SLOVENSKI STANDARD
oSIST prEN 12261:2021

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Plinomeri - Turbinski plinomeri

Gas meters - Turbine gas meters

Gaszähler - Turbinenradgaszähler

Compteurs de gaz - Compteurs de gaz à turbine

Ta slovenski standard je istoveten z: **prEN 12261**

ICS:

91.140.40 Sistemi za oskrbo s plinom Gas supply systems

oSIST prEN 12261:2021 **en,fr,de**

EUROPEAN STANDARD

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English Version

Gas meters - Turbine gas meters

Compteurs de gaz - Compteurs de gaz à turbine

Gaszähler - Turbinenradgaszähler

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 237.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword

This document (prEN 12261:2021) has been prepared by Technical Committee CEN/TC 237 “Gas meters”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12261:2018.

The main changes compared to the previous edition are listed below:

— Harmonization with PED;

— Clause 6 reworked completely;

— Annex G added;

— Annex ZB added.

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

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

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 proposed 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 working pressures up to 420 bar, actual flow rates up to 25 000 m^3/h over a gas temperature 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.

Clauses 1 to 7 and Annex B are for design and type testing only, with the exception of 6.2.4.3, 6.2.5.3, 6.7.1.2.2 and 6.7.2.2.2. Annex C can be used to provide guidance on periodic tests during use. Clause 8 and Annexes D and E are for each meter prior to dispatch. Annex A is intended to be used for both type and individual testing. Annex F is intended to be used for individual testing. Annex G is intended to be used for design.

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 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,[1] *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 3: Copper alloy flanges*

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

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*

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 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, *Explosive atmospheres - Part 0: Equipment - General requirements (IEC 60079-0:2017)*

EN 60079-11:2012, *Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" (IEC 60079-11:2011)*

EN 60529:1991,[3] *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) (IEC 60947-5-6:1999)*

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

EN ISO 5167-1:2003, *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 5167-1:2003)*

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

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 15607:2019, *Specification and qualification of welding procedures for metallic materials - General rules (ISO 15607:2019)*

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[2] As impacted by corrigendum EN 1759-3:2003/AC:2004.

[3] 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 15609-1:2019, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 1: Arc welding (ISO 15609-1:2019)*

EN ISO 15614-1:2017,[4] *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,[5] *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)*

ISO 17663:2009, *Welding — Quality requirements for heat treatment in connection with welding and allied processes*

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

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 terminological databases for use in standardization at the following addresses:

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

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

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
volume flow rate
volume at metering conditions divided by time

3.1.3
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

3.1.4
casing
pressure containing structure of the meter

[4] As impacted by amendment EN ISO 15614-1:2017/A1:2019.

[5] As impacted by corrigendum EN ISO 15614-2:2005/AC:2009.

3.1.5
pressures and temperatures
3.1.5.1
metering pressure
p_m
absolute gas pressure to which the indicated volume of gas is related

3.1.5.2
operating pressure
gas pressure within the piping containing the meter

3.1.5.3
working pressure range
allowable pressure range over which the meter is calibrated and performs within the metrological requirements

3.1.5.4
operating temperature range
range of metering temperatures over which the meter operates within the metrological requirements

3.1.5.5
maximum design pressure
p_{max}
pressure on which design calculations are based

3.1.6
designation
3.1.6.1
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.

3.1.6.2
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.

3.1.7
metering conditions
conditions of the gas prevailing at the point of the measurement

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

3.1.8
Reynolds number
Re
number referring to the flow conditions:

$$Re = 0,353\ 7 \cdot \frac{Q}{D \cdot \nu}$$

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.

3.1.9
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:

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

3.1.10
pressure loss
non-recoverable pressure drop caused by the presence of the turbine meter in the conduit

3.1.11
pulse value
number of pulses per cubic metre indicated

3.1.12
gas families
3.1.12.1
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

3.1.12.2
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

3.1.13
class 1,0 meter
meter which has an error of indication between –2% an + 2% for flow rates Q where $Q_{min} < Q < Q_t$, –1 % and +1 % for flow rates Q where $Q_t < Q < Q_{max}$ and when the errors between Q_t and Q_{max} all have the same sign, they do all not exceed 0,5 %

3.1.14
Q_{min}
lowest flowrate at which the gas meter provides indications that satisfy the requirements regarding maximum permissible error (MPE)

3.1.15
Q_{max}
highest flowrate at which the gas meter provides indications that satisfy the requirements regarding MPE

3.1.16
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 to entry 1: Each zone has a characteristic MPE.

3.1.17
Q_r
overload flowrate, the highest flowrate at which the meter operates for a short period of time without deteriorating

3.2 Symbols

The symbols and subscripts used hereafter in this document are specified in Table 1.

Table 1 — Symbols

Symbols	Represented quantity	Unit
c	Pressure loss coefficient depending on meter type	mm^{-4}
d	Relative density of the gas (air = 1)	-
D	Inside diameter meter outlet/inlet	mm
D_1	Inside diameter pipe	mm
E	Error	%
F	Force (bending moment)	N
F'	Force (torsional moment)	N
I	Current	A
L	Length of the lever arm (bending moment)	mm
L'	Length of the lever arm (torsional moment)	mm
M	Torque	N·m

Symbols	Represented quantity	Unit
p	Pressure	Pa, bar
Q	Volume flow rate	m^3/h
Re	Reynolds number	-
t	Temperature	°C
U_B	Battery voltage	V
V	Volume	m^3
ν	Kinematic viscosity	$m^2 \cdot s^{-1}$
ρ	Density of the gas	$kg \cdot m^{-3}$
Subscripts:		
i	Summation index	
m	Metering conditions of the gas	
max	Maximum value	
min	Minimum value	
s	Specified conditions	
t	Transitional	

4 Meter classification

4.1 General

The maximum allowable operating pressure for flanges in accordance with the relevant parts of ISO 7005-1:2011 and ISO 7005-2:1988 shall not be less than maximum allowable pressure PS. Flanges shall be in accordance with following appropriate standards: EN 1092-1:2018; EN 1092-2:1997; EN 1092-3:2003; EN 1092-4:2002; EN 1759-1:2004; EN 1759-3:2003; EN 1759-4:2003.

4.2 Flange pressure ratings

Flanges shall be designed according to PN Designation or ANSI class rating (see Table 2).