



SLOVENSKI STANDARD

SIST EN 16340:2014

01-september-2014

Zaznavala produktov zgorevanja za plinske gorilnike in plinske aparate

Combustion product sensing devices for gas burners and gas burning appliances

Sensoren zur Detektion von gasförmigen Verbrennungsprodukten in Gasbrennern und Gasgeräten

Dispositifs de détection des produits de combustion pour brûleurs à gaz et appareils à gaz

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Ta slovenski standard je istoveten z: **EN 16340:2014**

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ICS:

27.060.20 Plinski gorilniki Gas fuel burners

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EUROPEAN STANDARD

EN 16340

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2014

ICS 27.060.20

English Version

Safety and control devices for burners and appliances burning gaseous or liquid fuels - Combustion product sensing devices

Dispositifs de commande et de sécurité pour brûleurs et appareils utilisant des combustibles gazeux ou liquides - Dispositifs de détection des produits de combustion

Sicherheits- und Regeleinrichtungen für Brenner und Brennstoffgeräte für gasförmige oder flüssige Brennstoffe - Abgasfühler

This European Standard was approved by CEN on 14 May 2014.

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 CEN-CENELEC Management Centre or to any CEN member.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 16340:2014) has been prepared by Technical Committee CEN/TC 58 "Safety and control devices for burners and appliances burning gaseous or liquid fuels", 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of an identical text or by endorsement, at the latest by December 2014, and conflicting national standards shall be withdrawn at the latest by December 2014.

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 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 2009/142/EC.

For relationship with EU Directive 2009/142/EC, see informative Annex ZA, which is an integral part of this document.

This document is intended to be used in conjunction with EN 13611:2007+A2:2011. This document refers to clauses of EN 13611:2007+A2:2011 or adapts clauses by stating "with the following modification", "with the following addition", "is replaced by the following" or "is not applicable" in the corresponding clause. This European Standard adds clauses or subclauses to the structure of EN 13611:2007+A2:2011 which are particular to this standard. These clauses and subclauses are not indicated as an addition, i.e. subclauses or annexes which are additional to those in EN 13611:2007+A2:2011 are numbered starting from 101 or are designated as Annex AA, BB, CC, etc. When referring to EN 13611:2007+A2:2011 the word "control" is understood as "combustion product sensing device".

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.

EN 16340:2014 (E)**1 Scope**

This European Standard specifies the safety, construction and performance requirements for combustion product sensing devices intended to be used in combustion control systems, hereinafter referred to as CPSD.

This European Standard applies to sensing devices for the measurement of combustion products from burners and appliances for domestic, commercial and industrial use burning:

- gaseous fuels according to EN 437; or
- liquid fuels having a viscosity at the burner inlet of 1,6 mm²/s (cSt) up to 6 mm²/s (cSt) at 20 °C, higher boiling petroleum based first raffinates (viscosity greater than 6 mm²/s), that require preheating for proper atomisation.

This European Standard applies to all types of stationary sensing devices measuring flue gas components O₂, CO, CO₂, H₂, C_xH_y, NO_x, SO₂ or for a combination of them (multiple gasses).

This European Standard applies also to sensing devices for extractive systems.

This European Standard does not cover sensor requirements for combustible gas, combustible gas mixture and oil quality.

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 1856-1:2009, *Chimneys - Requirements for metal chimneys - Part 1: System chimney products*

<https://standards.iteh.ai/catalog/standards/sist/91dbac5f-175d-4709-b0e0->

EN 10088-1:2005, *Stainless steels - Part 1: List of stainless steels*

EN 13611:2007+A2:2011, *Safety and control devices for gas burners and gas burning appliances - General requirements*

EN 14241-1, *Chimneys - Elastomeric seals and elastomeric sealants - Material requirements and test methods - Part 1: Seals in flue liners*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13611:2007+A2:2011 and the following apply.

3.101**Combustion Product Sensing Device (CPSD)**

Combustion Product Sensing Element (CPSE) combined with control unit and a signal conditioner

Note 1 to entry: The combustion product sensing element is hereafter referred to as CPSE.

Note 2 to entry: The CPSE control unit and/or the signal conditioner can be integrated in the combustion control system (see Figure 1).

Note 3 to entry: Additional components (e.g. heater, flame arrester) used or necessary for operation are considered as parts of the CPSD.

