



SLOVENSKI STANDARD
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Ultrasonic domestic gas meters

Ultraschall-Haushaltsgaszähler

Compteurs de gaz domestiques à ultrasons

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English Version

Ultrasonic domestic gas meters

Compteurs de gaz domestiques à ultrasons

Ultraschall-Haushaltsgaszähler

This European Standard was approved by CEN on 13 December 2006.

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Foreword

This document (EN 14236:2007) 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of an identical text or by endorsement, at the latest by July 2007, and conflicting national standards shall be withdrawn at the latest by July 2007

This document supersedes ENV 14236:2002.

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 Directive 2004/22/EC.

For relationship with EU Directive 2004/22/EC, see informative Annex ZA, which is an integral part 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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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1 Scope

This European Standard specifies requirements and tests for the construction, performance and safety of class 1,0 and class 1,5 battery powered ultrasonic gas meters (hereinafter referred to as meters), having co-axial single pipe, or two pipe connections, used to measure volumes of distributed fuel gases of the second and/or third family, as given in EN 437, at maximum working pressures not exceeding 0,5 bar¹⁾ and maximum actual flow rates of up to 10 m³/h over a minimum ambient temperature range of -10 °C to +40 °C, and minimum gas temperature span of 40 K, for domestic applications. This European Standard applies to meters where the measuring element and the register(s) are enclosed in the same case.

This European Standard applies to meters with and without built-in temperature conversion, 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 stated, all pressures given in this European Standard are gauge pressures.

When more than one meter type is submitted for testing, then each meter type is required to be tested against this European Standard.

Clauses 1 to 15 and Annex C are for design and type testing only.

NOTE See Annex A for production requirements.

2 Normative references

The following referenced documents are indispensable for the application 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 55022, *Information technology equipment — Radio disturbance characteristics — Limits and methods of measurement (CISPR 22:1997, modified)*

EN 60068-2-5, *Environmental testing — Part 2: Tests — Test Sa: Simulated solar radiation at ground level (IEC 60068-2-5:1975)*

EN 60068-2-30, *Environmental testing — Part 2-30: Tests — Test Db: Damp heat, cyclic (12 + 12 h cycle) (IEC 60068-2-30:2005)*

EN 60079-0:2004, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements (IEC 60079-0:2004, modified)*

1) 1 bar = 1 000 mbar = 10⁵ Pa.

EN 60079-10, *Electrical apparatus for explosive gas atmospheres — Part 10: Classification of hazardous areas* (IEC 60079-10:1995)

prEN 60079-11, IEC 60079-11, Ed. 5.0: *Explosive atmospheres — Part 11: Equipment protection by intrinsic safety “i”*

EN 60079-15, *Electrical apparatus for explosive gas atmospheres — Part 15: Construction, test and marking of type of protection “n” electrical apparatus* (IEC 60079-15:2005)

EN 60086-1, *Primary batteries — Part 1: General* (IEC 60086-1:2000)

EN 60086-4, *Primary batteries — Part 4: Safety standard for lithium batteries* (IEC 60086-4:2000)

EN 60529, *Degrees of protection provided by enclosures (IP code)* (IEC 60529:1989)

EN 60695-11-5, *Fire hazard testing — Part 11-5: Test flames — Needle-flame test method — Apparatus, confirmatory test arrangement and guidance* (IEC 60695-11-5:2004)

EN 60707, *Flammability of solid non-metallic materials when exposed to flame sources — List of test methods* (IEC 60707:1999)

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

EN 61000-4-2, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 2: Electrostatic discharge immunity test — Basic EMC publication* (IEC 61000-4-2:1995)

EN 61000-4-3, *Electromagnetic compatibility (EMC) — Part 4-3: Testing and measurement techniques — Radiated, radio frequency, electromagnetic field immunity test — (IEC 61000-4-3:2006)*

EN 61000-4-8, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 8: Power frequency magnetic field immunity test — Basic EMC publication* (IEC 61000-4-8:1993)

EN 61000-4-9, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 9: Pulse magnetic field immunity test — Basic EMC publication* (IEC 61000-4-9:1993)

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

EN 61000-6-2, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards – Immunity for industrial environments* (IEC 61006-2-2:2005)

EN 62056-21:2002, *Electricity metering — Data exchange for meter reading, tariff and load control — Part 21: Direct local data exchange* (IEC 62056-21:2002)

EN ISO 2409, *Paints and varnishes — Cross-cut test* (ISO 2409:1992)

EN ISO 2812-1:1994, *Paints and varnishes — Determination of resistance to liquids — Part 1: General methods* (ISO 2812-1:1993)

EN ISO 4628-2:2003, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering* (ISO 4628-2:2003)

EN ISO 4628-3:2003, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 3: Assessment of degree of rusting (ISO 4628-3:2003)*

