



SLOVENSKI STANDARD
oSIST prEN 12480:2024
01-maj-2024

Plinomeri - Rotacijski plinomeri

Gas meters - Rotary displacement gas meters

Gaszähler - Drehkolbengaszähler

Compteurs de gaz - Compteurs de gaz à déplacement rotatif

Ta slovenski standard je istoveten z: prEN 12480

ICS:

91.140.40 Sistemi za oskrbo s plinom Gas supply systems

oSIST prEN 12480:2024

en,fr,de

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 12480

December 2023

ICS 91.140.40

Will supersede EN 12480:2018

English Version

Gas meters - Rotary displacement gas meters

Compteurs de gaz - Compteurs de gaz à déplacement
rotatif

Gaszähler - Drehkolbengaszähler

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.

CEN members are the national standards bodies of 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 United Kingdom.

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.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

[oSIST prEN 12480:2024](https://standards.iteh.ai/catalog/standards/sist/84f6915e-2c33-4283-a80b-50c4544c5d9e/osist-pren-12480-2024)

<https://standards.iteh.ai/catalog/standards/sist/84f6915e-2c33-4283-a80b-50c4544c5d9e/osist-pren-12480-2024>



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.....	5
1 Scope	6
2 Normative references	6
3 Terms, definitions, symbols and abbreviations	9
3.1 Terms and definitions	9
3.2 Symbols and abbreviations	12
4 Operating range	13
4.1 General.....	13
4.2 Flow rate range	13
4.3 Operating pressure range	13
4.4 Operating temperature range	13
5 Metrological performance	13
5.1 General.....	13
5.2 Error of indication	13
5.2.1 Requirements.....	13
5.2.2 Test.....	14
5.3 Pressure loss.....	15
5.3.1 Requirements	15
5.3.2 Test.....	15
5.4 Metrological repeatability	15
5.4.1 Requirements	15
5.4.2 Test.....	15
5.5 Operating pressure.....	16
5.5.1 General.....	16
5.5.2 Requirements	16
5.5.3 Pattern approval test.....	16
5.5.4 Individual test	16
5.6 Temperature ranges	17
5.6.1 General.....	17
5.6.2 Minimum operational temperature	17
5.6.3 Maximum operational temperature	17
5.6.4 Storage temperature range	18
5.7 Condensing ambient conditions	18
5.7.1 Requirements	18
5.7.2 Test.....	18
5.8 Bidirectional meters	18
5.8.1 Requirements	18
5.8.2 Test.....	18
5.9 Influence of oil filling.....	19
5.9.1 Requirements	19
5.9.2 Tests.....	19
6 Design and manufacturing	19
6.1 General.....	19
6.2 Material.....	19

6.2.1	General	19
6.2.2	Design method	20
6.2.3	Resistance to external corrosion	20
6.2.4	Penetration resistance.....	20
6.2.5	Adhesion of the protective coating.....	21
6.2.6	Materials for pressurized parts.....	21
6.3	Adequate strength.....	23
6.3.1	Resistance to internal pressure	23
6.3.2	Fire resistance	24
6.3.3	External leak tightness	24
6.3.4	Overload.....	25
6.3.5	Bending and torsional moment.....	25
6.4	Transportation and storage.....	27
6.4.1	Protection against foreign matter	27
6.4.2	Protection against damage.....	27
6.5	Connections	28
6.6	Pressure and temperature tappings.....	28
6.6.1	Pressure tappings.....	28
6.6.2	Temperature tappings.....	29
6.7	Manufacturing.....	29
7	Meter output.....	30
7.1	Index.....	30
7.1.1	General	30
7.1.2	Magnetic coupling.....	30
7.1.3	Mechanical indicating device	30
7.1.4	Test element	31
7.2	Index window.....	31
7.2.1	Requirements.....	31
7.2.2	Tests	32
7.3	Output drive shafts.....	32
7.3.1	Requirements.....	32
7.3.2	Tests	35
7.4	Pulse generators	35
7.4.1	General	35
7.4.2	Specification for low frequency pulse generator	36
7.4.3	Specification for high frequency pulse generator.....	36
7.4.4	Electrical connection.....	37
8	Durability	37
8.1	Requirements.....	37
8.2	Tests	37
9	Marking, labelling and packaging.....	37
9.1	General	37
9.2	Direction of flow.....	38
9.3	Pressure tappings.....	38
9.4	Durability and legibility of marking	38
9.4.1	Requirements.....	38
9.4.2	Test	38
10	Documentation	39
10.1	General	39
10.2	Documentation related to the manufacturer's tests.....	39
10.3	Instruction manual	39

