SLOVENSKI STANDARD
SIST EN 12405-1:2005+A2:2010

01-december-2010

Nadomešča:
SIST EN 12405-1:2005
SIST EN 12405-1:2005/A1:2007

Plinomeri - Korektorji - 1. del: Volumska korekcija (vključno z dopolnili do A2)

Gas meters - Conversion devices - Part 1: Volume conversion

Gaszähler - Umwerter - Teil 1: Volumenumwertung

Compteurs de gaz - Dispositifs de conversion - Partie 1: Conversion de volume

Ta slovenski standard je istoveten z: **EN 12405-1:2005+A2:2010**

ICS:

91.140.40 Sistemi za oskrbo s plinom Gas supply systems

SIST EN 12405-1:2005+A2:2010 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12405-1:2005+A2

October 2010

ICS 91.140.40

Supersedes EN 12405-1:2005

English Version

Gas meters - Conversion devices - Part 1: Volume conversion

Compteurs de gaz - Dispositifs de conversion - Partie 1: Conversion de volume

Gaszähler - Umwerter - Teil 1: Volumenumwertung

This European Standard was approved by CEN on 15 March 2005 and includes Amendment 1 approved by CEN on 6 July 2006 and Amendment 2 approved by CEN on 19 September 2010.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN 12405-1:2005+A2:2010: E

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Foreword

[A1] This document [A2] (EN 12405-1:2005+A2:2010) [A2] has been prepared by Technical Committee CEN/TC 237 “Gas meters”, the secretariat of which is held by BSI.

This [A2] *deleted text* [A2] European Standard [A2] *deleted text* [A2] shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by [A2] April 2011 [A2], and conflicting national standards shall be withdrawn at the latest by [A2] April 2011 [A2].

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 Measuring Instruments Directive (MID).

For relationship with EU Directive 2004/22, see informative Annex ZA, which is an integral part of this document. [A1]

This document includes Amendment 1, approved by CEN on 2006-07-06 and Amendment 2, approved by CEN on 2010-09-19.

This document supersedes [A2] EN 12405-1:2005 [A2].

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1] [A1] and [A2] [A2].

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.

Due to technical developments the layout of the document has been changed and EN 12405 will appear in parts:

— Part 1: Volume conversion (this European Standard),

— Part 2: Energy conversion (in preparation),

— Part 3: Data loggers.

Further parts are under consideration, following the technical progress.

In the preparation of this European Standard, the content of OIML Publication, “International Document 11”, “International Recommendations 6” and “International Recommendations 32” and the content of member bodies' national standards on gas-volume electronic conversion devices have been taken into account.

[A1] *deleted text* [A1]

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard specifies the requirements and tests for the construction, performance, safety and conformity of gas-volume electronic conversion devices associated to gas meters, used to measure volumes of fuel gases of the 1st and 2nd families according to EN 437.

This European Standard is intended for type testing, the detailed relevant provisions of which are given in Annex A.

Only three kinds of conversion are treated in this European Standard:

— conversion as a function of temperature only (called T conversion);

— conversion as a function of the pressure and of the temperature with constant compression factor (called PT conversion);

— conversion as a function of the pressure, the temperature and taking into account the compression factor (called PTZ conversion).

〚A1〛 This document is not relevant to temperature conversion integrated into gas meters which only indicate the converted volume. 〚A1〛

EN 12405-2 for energy conversion is in preparation.

Gas-volume conversion devices consist of a calculator and a temperature transducer or a calculator, a temperature transducer and a pressure transducer locally installed.

For application of this European Standard, a conversion device may be, as a choice of the manufacturer, considered as a complete instrument (Type 1) or made of separate elements (Type 2), according to the definitions given in 3.1.18.1 and 3.1.18.2.

In this last case, the provisions concerning pressure transducers, temperature sensors and temperature transducers are given in Annexes B, C and D respectively.

Any conversion device can provide an error curve correction for a gas meter.

NOTE When rendering an account to an end user the readings from the conversion device can be used in conjunction with the readings from a gas meter conforming to EN 1359, EN 12480, or EN 12261, as appropriate, or to any other appropriate and relevant international or national standard for gas meters, without prejudice of national regulations.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

EN 1776, *Gas supply systems — Natural gas measuring stations — Functional requirements*

〚A2〛 *deleted text* 〚A2〛

EN 55011, *Industrial, scientific and medical (ISM) radio-frequency equipment — Radio disturbance characteristics — Limits and methods of measurement (CISPR 11:1997, modified)*

EN 60068-2-1, *Environmental testing — Part 2: Tests — Tests A: Cold (IEC 60068-2-1:1990)*

EN 60068-2-2, *Basic environmental testing procedures — Part 2: Tests — Tests B: Dry heat (IEC 60068-2-2:1974 + IEC 60068-2-2A:1976)*

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 60068-2-31, *Basic environmental testing procedures — Part 2: Tests — Test Ec: Drop and topple, primarily for equipment-type specimens (IEC 60068-2-31:1969 + A1:1982)*

EN 60068-2-78, *Environmental testing — Part 2-78: Tests — Test Cab: Damp heat, steady state (IEC 60068-2-78:2001)*

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

EN 60079-1, *Electrical apparatus for potentially explosive atmospheres — Flameproof enclosures "d" (IEC 60079-1:2003)*

EN 60079-2, *Electrical apparatus for potentially explosive atmospheres — Part 2: Pressurized apparatus "p" (IEC 60079-2:2001)*