EN ISO 4892-3, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps (ISO 4892-3:2006)*

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

EN ISO 6272-1, *Paints and varnishes — Rapid-deformation (impact resistance) tests — Part 1: Falling-weight test, large-area indenter (ISO 6272-1:2002)*

EN ISO 9001, *Quality management systems — Requirements (ISO 9001:2000)*

EN ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227:2006)*

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

ISO 1518, *Paints and varnishes — Scratch test*

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

ASTM D471, *Standard Test Method for Rubber Property — Effect of Liquids*

ASTM D1003, *Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics*

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3 Terms, definitions and symbols

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3.1 Terms and definitions

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

3.1.1

actual flow rate

flow rate at the gas pressure and gas temperature conditions prevailing in the gas distribution line in which the meter is fitted, at the meter inlet

3.1.2

base conditions

fixed conditions to which a volume of gas is converted (i.e. base gas temperature 15 °C, base gas pressure 1 013,25 mbar)

3.1.3

contaminants

gas borne dust, vapour and other substances that could affect the operation of the meter

3.1.4

communications port

galvanic or optical serial data port

3.1.5

display

device (e.g. liquid crystal display) which shows the contents of a memory (e.g. registered volume or flags)

3.1.6**distributed gas**

gas locally available

3.1.7**error of indication (ϵ)**

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 volume:

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

where

V_i is the indicated volume in cubic metres (m³);

V_c is the volume in cubic metres (m³) that has actually flowed through the meter

3.1.8**external leak tightness**

leak tightness of the gas carrying components of the gas meter with respect to the atmosphere

3.1.9**flag**

single alphabetic character on the index giving a visual signal of significant events and/or change(s) in the operation of the meter

3.1.10**galvanic connection/interface**

hard wired serial connection or pulse output from the meter

3.1.11**index**

all that which is viewed through the index window, including the display

3.1.12**index window(s)**

area(s) of transparent material through which the index can be read

3.1.13**maximum error shift**

maximum mean error shift at any of the tested flow rates

3.1.14**maximum working pressure**

upper limit of the working pressure for which the meter has been designed, as declared by the manufacturer and marked on the index or the data plate

3.1.15**mean error**

arithmetic mean of consecutive errors of indication at a flow rate

3.1.16**measuring element**

part of the meter which produces an electrical signal proportional to the gas flow rate

3.1.17

memory

element which stores digital information

3.1.18

meter case

complete meter, not casing only

3.1.19

meter class

class to which a meter belongs, according to the metrological requirements of this European Standard, i.e. class 1,5 or class 1,0.

3.1.20

meter cover

rigid enclosure on the front of the meter made either wholly of transparent material, or of opaque material provided with index window(s)

3.1.21

normal conditions of operation

conditions referring to the meter operating:

- at a pressure up to the maximum working pressure (with or without a flow of gas);
- within the range of flow rates;
- within the ambient temperature range;
- within the gas temperature range;
- with the distributed gas

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3.1.22

operating mode

method (sample frequency and timing) of obtaining volume flow measurements

3.1.23

optical port

serial data port using an infra-red transmitter and receiver

3.1.24

pressure absorption

difference between the pressure measured at the inlet and outlet connections of the meter whilst the meter is operating

3.1.25

pressure measuring point

permanent fitting on the meter outlet enabling a direct measurement of the outlet pressure to be obtained

3.1.26

range of mean errors

difference between the minimum and maximum mean errors over a specified flow range

3.1.27

regression line

straight line, generated using a statistical method, to give a graphical representation of a set of results

3.1.28**register**

electronic device comprising both memory and display, which stores and displays information

3.1.29**segment**

individual part of a display which is able to show a portion of a character

3.1.30**starting flow rate**

lowest flow rate at which the meter is able to indicate a volume of gas passed

3.1.31**temperature conversion device**

device which converts the measured volume to a corresponding volume at base gas temperature

3.1.32**test house**

organisation used to perform prescribed tests on meters, in accordance with this standard

3.1.33**thermal cut-off valve**

heat sensitive valve used to cut off the flow of gas to the meter if the ambient temperature rises above a predetermined level for a specified time

3.1.34**ultrasonic gas meter**

gas meter that uses ultrasound and that is designed to measure, memorise and display the fuel gas volume that has passed through it

3.1.35**ultrasonic transducer**

device used to generate and detect the ultrasound signals within the meter

3.1.36**working pressure**

pressure of the gas at the inlet of the meter

3.2 Symbols**3.2.1***D*

outside diameter of the pipe in millimetres (mm)

3.2.2*g*

acceleration due to gravity, in metres per square second ($\text{m} \cdot \text{s}^{-2}$)

3.2.3*MPE*

maximum permissible error, in percent (%)

3.2.4*p*_{max}

maximum working pressure

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