prEN 12480:2023 (E)

Annex A (normative) Pattern approval	41
Annex B (normative) Individual meter testing	43
Annex C (normative) Resistance to high temperature	44
C.1 General	44
C.2 Requirements	44
C.3 Test	44
C.3.1 Apparatus	44
C.3.2 Test conditions	44
C.3.3 Test procedure	45
C.4 Marking	46
Annex D (normative) Compliance evaluation for gas meters	47
D.1 General	47
D.2 Quality Management System	47
D.2.1 General	47
D.2.2 Manufacturer's compliance evaluation	47
D.2.3 Issue of the certificate of compliance with EN 12480	47
Annex E (normative) Non-destructive testing (NDT)	48
Annex F (informative) Materials for pressurized parts	50
Annex G (normative) Additional tests for meters to be used in open locations	62
G.1 General	62
G.2 Weathering	62
G.2.1 Requirements	62
G.2.2 Test	62
Annex H (normative) Meter family	63
H.1 Definition of meter family	63
H.2 Criteria for grouping meters together in order to form a family	63
Annex ZA (informative) Relationship between this European Standard and the essential requirements of EU Directive 2014/32/EU aimed to be covered	64
Annex ZB (informative) Relationship between this European Standard and the essential requirements of EU Directive 2014/68/EU aimed to be covered	70
Bibliography	72

European foreword

This document (prEN 12480:2023) 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 12480:2018.

prEN 12480:2023 includes the following significant technical changes with respect to EN 12480:2018:

- Clause 2 normative references updated;
- Clause 6 reworded;
- Annex ZB reworked.

The main goal of this revision was to be harmonized with 2014/32/EU (Measuring Instruments Directive) and 2014/68/EU Pressure Equipment Directive.

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 Annexes ZA and ZB, which is an integral part of this document.

EN 12480:2018 was published and assessed by a HAS Consultant on PED and could not be cited in the OJEU.

[oSIST prEN 12480:2024](https://standards.iteh.ai/catalog/standards/sist/84f6915e-2c33-4283-a80b-50c4544e5d9e/osist-pren-12480-2024)

<https://standards.iteh.ai/catalog/standards/sist/84f6915e-2c33-4283-a80b-50c4544e5d9e/osist-pren-12480-2024>

prEN 12480:2023 (E)

1 Scope

This document specifies ranges, construction, performances, output characteristics and testing of rotary displacement gas meters (hereinafter referred to as RD meters or simply meters) for gas volume measurement.

This document applies to rotary displacement gas meters used to measure the volume of fuel gases of at least the 1st, 2nd and 3rd gas families, the composition of which is specified in EN 437:2021, at a maximum working pressure up to and including 20 bar over an ambient and gas temperature range of at least -10 °C to $+40\text{ °C}$.

This document applies to meters that are installed in locations with vibration and shocks of low significance (class M1) 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 (class E1 and E2). The standards apply to mechanical meters with mechanical index, electronic devices are not covered by this document.

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.

This document applies to meters with a maximum allowable pressure PS and the volume V of less than $6\ 000\text{ bar} \cdot \text{L}$ or with a product of PS and DN of less than $3\ 000\text{ bar}$.

This document can be used for both pattern approval and individual meter testing. Cross-reference tables are given in:

- Annex A for the tests that need to be undertaken for pattern approval;
- Annex B for individual meter testing.

