



# SLOVENSKI STANDARD

## SIST EN 12480:2015

01-junij-2015

Nadomešča:

SIST EN 12480:2004

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**Plinomeri - Plinomeri z rotacijskimi bati**

Gas meters - Rotary displacement gas meters

Gaszähler - Drehkolbengaszähler

Compteurs de gaz - Compteurs de gaz à déplacement rotatif

**Ta slovenski standard je istoveten z: EN 12480:2015**

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**ICS:**

91.140.40      Sistemi za oskrbo s plinom      Gas supply systems

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 12480**

March 2015

ICS 91.140.40

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English Version

**Gas meters - Rotary displacement gas meters**

Compteurs de gaz - Compteurs de gaz à déplacement  
rotatif

Gaszähler - Drehkolbengaszähler

This European Standard was approved by CEN on 11 January 2015.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## Foreword

This document (EN 12480:2015) 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of an identical text or by endorsement, at the latest by September 2015 and conflicting national standards shall be withdrawn at the latest by September 2015.

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

This document supersedes EN 12480:2002.

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 Directives.

For relationship with EU Directives, see informative Annex ZA and ZB, which are integral parts of this document.

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

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## EN 12480:2015 (E)

## 1 Scope

This European Standard 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 European Standard 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 437:2003+A1:2009, at a maximum working pressure up to and including 20 bar over an ambient and gas temperature range of at least  $-10\text{ }^{\circ}\text{C}$  to  $+40\text{ }^{\circ}\text{C}$ .

This European Standard 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;

Unless otherwise specified in this standard:

- all pressures used are gauge;
- all influence quantities, except the one under test, are kept relatively constant at their reference value.

This European Standard also applies to meters with a maximum allowable pressure PS and the volume V of less than 6 000 bar · litres or with a product of PS and DN of less than 3 000 bar.

NOTE These limits are the same as in EU directive 97/23/EC.

This European Standard 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 standard cover meters with mechanical index only.

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

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 485-2:2013, *Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties*

EN 586-2:1994, *Aluminium and aluminium alloys - Forgings - Part 2: Mechanical properties and additional property requirements*



- EN 754-2:2013, *Aluminium and aluminium alloys - Cold drawn rod/bar and tube - Part 2: Mechanical properties*
- EN 755-2:2013, *Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 2: Mechanical properties*
- EN 1057:2006+A1:2010, *Copper and copper alloys - Seamless, round copper tubes for water and gas in sanitary and heating applications*
- EN 1092-1:2007+A1:2013, *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 1563:2011, *Founding - Spheroidal graphite cast irons*
- EN 1652:1997, *Copper and copper alloys - Plate, sheet, strip and circles for general purposes*
- EN 1706:2010, *Aluminium and aluminium alloys - Castings - Chemical composition and mechanical properties*
- 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 1982:2008, *Copper and copper alloys - Ingots and castings*
- EN 10025 (all parts), *Hot rolled products of structural steels*
- EN 10028-2:2009, *Flat products made of steels for pressure purposes - Part 2: Non-alloy and alloy steels with specified elevated temperature properties*
- EN 10028-3:2009, *Flat products made of steels for pressure purposes - Part 3: Weldable fine grain steels, normalized*
- EN 10028-4:2009, *Flat products made of steels for pressure purposes - Part 4: Nickel alloy steels with specified low temperature properties*
- EN 10028-6:2009, *Flat products made of steels for pressure purposes - Part 6: Weldable fine grain steels, quenched and tempered*
- EN 10028-7:2007, *Flat products made of steels for pressure purposes - Part 7: Stainless steels*
- EN 10083-1:2006, *Steels for quenching and tempering - Part 1: General technical delivery conditions*

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EN 10083-2:2006, *Steels for quenching and tempering - Part 2: Technical delivery conditions for non alloy steels*

EN 10087:1998, *Free-cutting steels - Technical delivery conditions for semi-finished products, hot-rolled bars and rods*

EN 10088-1:2014, *Stainless steels - List of stainless steels*

EN 10088-3:2014, *Stainless steels - Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes*

EN 10111:2008, *Continuously hot rolled low carbon steel sheet and strip for cold forming - Technical delivery conditions*

EN 10130:2006, *Cold rolled low carbon steel flat products for cold forming - Technical delivery conditions*

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

EN 10222-1:1998, *Steel forgings for pressure purposes - Part 1: General requirements for open die forgings*

EN 10222-5:1999, *Steel forgings for pressure purposes - Part 5: Martensitic, austenitic and austenitic-ferritic stainless steels*

EN 10213:2007, *Steel castings for pressure purposes*

EN 10250-1:1999, *Open die steel forgings for general engineering purposes - Part 1: General requirements*

EN 10250-2:1999, *Open die steel forgings for general engineering purposes - Part 2: Non-alloy quality and special steels*

EN 10250-4:1999, *Open die steel forgings for general engineering purposes - Part 4: Stainless steels*

EN 10272:2007, *Stainless steel bars for pressure purposes*

EN 10277-3:2008, *Bright steel products - Technical delivery conditions - Part 3: Free-cutting steels*

EN 12164:2011, *Copper and copper alloys - Rod for free machining purposes*

EN 12165:2011, *Copper and copper alloys - Wrought and unwrought forging stock*

EN 12516-1:2014, *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 12516-3:2002, *Valves - Shell design strength - Part 3: Experimental method*