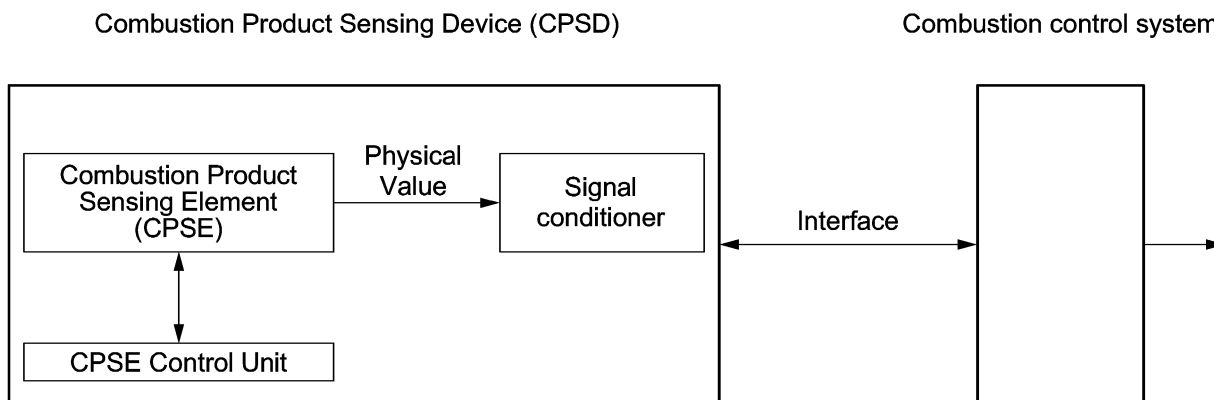


Figure 1 — CPSD coupled with combustion control system

3.102

Combustion Product Sensing Element (CPSE)

part of the CPSD, which transforms the concentration of the sensed combustion product into a physical value (e.g. voltage, current, resistance)

3.103

CPSE control unit

unit that provides additional functions in order to operate the sensing element

Note 1 to entry: Example of additional function is the control of the heating element.

3.104

signal conditioner

electronic circuit that transforms the physical value from the sensing element into an output signal

Note 1 to entry: The signal conditioner may consist of functional electronics as well as electronics which cause the CPSD to be classified as Class B or C according to EN 13611:2007+A2:2011.

3.105

measuring range

declared range between two values that can be measured by the CPSD with the accuracy stated in the installation and operating instructions

3.106

offset

positive or negative deviation of the zero point value

3.107

accuracy

ability of the CPSD to provide an indicated value close to the true value

3.108

linearity

highest value of the deviation between the CPSD output characteristic from the ideal curve

3.109

drift

difference between the value indicated/measured value by the CPSD before and after the endurance test

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3.110

temperature range (flue gas)

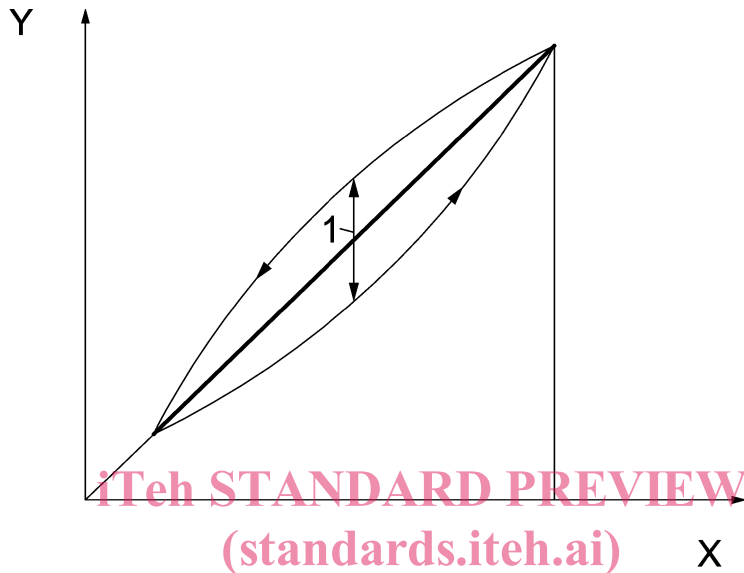
temperature range of the medium to be measured

3.111

hysteresis

the highest value of the difference between the ascending and the descending CPSD output characteristic

Note 1 to entry: For illustration refer to Figure 2.

**Key**

1 hysteresis

X combustion product concentration

Y CPSD output signal

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Figure 2 — Clarification of definitions for CPSD

3.112

repeatability

ability of the CPSD to provide similar output signals whilst measuring the same concentration of combustion product under the same test condition

3.113

flue gas pressure

differential pressure from flue gas side to reference (ambient) side

3.114

flue gas velocity

speed of the combustion product flow at the location of measurement of the CPSD (m/s)

3.115

warm up time

time from power on until specified operation

3.116

stand by mode

non-operational mode in which the CPSD is able to come in operation after a start up time

3.117**start up time**

time from stand by mode until specified operation

3.118**response time****T_x**

time interval from the start of the gas concentration step shaped change until the output signal of the CPSD has reached x % of the final value

3.119**useful lifetime**

time span where the CPSD fulfils the specifications as stated in the installation and operating instructions

3.120**combustibles**

gaseous, liquid, and solid fuels

Note 1 to entry: Combustibles can be oil, gas, bio-fuel, etc.

3.121**cross sensitivity**

influence on the measured value by any predictable flue gas component

Note 1 to entry: Flue gas components can be O₂, CO₂, H₂O, SO₂, NO_x, CO, H₂, C_xH_y, etc.

