SLOVENSKI STANDARD
SIST ENV 14236:2004

01-februar-2004

Ultrazvoļ ni plinomeri za gospodinjstva

Ultrasonic domestic gas meters

Ultraschall-Haushaltsgaszähler

Compteurs a gaz domestiques a ultrasons

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Ta slovenski standard je istoveten z: **ENV 14236:2002**

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91.140.40 Sistemi za oskrbo s plinom Gas supply systems

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EUROPEAN PRESTANDARD

PRÉNORME EUROPÉENNE

EUROPÄISCHE VORNORM

ENV 14236

July 2002

ICS 91.140.40

English version

Ultrasonic domestic gas meters

This European Prestandard (ENV) was approved by CEN on 25 March 2002 as a prospective standard for provisional application.

The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard.

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document ENV 14236:2002 has been prepared by Technical Committee CEN/TC 237 "Gas meters", the secretariat of which is held by BSI.

The metrological aspects of this Pre-standard may be subject to amendments to bring it into line with the proposed Measuring Instruments Directive.

In this standard the annexes A and B are normative.

This standard includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this European Prestandard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This European Prestandard specifies requirements and tests for the construction, performance and safety of 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 first and/or second and/or third family, as given in EN 437, at maximum working pressures of up to 0,5 bar[1)] and maximum actual flow rates of up to 10 m³/h over a minimum ambient and gas temperature range of -10 °C to +40 °C, for domestic applications. This prestandard applies to meters where the measuring element and the register(s) are enclosed in the same case.

Unless otherwise stated, all pressures given in this document are gauge pressures.

Clauses 1 to 15 and annex B are for design and type testing only.

NOTE See annex A for production requirements.

2 Normative references

This European Prestandard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Prestandard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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EN 437, *Test gases — Test pressures — Appliance categories.*

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EN 50014, *Electrical apparatus for potentially explosive atmospheres — General requirements.*

EN 50020, *Electrical apparatus for potentially explosive atmospheres — Intrinsic safety 'i'.*

EN 50021, *Electrical apparatus for potentially explosive atmospheres —Type of protection 'n'.*

EN 50082-1, *Electromagnetic compatibility — Generic immunity standard — Part 1: Residential, commercial and light industry.*

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: Tests – Test Db and guidance : Damp heat, cyclic (12 + 12 hour cycle) (IEC 60068-2-30:1980 + A1:1985).*

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

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).*

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1) 1 bar = 1 000 mbar = 10^5 Pa.

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

EN 60695-2, *Fire hazard testing — Part 2: Test methods.*

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: Testing and measurement techniques — Section 3: Radiated, radio frequency electromagnetic field immunity test — (IEC 61000-4-3:1995, modified).*

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).*

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EN 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments (IEC 61006-2-2:1999).*

EN 61107: 1996, *Data exchange for meter reading, tariff and load control — Direct local data exchange (IEC 61107:1996).*

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

EN ISO 6272, *Paints and varnishes — Falling-weight test (ISO 6272:1993).*

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation.*

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

ISO 1518, *Paints and varnishes — Scratch test.*

ISO 4628-2, *Paints and varnishes — Evaluation of degradation of paint coatings — Designation of intensity, quantity and size of common types of defect — Part 2: Designation of degree of blistering.*

ISO 4628-3:1982, *Paints and varnishes — Evaluation of degradation of paint coatings — Designation of intensity, quantity and size of common types of defect — Part 3: Designation of degree of rusting.*

ISO/TR 5168, *Measurement of fluid flow — Evaluation of uncertainties.*

ASTM D 471, *Test method for rubber property — Effect of liquids.*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this European Prestandard, 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)

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3.1.6
distributed gas
gas locally available

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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 (m^3) and V_c is the volume in cubic metres (m^3) 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

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3.1.17
memory
element which stores digital information

3.1.18
meter case
meter complete with any meter cover

3.1.19
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)

3.1.20
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;

— with the distributed gas.