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

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code)*

EN 60730-1:2000, *Automatic electrical controls for household and similar use - Part 1: General requirements*

EN 61000-6, *Electromagnetic compatibility (EMC) Generic standards (IEC 61000-6)*

EN ISO 898-1:2013, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread (ISO 898-1:2013)*

EN ISO 898-2:2012, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 2: Nuts with specified property classes - Coarse thread and fine pitch thread (ISO 898-2:2012)*

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

EN ISO 2409:2013, *Paints and varnishes - Cross-cut test (ISO 2409:2013)*

EN ISO 3506 (all parts), *Mechanical properties of corrosion-resistant stainless steel fasteners (ISO 3506)*

EN ISO 6270-1:2001, *Paints and varnishes - Determination of resistance to humidity - Part 1: Continuous condensation (ISO 6270-1:1998)*

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

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 10675-1:2013, *Non-destructive testing of welds - Acceptance levels for radiographic testing - Part 1: Steel, nickel, titanium and their alloys (ISO 10675-1:2008)*

EN ISO 11666:2010, *Non-destructive testing of welds - Ultrasonic testing - Acceptance levels (ISO 11666:2010)*

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 15614-1:2004, *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 15614-1:2004)*

EN ISO 15614-2:2005, *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 17636-1:2013, *Non-destructive testing of welds - Radiographic testing - Part 1: X- and gamma-ray techniques with film (ISO 17636-1:2013)*

EN ISO 17636-2:2013, *Non-destructive testing of welds - Radiographic testing - Part 2: X- and gamma-ray techniques with digital detectors (ISO 17636-2:2013)*

EN ISO 17637:2011, *Non-destructive testing of welds - Visual testing of fusion-welded joints (ISO 17637:2003)*

EN ISO 17640:2010, *Non-destructive testing of welds - Ultrasonic testing - Techniques, testing levels, and assessment (ISO 17640:2010)*

EN ISO 23279:2010, *Non-destructive testing of welds - Ultrasonic testing - Characterization of indications in welds (ISO 23279:2010)*

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

ISO 1083:2004, *Spheroidal graphite cast irons - Classification*

ISO 2768-1:1989, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

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 7724-3:1984, *Paints and varnishes — Colorimetry — Part 3: Calculation of colour differences*

ISO 8434 (all parts), *Hydraulic fluid power — Connection for tubes and hoses — Dimensions and designs for 37 degrees flare and 24 degrees flareless fittings*

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

ASTM A 105/A 105M:2011, *Standard Specification for Carbon Steel Forgings for Piping Applications*

ASTM A 106/A 106M:2011, *Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service*

ASTM A 182/A 182M:2012, *Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service*

ASTM A 193/A 193M:2012, *Standard Specification for Alloy Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications*

ASTM A 194/A 194M:2012, *Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both*

ASTM A 213/A 213M:2011, *Standard Specification for Seamless Ferritic and Austenitic Alloy Steel Boiler, Superheater, and Heat Exchanger Tubes*

ASTM A 234/A 234M:2011, *Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service*

ASTM A 240/A 240M:2012, *Standard Specification for Chromium and Chromium Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications*

ASTM A 266/A 266M:2011, *Standard Specification for Carbon Steel Forgings for Pressure Vessel Components*

ASTM A 269:2010, *Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service*

ASTM A 276:2010, *Standard Specification for Stainless Steel Bars and Shapes*

ASTM A 312/A 312M:2012, *Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes*

ASTM A 320/A 320M:2011, *Standard Specification for Alloy Steel and Stainless Steel Bolting for Low Temperature Service*

ASTM A 333/A 333M:2011, *Specification for Seamless and Welded Steel Pipe for Low-Temperature Service*

ASTM A 350/A 350M:2010, *Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components*

ASTM A 395/A 395M:2009, *Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures*

ASTM A 420/A 420M:2006, *Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service*

ASTM A 513/A 513M:2012, *Standard Specification for Electric Resistance Welded Carbon and Alloy Steel Mechanical Tubing*

ASTM A 516/A 516M:2010, *Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate and Lower Temperature Service*

ASTM A 536:2009, *Standard Specification for Ductile Iron Castings*

ASTM A 564/A 564M:2010, *Standard Specification for Hot Rolled and Cold Finished Age Hardening Stainless Steel Bars and Shapes*

ASTM A 694/A 694M:2008, *Standard Specification for Carbon and Alloy Steel Forgings for Pipe Flanges, Fittings, Valves, and Parts for High Pressure Transmission Service*

ASTM A 707/A 707M:2010, *Standard Specification for Forged Carbon and Alloy Steel Flanges for Low Temperature Service*

ASTM A 874/A 874M:2009, *Standard Specification for Ferritic Ductile Iron Castings Suitable for Low Temperature Service*

ASTM B 85/B 85M:2010, *Standard Specification for Aluminum Alloy Die Castings*

ASTM F 593:2008, *Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs*

ASTM F 594:2009, *Standard Specification for Stainless Steel Nuts*

### 3 Terms and definitions

#### 3.1 Definitions

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

##### 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

**EN 12480:2015 (E)****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**

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:

where

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

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

**3.1.7****maximum allowable design pressure**

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)

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**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 conditions**

conditions 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 standard

### 3.1.16

#### **overload flow rate**

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 (RD 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