[A2] EN 60079-5, *Explosive atmospheres — Part 5: Equipment protection by powder filling "q" (IEC 60079-5:2007)*

EN 60079-6, *Explosive atmospheres — Part 6: Equipment protection by oil immersion "o" (IEC 60079-6:2007)* [A2]

EN 60079-7, *Electrical apparatus for potentially explosive atmospheres — Increased safety "e" (IEC 60079-7:2001)*

[A2] EN 60079-11, *Explosive atmospheres — Part 11: Equipment protection by intrinsic safety "i" (IEC 60079-11:2006)*

EN 60079-25, *Electrical apparatus for explosive gas atmospheres — Part 25: Intrinsically safe systems (IEC 60079-25:2003)* [A2]

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

[A1] EN 60730-1:2000, *Automatic electrical controls for household and similar use — Part 1: General requirements (IEC 60730-1:1999, modified)* [A1]

EN 60751, *Industrial platinum resistance thermometer sensors (IEC 60751:1983 + A1:1986)*

EN 60950-1, *Information technology equipment — Safety — Part 1: General requirements (IEC 60950-1:2001, 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 61000-4-3:2002)*

EN 61000-4-4, *Electromagnetic compatibility (EMC) — Part 4-4: Testing and measurement techniques — Electrical fast transient/burst immunity test (IEC 61000-4-4:2004)*

[A2] EN 61000-4-5, *Electromagnetic compatibility (EMC) — Part 4-5: Testing and measurement techniques — Surge immunity test (IEC 61000-4-5:2005)* [A2]

EN 61000-4-6, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 6: Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6:1996)*

[A2] EN 61000-4-8, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 8: Power frequency magnetic field immunity test (IEC 61000-4-8:1993 + A1 2001)* [A2]

EN 61000-4-11, *Electromagnetic compatibility (EMC) — Part 4-11: Testing and measurement techniques — Voltage dips, short interruptions and voltage variations immunity tests (IEC 61000-4-11:2004)*

[A2] EN 61000-4-29, *Electromagnetic Compatibility (EMC) — Part 4-29: Testing and measurement techniques — Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests (IEC 61000-4-29:2000)* [A2]

EN ISO 12213-2:2005, *Natural gas — Calculation of compression factor — Part 2: Calculation using molar-composition analysis (ISO 12213-2:1997)*

EN ISO 12213-3:2005, *Natural gas — Calculation of compression factor — Part 3: Calculation using physical properties (ISO 12213-3:1997)*

3 Terms, definitions and symbols

3.1 Terms and definitions

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

3.1.1
absolute static pressure
value of the static pressure of the gas relative to vacuum

[A1] **3.1.2**
base conditions
specified conditions to which the measured quantity of gas is converted [A1]

EXAMPLES Temperature of 273,15 K and absolute pressure of 1,013 25 bar[1] or temperature of 288,15 K and absolute pressure of 1,013 25 bar.

3.1.3
calculator
electronic device that receives the output signals from the associated gas meter and transducers and processes them

3.1.4
conversion factor
factor equal to the volume at base conditions divided by the corrected volume, or if there is no gas meter correction, equal to the volume at base conditions divided by the volume at measurement conditions

3.1.5
conventional true value (of a quantity)
value attributed to a particular quantity and accepted, sometimes by convention, as having an uncertainty appropriate for a given purpose

3.1.6
corrected volume
volume at measurement conditions corrected for the error curve of the gas meter

3.1.7
correction
value added algebraically to the uncorrected result of a measurement to correct the systematic error

3.1.8
correction factor
numerical factor by which the measured volume is multiplied to correct it to compensate the error curve of the gas meter

3.1.9
display
element or assembly of elements of the indicating device on which the results of measurement and memorized values are displayed

3.1.10
disturbance
influence quantity having a value within the limits specified but outside the specified rated operating conditions of the measuring instrument

NOTE An influence quantity is a disturbance if the rated operating conditions for that influence quantity are not specified.

3.1.11
durability
ability of an instrument to maintain its performance characteristics over a specified period of use

3.1.12
environmental class
class referring to the ambient temperature, humidity and power supply

3.1.13
error of conversion
difference between the conversion factor C displayed by a conversion device and the conventional true value of the conversation factor $C_{CV,}$ expressed as a percentage of the conventional true value of the conversion factor

3.1.14
error of indication
indication of a measuring instrument minus the (conventional) true value of the corresponding input quantity

3.1.15
error of the calculator unit
error of the indicated volume at base conditions V_b, when the gas volume, pressure and temperature are simulated by signals, in accordance to the manufacturer specification of interfaces

NOTE The calculator error includes all conversion errors with the exception of the pressure and temperature transducer errors (i.e. signal conditioning, Z factor calculation (if applicable), other mathematical calculations etc.).

3.1.16
error of the pressure transducer
difference between the measured output signals from the pressure transducer and the nominal signal at the applied physical value

3.1.17
error of the temperature transducer
difference between the measured output signals from the temperature transducer and the nominal signal at the applied physical value

3.1.18
gas-volume conversion device
device that computes, integrates and indicates the volume increments measured by a gas meter if it were operating at base conditions, using as inputs the volume at measurement conditions as measured by the gas meter, and other parameters such as gas temperature and gas pressure

NOTE 1 The conversion device can also compensate for the error curve of a gas meter and associated measuring transducers.