[1] *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 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*

[1] As impacted by corrigendum EN 1092-3:2003/AC:2007.

EN 1759-3:2003,[2] *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 15612:2020, *Railway applications - Braking - Brake pipe accelerator*

EN ISO 17663:2023, *Welding — Quality requirements for heat treatment in connection with welding and allied processes (ISO 17663:2023)*

EN 22768-1:1993, *General tolerances - Part 1: Tolerances for linear and angular dimensions without individual tolerance indications (ISO 2768-1:1989)*

EN IEC 60079-0:2018,[3] *Explosive atmospheres — Part 0: Equipment — General requirements (IEC 60079-0:2018)*

EN 60079-11:2012, *Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"*

EN 60529:1991,[4] *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60947-5-6:2000, *Low-voltage switchgear and controlgear - Part 5-6: Control circuit devices and switching elements - DC interface for proximity sensors and switching amplifiers (NAMUR)*

EN 62246-1:2015, *Reed switches - Part 1: Generic specification*

EN ISO 5167-1:2022, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 1: General principles and requirements (ISO 5167-1:2022)*

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 9606-5:2000, *Approval testing of welders - Fusion welding - Part 5: Titanium and titanium alloys, zirconium and zirconium alloys (ISO 9606-5:2000)*

EN ISO 9712:2022, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712:2021)*

[2] As impacted by corrigendum EN 1759-3:2003/AC:2004.
[3] As impacted by corrigendum EN 60079-0:2018/AC:2020-02.
[4] As impacted by EN 60529:1991/corrigendum May 1993, EN 60529:1991/AC:2016-12, EN 60529:1991/A1:2000, EN 60529:1991/A2:2013 and EN 60529:1991/A2:2013/AC:2019-02.

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

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,[5] *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,[6] *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)*

EN ISO 15614-4:2005,[7] *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 4: Finishing welding of aluminium castings (ISO 15614-4:2005)*

EN ISO 15614-5:2004, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 5: Arc welding of titanium, zirconium and their alloys (ISO 15614-5:2004)*

EN ISO 15614-6:2006, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 6: Arc and gas welding of copper and its alloys (ISO 15614-6:2006)*

EN ISO 15614-7:2019, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 7: Overlay welding (ISO 15614-7:2016)*

EN ISO 15614-8:2016, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 8: Welding of tubes to tube-plate joints (ISO 15614-8:2016)*

EN ISO 15614-11:2002, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 11: Electron and laser beam welding (ISO 15614-11:2002)*

ISO 7005-1:2011, *Pipe flanges — Part 1: Steel flanges for industrial and general service piping systems*

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

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

[5] As impacted by amendment EN ISO 15614-1:2017/A1:2019.
[6] As impacted by corrigendum EN ISO 15614-2:2005/AC:2009.
[7] As impacted by corrigendum EN ISO 15614-242005/AC:2007.

3 Terms, definitions and symbols

3.1 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org

3.1.1
turbine gas meter
measuring device in which the dynamic forces of the flowing gas cause a turbine wheel to rotate with a speed as a function of the volume flow rate

Note 1 to entry: The number of revolutions of the turbine wheel is the basis for the indication of the volume passed through the meter.

Note 2 to entry: It is designed to measure, memorize and display the volume of a fuel gas that has passed through it.

3.1.2
measured quantity
volume in cubic meters, at metering conditions

3.1.3
volume flow rate
volume at metering conditions divided by time

3.1.4
rangeability
ratio between Q_{min} and Q_{max}, i.e. the minimum and maximum flow rate respectively for which the meter performs within the maximum permissible errors

3.1.5
average velocity
volume flow rate divided by the cross-sectional area of the meter connections

3.1.6
casing
pressure containing structure of the meter

3.1.7 Pressures and temperatures

3.1.7.1
maximum allowable pressure (strength)
PS
maximum allowable pressure *PS*′ means the maximum pressure for which the equipment is designed, as specified by the manufacturer, and defined at a location specified by him, being either the connection of protective and/or limiting devices, or the top of equipment or, if not appropriate, any point specified