Some parts of this document cover meters with mechanical index only.

The risk philosophy adopted in this document is based on the analysis of hazards including pressure. The document applies principles to eliminate or reduce hazards. Where these hazards cannot be eliminated appropriate protection measures are specified.

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*

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, *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 12516-2:2014+A1:2021, *Industrial valves — Shell design strength — Part 2: Calculation method for steel valve shells*

EN 12516-3:2003, *Valves — Shell design strength — Part 3: Experimental method*

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 60529:1992, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN IEC 60079-0:2018,² *Explosive atmospheres — Part 0: Equipment - General requirements (IEC 60079-0:2017)*

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

EN 60730-1:2000,³ *Automatic electrical controls for household and similar use — Part 1: General requirements (IEC 60730-1:1999)*

EN IEC 61000-6-1:2019, *Electromagnetic compatibility (EMC) — Part 6-1: Generic standards — Immunity standard for residential, commercial and light-industrial environments (IEC 61000-6-1:2016)*

EN IEC 61000-6-2:2019, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity standard for industrial environments (IEC 61000-6-2:2016)*

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

² As impacted by EN 60079-0:2018/AC:2020-02.

³ As impacted by EN 60730-1:2000/A1:2019 and EN 60730-1:2000/A2:2022.

prEN 12480:2023 (E)

EN IEC 61000-6-3:2021, *Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for equipment in residential environments (IEC 61000-6-3:2020)*

EN IEC 61000-6-4:2019, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments (IEC 61000-6-4:2018)*

EN 61000-6-5:2016, *Electromagnetic compatibility (EMC) — Part 6-5: Generic standards — Immunity for equipment used in power station and substation environment*

EN 61000-6-7:2015, *Electromagnetic compatibility (EMC) — Part 6-7: Generic standards — Immunity requirements for equipment intended to perform functions in a safety-related system (functional safety) in industrial locations*

EN IEC 61000-6-8:2020, *Electromagnetic compatibility (EMC) — Part 6-8: Generic standards — Emission standard for professional equipment in commercial and light industrial locations (IEC 61000-6-8:2020)*

EN ISO 1518-2:2011, *Paints and varnishes — Determination of scratch resistance — Part 2: Variable-loading method (ISO 1518-2:2011)*

EN ISO 2409:2020, *Paints and varnishes— Cross-cut test (ISO 2409:2020)*

EN ISO 6270-2:2018, *Paints and varnishes — Determination of resistance to humidity — Part 2: Procedure for exposing test specimens in condensation-water atmospheres (ISO 6270-2:2018)*

EN ISO 9606-1:2017, *Qualification testing of welders — Fusion welding — Part 1: Steels (ISO 9606-1:2012 including Cor 1:2012 & 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 9712:2022, *Non-destructive testing — Qualification and certification of NDT personnel (ISO 9712:2022)*

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)*

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, *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)*

EN ISO 15614-2:2005,⁴ *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)*

⁴ As impacted by EN ISO 15614-2:2005/AC:2009.

ISO 834-1:1999+A2:2021, *Fire-resistance tests — Elements of building construction — Part 1: General requirements*

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 14782:2021, *Plastics — Determination of haze for transparent materials*

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

3 Terms, definitions, symbols and abbreviations

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

accuracy class 1,0

accuracy achieved by a meter, which has an error of indication between -2% and $+2\%$ for flow rates Q , where $Q_{\min} \leq Q < Q_t$ and an error of indication between -1% and $+1\%$ for flow rates Q , where $Q_t \leq Q \leq Q_{\max}$

3.1.2

cyclic volume

volume of the gas measured by one complete revolution of the element(s)

3.1.3

density of gas

mass of gas divided by the volume

3.1.4

allowable design temperature range

range of gas temperatures (minimum to maximum) for which the meter is designed as declared and marked on the meter

