SLOVENSKI STANDARD

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 a déplacement rotatifs

Ta slovenski standard je istoveten z: EN 12480:2002

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91.140.40 Sistemi za oskrbo s plinom Gas supply systems

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Gas meters - Rotary displacement gas meters

Compteurs de gaz - Compteurs de gaz à déplacement rotatifs

Gaszähler - Drehkolbengaszähler

This European Standard was approved by CEN on 16 November 2001.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by August 2002, and conflicting national standards shall be withdrawn at the latest by August 2002.

In the preparation of this European Standard, the content of OIML Publication, “International Recommendations 6” and “International Recommendations 32” and the content of member bodies national standards on rotary displacement gas meters have been taken into account.

The metrological aspects of this European Standard may be subject to amendments to bring it into line with the proposed Measuring Instruments Directive (MID).

Electronic Indexes are not specifically covered by this standard, however, work to produce a standard covering these devices is in progress under CEN/TC 237.

Annexes A, B and C 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 implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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 the 1st, 2nd and 3rd gas families, the composition of which is specified in EN 437, at a maximum working pressure up to and including16 bar over a gas temperature range of at least – 10 °C to + 40 °C.

Unless otherwise specified in this standard, all pressures used are gauge pressures.

2 NORMATIVE REFERENCES

This European Standard incorporates by dated or undated references 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 Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 437, *Test gas - Test pressures – Appliance categories.*

EN 10204, *Metallic products - Types of inspection documents.*

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

EN 50020, *Electrical apparatus for potentially explosive atmospheres - Intrinsic safety "i".*

EN 60947-5-6,*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 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*

EN 60730-1:1995, *Automatic electrical controls for household and similar use - Part 1: General requirements (IEC 60730-1:1993, modified).*

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

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

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

ISO 7005-1, *Metallic flanges - Part 1 : Steel flanges.*

ISO 7005-2, *Metallic flanges - Part 2 : Cast iron flanges.*

3 TERMINOLOGY

3.1 Terms and definitions

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

3.1.1
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. Each rotation cycle of the element(s) displaces a fixed volume of gas which is cumulatively registered and indicated by an indicating device

3.1.2
actual flowrate
flow, at the pressure and temperature conditions prevailing in the gas distribution line in which the meter is fitted

3.1.3
flowrate range
range of flowrates of gas limited by the maximum flowrate Q_{max} and the minimum flowrate Q_{min} for which the error of indication of the meter lies within the specified limits (also referred to as "rangeability")

3.1.4
working pressure
difference between the pressure of the gas at the inlet of the meter and the atmospheric pressure

3.1.5
maximum working pressure (p_{max})
upper limit of working pressure for which the meter has been designed, as declared by the manufacturer and marked on the meter

3.1.6
metering pressure (p_m)
absolute pressure at which the volume of the gas is measured

3.1.7
pressure loss
non-recoverable pressure drop caused by the presence of the meter in the pipeline

3.1.8
metering conditions
conditions of the gas prevailing at the point of measurement

3.1.9
base conditions
fixed conditions to which a volume of gas is converted, having been initially measured at prevailing metering conditions

3.1.10
specified conditions
condition of the gas at which the performance specifications of the meter are given

3.1.11
normal conditions of use
conditions referring to the meter operating :

- at an inlet pressure up to the maximum working pressure
- within the range of flow rates
- within the operational temperature and gas temperature range
- with the distributed gas

3.1.12
operational temperature range
range of temperatures for which the meter satisfies the requirements of this specification

3.1.13
storage temperature range
range of temperatures at which the meter can be stored without being adversely affected

3.1.14
transitional flowrate (Q_t)
rate of flow at which the maximum permissible error of indication changes

3.1.15
cyclic volume
volume of the gas measured by one complete revolution of the element(s)

3.1.16
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 :

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

where

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

3.1.17
normal ambient conditions
a pressure of (1 013,25 ± 100) mbar and temperature of (20 ± 5) °C

3.2 Symbols

Table 1

	Represented quantity	SI Unit
DN	Diameter	dimensionless
p	Absolute pressure	Pa, bar
Q	Volume flowrate	m^3/h
V	Volume	m^3
T	Temperature	°C
E	Error	%
ρ	Density of gas	$kg \cdot m^{-3}$
U_B	Battery voltage	V
I	Current	A
	SUBSCRIPTS:	
m	Metering conditions of the gas	
b	Base conditions	
t	Transitional	
c	actual	
i	indicated	

4 WORKING RANGE

4.1 General

The values of maximum flow rates and the corresponding values of the upper limits of the minimum flow rates shall be one of those given in Table 2, when the meter is tested with air of density approximately 1,2 kg·m^{-3}.