3.1.7.2
metering pressure
p_m
absolute gas pressure to which the indicated volume of gas is related

3.1.7.3
operating pressure
gas pressure within the piping containing the meter

3.1.7.4
operating pressure range
permissible pressure range over which the meter is calibrated and operates within the metrological requirements, which has to be compatible with the design and construction calculations

3.1.7.5
maximum/minimum allowable temperature (strength)
TS
maximum/minimum allowable temperature *TS*' means the maximum/minimum temperatures for which the equipment is designed, as specified by the manufacturer

3.1.7.6
operating temperature range
range of metering temperatures over which the meter operates within the metrological requirements, which has to be compatible with the design and construction calculations

3.1.8 Designation

3.1.8.1
DN-designation
numerical designation of size for components of a pipework system, which is used for reference purposes

Note 1 to entry: It comprises the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections.

3.1.8.2
PN-designation
alphanumeric term used for reference purposes related to a combination of mechanical and dimensional characteristics of a component of a pipework system with regard to pressure

Note 1 to entry: It comprises the letters PN followed by a dimensionless whole number.

3.1.9
metering conditions
conditions of the gas prevailing at the point of the measurement

EXAMPLE Temperature and pressure of the measured gas in the meter.

3.1.10
Reynolds number
Re
number referring to the flow conditions:

$$Re = \frac{4Q_{\text{mass}}}{\pi \mu D} 10^3$$

where

Re is the Reynolds number, dimensionless value;

D is the pipe internal diameter, mm;

μ is the dynamic viscosity, kg/m·s;

Q_{mass} is the mass flow rate, kg/s;

where the value of D is given by the internal pipe diameter

Note 1 to entry: The parameters (variables) in the above equation and their units are defined in Table 1.

3.1.11
error of indication
indication of a turbine meter minus the reference value of the measurand

Note 1 to entry: Errors (E) are expressed as relative values (as a percentage) by the ratio of the difference between the indicated volume (V_i) and a reference volume (V_c) of the gas which has passed through the gas meter to this latter value:

$$E = \frac{V_i - V_c}{V_c} \cdot 100\left[\%\right]$$

or between the indicated flow rate (Q_i) and the reference flow rate (Q_c)

$$E = \frac{Q_i - Q_c}{Q_c} \cdot 100\left[\%\right]$$

3.1.12
pressure loss
non-recoverable pressure drop caused by the presence of the turbine meter in the conduit

3.1.13
pulse value
number of pulses per cubic metre indicated

3.1.14 Gas families

3.1.14.1
1st family
gas having a Wobbe index between:

23,8 MJ · m^{-3} and 31,4 MJ · m^{-3}

according to EN 437:2021 related on gross calorific value

3.1.14.2
2nd family
gas having a Wobbe index between:

41,3 MJ · m^{-3} and 57,9 MJ · m^{-3}

according to EN 437:2021 related on gross calorific value

3.1.15
class 1,0 meter
meter which has an error of indication between −2 % and +2 % for flow rates Q where $Q_{min} \leq Q < Q_t$, and between −1 % and +1 % for flow rates Q where $Q_t \leq Q \leq Q_{max}$ and when the errors between Q_t and Q_{max} all have the same sign, they all shall not exceed 0,5 %

3.1.16
Q_{min}
lowest flowrate at which the gas meter provides indications that satisfy the requirements regarding maximum permissible error (MPE)

3.1.17
Q_{max}
highest flowrate at which the gas meter provides indications that satisfy the requirements regarding MPE

3.1.18
Q_t
transitional flowrate, the flowrate occurring between the maximum and minimum flowrates at which the flowrate range is divided into two zones, the ‘upper zone’ and the ‘lower zone’

Note 1 to entry: Each zone has a characteristic MPE.

3.1.19
Q_r
overload flowrate, the highest flowrate at which the meter operates for a short period of time without deteriorating