3.1.5

diameter

DN

nominal size of diameter

3.1.6

error of indication

value which shows the relationship in percentage terms of the difference between the volume indicated by the meter and the volume which has actually flowed through the meter, to the latter value:

prEN 12480:2023 (E)

$$E = \frac{V_i - V_c}{V_c} \cdot 100$$

where

V_i is the indicated volume and V_c is the volume which has actually flowed through the meter

3.1.7**maximum allowable pressure****PS**

maximum pressure for which the meter is designed as specified by the manufacturer

3.1.8**minimum flow rate**

lowest flow rate at which the gas meter provides indications that satisfy the requirements regarding maximum permissible error (MPE)

3.1.9**maximum flow rate**

highest flow rate at which the gas meter provides indications that satisfy the requirements regarding maximum permissible error (MPE)

3.1.10**meter family**

group of meters of different sizes but with similar construction (see Annex H)

Note 1 to entry: By specifying a meter family it is possible to reduce the number of tests and documents during assessment.

3.1.11**metering condition**

condition of the gas prevailing at the point of measurement

3.1.12**metering pressure**

absolute pressure at which the volume of the gas is measured

3.1.13**normal conditions of use**

conditions referring to the meter operating:

- within the range of working pressure;
- within the operational temperature and gas temperature range;
- with the distributed gas

3.1.14**operating pressure range**

limits of working pressure, as declared by the manufacturer, for which the meter will continue to operate within its metrological characteristics

3.1.15**operating temperature range**

range of gas and ambient temperatures for which the meter satisfies the metrological requirements of this document

3.1.16**overload flow rate** Q_r

highest flow rate at which the meter operates for a short period of time without deteriorating

3.1.17**pressure loss**

non-recoverable pressure drop caused by the presence of the meter in the pipeline

3.1.18**rotary displacement meter**

gas volume meter in which a rigid measuring compartment is formed between the walls of a stationary chamber and rotating element or elements

Note 1 to entry: Each rotation of the element(s) displaces a fixed volume of gas which is cumulatively registered and indicated by an indicating device. It is designed to measure, memorize and display the volume of a fuel gas that has passed through it.

3.1.19**storage temperature range**

range of temperatures at which the meter can be stored without being adversely affected

3.1.20**transitional flow rate**

flow rate occurring between the maximum and minimum flow rates at which the flow rate range is divided into two zones, the upper zone and the lower zone, each zone having a characteristic MPE

3.1.21**volume of meter**

internal volume of meter excluding the volume of internal parts

3.1.22**working pressure**

pressure of the gas at the inlet of the meter

3.1.23**limit pressure**

pressure at which yielding becomes apparent in any component of the meter or its fixtures

3.1.24**safety factor body**

ratio of the limit pressure p_l to the maximum allowable pressure PS applied to the meter body

3.1.25**safety factor others**

ratio of the limit pressure p_l to the maximum allowable pressure PS applied to other pressure containing parts of the meter

prEN 12480:2023 (E)

3.2 Symbols and abbreviations

For the purposes of this document, the symbols and subscripts given in Table 1 apply.

Table 1 — Symbols

Symbol	Represented quantity	Unit
V_{cyc}	Cyclic volume	dm^3
ρ	Density of gas	$kg \cdot m^{-3}$
TS	Allowable design temperature range	$^{\circ}C$
DN	Diameter	Dimensionless
E	Error of indication	%
MPE	Maximum permissible error	%
WME	Weighted mean error	%
PS	Maximum allowable pressure	Pa, bar
Q	Flow rate	m^3/h
p_m	Metering pressure	Pa, bar
p	Operating pressure range	Pa, bar
t	Operating temperature range	$^{\circ}C$
Q_r	Overload flow rate	m^3/h
t_s	Storage temperature range	$^{\circ}C$
Q_t	Transitional flow rate	m^3/h
V	Volume of meter in litres	L
p_l	Limit pressure	bar
S_b	Safety factor body	Dimensionless
S	Safety factor others	Dimensionless
tr	Revolution	Dimensionless
Subscripts		
m	Metering conditions of the gas	
min	Minimum	
max	Maximum	
i	Indicated	
t	Transitional	