3.1.21
operating mode
method (sample frequency and timing) of obtaining volume flow measurements

3.1.22
optical port
serial data port using an infra-red transmitter and receiver

3.1.23
pressure absorption
difference between the pressure measured at the inlet and outlet connections of the meter whilst the meter is operating

3.1.24
pressure measuring point
permanent fitting on the meter outlet enabling a direct measurement of the outlet pressure to be obtained

3.1.25
range of mean errors
difference between the minimum and maximum mean errors over a specified flow range

3.1.26
regression line
straight line, generated using a statistical method, to give a graphical representation of a set of results

3.1.27
register
electronic device comprising both memory and display, which stores and displays information

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3.1.28
segment
individual Part of a display which is able to show a portion of a character

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3.1.29
starting flow rate
lowest flow rate at which the meter is able to indicate a volume of gas passed

3.1.30
temperature conversion device
device which converts the measured volume to a corresponding volume at base gas temperature

3.1.31
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

3.1.32
ultrasonic gas meter
gas meter that uses ultrasound to determine the volume of gas passing through it

3.1.33
ultrasonic transducer
device used to generate and detect the ultrasound signals within the meter

3.1.34
working pressure
difference between the pressure of the gas at the inlet of the meter and the atmospheric pressure

3.2 Symbols

3.2.1
Q_{min}
minimum flow rate, specified in cubic metres per hour (m^3/h) for which the meter has been designed

3.2.2
Q_{max}
maximum flow rate, specified in cubic metres per hour (m^3/h) for which the meter has been designed

3.2.3
Q_t
transitional 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 has a characteristic maximum permissible error

3.2.4
t_m
gas and ambient temperature range of the meter

3.2.5
D
outside diameter of the pipe in millimetres (mm)

3.2.6
MPE
maximum permissible error, in percent (%)

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3.2.7
g
acceleration due to gravity, in metres per square second ($m \cdot s^{-2}$)

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4 Normal operating conditions

4.1 Flow range

The values of maximum flow rates and those corresponding values of the upper limits of the minimum flow rates shall be those given in Table 1.

Table 1 — Flow range

Q_{max} m^3/h	Upper limits of Q_{min} m^3/h
1	0,016
1,6	0,016
2,5	0,016
4	0,025
6	0,040
10	0,060

Q_t shall not exceed 0,1 Q_{max}

4.2 Maximum working pressure

The manufacturer shall declare the maximum working pressure of the meter and this pressure shall be marked on the index or data plate of the meter. This pressure shall not exceed 0,5 bar.

4.3 Temperature range

Unless otherwise stated, all temperatures given in this document are to ± 1 °C.

All meters shall be capable of meeting the requirements for a minimum ambient temperature range and a minimum gas temperature range of -10 °C to +40 °C (see 5.14) and minimum storage temperature range of -20 °C to +60 °C.

If the manufacturer declares a wider ambient and gas temperature range and/or a wider storage temperature range, the meter shall be capable of meeting the requirements over this declared wider range.

If the manufacturer declares that the meter is resistant to high ambient temperatures, the meter shall also be capable of meeting the requirements of the heat resistance test and shall be marked accordingly (see 7.2.1 and 9.1).

4.4 Range of gases

4.4.1 General

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The current ultrasonic domestic meter technology has been designed almost exclusively for use on second family gases, although it is feasible to use it to measure gases of the other families as well. The meters are typically designed to operate on gases with speeds of sound in the range 300 m/s to 475 m/s.

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Natural gases distributed within the EU fall into the second family of gases. The majority of distributed gases exist within the high methane groups H and E as defined by EN 437.

The main gas exceeding the limits applied is the test gas G 222 that has a speed of sound of 497 m/s due to the 23 % hydrogen content. However, this is not felt to be a problem as this gas is designed to test the performance limits of domestic appliances and is not intended to represent distributed gases.

Distributed gases exist that also exceed the limits applied, these being propane/butane/air mixes manufactured to be within the allowable calorific value range for second family gases. These gas types cannot currently be measured using existing ultrasonic technology and the gases for which these meters can be used will be shown on the ‘dial plate’ (see 9.1).

4.4.2 Test gases

The test gases given in Tables 2, 3 and 4 shall be used as specified in 5.3.2 b).