4.2 Flowrate range

The declared values of the maximum flowrate and the corresponding minimum flowrate of rotary displacement gas meters are given in the Table 2.

In addition, decimal multiples and sub-multiples of the values given in the last five rows of Table 2 can be used.

Table 2

Q_{max} (m^3/h)	Flowrate range								
	1:10	1:20	1:30	1:50	1:65	1:100	1:160	1:200	1:250
	Q_{min} (m^3/h)								
16	1,6	0,8	0,5	0,3	0,25	0,16	0,10	0,08	0,065
25	2,5	1,3	0,8	0,5	0,4	0,25	0,16	0,13	0,10
40	4	2	1,3	0,8	0,65	0,4	0,25	0,2	0,16
65	6,5	3,2	2	1,3	1	0,65	0,4	0,3	0,25
100	10	5	3,2	2	1,6	1	0,65	0,5	0,4
160	16	8	5	3,2	2,5	1,6	1	0,8	0,65
250	25	13	8	5	4	2,5	1,6	1,3	1
400	40	20	13	8	6,5	4	2,5	2,0	1,6
650	65	32	20	13	10	6,5	4	3,2	2,5
1 000	100	50	32	20	16	10	6,5	5	4
1 600	160	80	50	32	25	16	10	8	6,5
2 500	250	130	80	50	40	25	16	13	10
4 000	400	200	130	80	65	40	25	20	16
6 500	650	320	200	130	100	65	40	32	25

4.3 Pressure range

The pressure range shall be from the atmospheric pressure to the maximum allowable working pressure stated by manufacturer and shall be marked on the meter.

4.4 Temperature range

All meters shall be capable of meeting the requirements for operational and gas temperature range, according to TC1/TC2 classes (see Table 3), as declared by the manufacturer.

Table 3

Temperature class	Operational temperature range °C	Storage temperature range °C
TC1	- 10 / + 40	- 20 / + 60
TC2	- 25 / + 55	- 25 / + 60

5 METROLOGICAL PERFORMANCE

5.1 Error of indication

5.1.1 Requirements

When tested in accordance with 5.1.2, the meter error of indication shall be within the limits specified in Table 4.

Table 4

Flow rate Q m³/h	Maximum permissible errors
$Q_{min} \leq Q < Q_t$	± 2 %
$Q_t \leq Q \leq Q_{max}$	± 1 %

Transitional flowrate values, Q_t, are given in Table 5:

Table 5

Flowrate range	Q_t
≤ 1: 20	0,20 Q_{max}
1: 30	0,15 Q_{max}
1: 50	0,10 Q_{max}
> 1: 50	0,05 Q_{max}

Each meter shall be adjusted so that the "weighted mean error" (*WME*) is as close to zero as the adjustment and the maximum permissible errors allow.

The *WME* shall have a value between -0,4 % and +0,4 %.

The *WME* is calculated as follows:

$$WME = \frac{\sum (Q_i / Q_{max}) \cdot E_i}{\sum (Q_i / Q_{max})}$$

Where:

Q_i / Q_{max} is a weighting factor;

E_i is the error of indication at the flow rate Q_i given as a percentage.

When $Q_i = Q_{max}$ a weighting factor of 0,4 instead of 1 shall be used.

5.1.2 Test

The test is carried out using air (density 1,2 kg·m^{-3}), or gas specified in the scope, at normal ambient conditions.

The meter is tested at the following flow rates (± 10 %):

a) type test:

1) for meters with flowrate range between 1:10 to 1:30:

Q_{min}; 0,05 Q_{max}; 0,1Q_{max} (when these values are larger than Q_{min}); 0,25 Q_{max}; 0,4 Q_{max}; 0,7Q_{max}; Q_{max}.

2) for meters with a flowrate range ≥ 1:50:

Q_{min}; 0,05 Q_{max}; 0,15 Q_{max}; 0,25 Q_{max}; 0,40 Q_{max}; 0,70 Q_{max}; Q_{max}.

b) individual factory testing for error of indication (every meter shall be tested):

Q_{min}; 0,25 Q_{max}; Q_{max}.