3.122**maximum concentration**

highest concentration at which the CPSD may be operated

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3.123**withstand concentration**

concentration that is withstood without a degraded characteristic after returning below the maximum concentration

3.124**poisoning**

damage to the CPSE by certain substances, reducing the useful lifetime of the CPSD

3.125**inoperative state**

state of the output signal that indicates the inoperative condition of the CPSD

4 Classification**4.1 Classes of control**

EN 13611:2007+A2:2011, 4.1 is not applicable.

4.2 Groups of control

EN 13611:2007+A2:2011, 4.2. is not applicable.

4.3 Classes of control functions

Shall be according to EN 13611:2007+A2:2011, 4.3.

EN 16340:2014 (E)**5 Units of measurement and test conditions****5.1 Dimensions**

Shall be according to EN 13611:2007+A2:2011, 5.1.

5.2 Pressures

Shall be according to EN 13611:2007+A2:2011, 5.2.

5.3 Bending moments and torques

Shall be according to EN 13611:2007+A2:2011, 5.3.

5.4 Test conditions and measurement tolerances

Shall be according to EN 13611:2007+A2:2011, 5.4 with the following additions and modification:

Modification:

The paragraphs 1, 2, 3 and 4 of EN 13611:2007+A2:2011, 5.4 are not applicable.

Addition:

The measurement uncertainty of the test equipment used for the test in Clause 6 and 7 shall not exceed the values given in 5.4 of EN 13611:2007+A2:2011 and Table 1.

Table 1 — Measurement uncertainties

Type of Measurement	Uncertainties
Temperature above 50 °C	± 2 % of absolute measurement value in °C
Test gas concentration	1/3 of the accuracy as declared for the CPSD under test.
Flow rate/velocity	± 10 %
Differential pressure	± 10 %

6 Construction requirements**6.1 General**

Shall be according to EN 13611:2007+A2:2011, 6.1 with the following addition:

All parts of a CPSD in contact with flue gas shall withstand the chemical stresses to which it is subjected under normal conditions.

6.2 Mechanical parts of the control**6.2.1 Appearance**

Shall be according to EN 13611:2007+A2:2011, 6.2.1.

6.2.2 Holes

EN 13611:2007+A2:2011, 6.2.2 is not applicable.

6.2.3 Breather holes

EN 13611:2007+A2:2011, 6.2.3 is not applicable.

6.2.4 Test for leakage of breather holes

EN 13611:2007+A2:2011, 6.2.4 is not applicable.

6.2.5 Screwed fastenings

EN 13611:2007+A2:2011, 6.2.5 is not applicable.

6.2.6 Jointing

EN 13611:2007+A2:2011, 6.2.6 is not applicable.

6.2.7 Moving parts

EN 13611:2007+A2:2011, 6.2.7 is not applicable.

6.2.8 Sealing caps

Shall be according to EN 13611:2007+A2:2011, 6.2.8.

6.2.9 Dismantling and reassembly

Shall be according to EN 13611:2007+A2:2011, 6.2.9 with the following modification and addition:

Modification:

The 2nd and 3rd paragraphs of EN 13611:2007+A2:2011, 6.2.9 are not applicable.

Addition:

If closure parts, including those of measuring and test points, may be dismantled for service or adjustment then sufficient details shall be provided in the installation and operating instructions on the materials to be used and procedures to be applied.

6.2.101 Protection against blockage of inlets

Inlets for reference gas and combustion product gas shall be protected against blockage or they shall be located such that they do not easily become blocked.

6.3 Materials**6.3.1 General material requirements**

Shall be according to EN 13611:2007+A2:2011, 6.3.1.

6.3.2 Housing

EN 13611:2007+A2:2011, 6.3.2 is not applicable.

6.3.3 Test for leakage of housing after removal of non-metallic parts

EN 13611:2007+A2:2011, 6.3.3 is not applicable.

EN 16340:2014 (E)**6.3.4 Zinc alloys**

EN 13611:2007+A2:2011, 6.3.4 is not applicable.

6.3.5 Springs providing closing and/or sealing force

EN 13611:2007+A2:2011, 6.3.5 is not applicable.

6.3.6 Resistance to corrosion and surface protection

EN 13611:2007+A2:2011, 6.3.6 is not applicable.

6.3.7 Impregnation

EN 13611:2007+A2:2011, 6.3.7 is not applicable.

6.3.8 Seals for glands for moving parts

EN 13611:2007+A2:2011, 6.3.8 is not applicable.

6.3.101 Mounting and fixing elements

Mounting and fixing elements of the CPSD shall not affect the accuracy of the CPSD itself.

6.3.102 Prevention from igniting**6.3.102.1 Requirement**

If the sensing element uses a heating element for operation and if the sensing element or the heating element is placed in the sensed medium, possible ignition of combustibles shall be prevented by:

- the use of flame arresters; or
- having a Class B CPSE control unit, preventing the heating element from reaching a temperature above the ignition temperature of the foreseeable combustibles under fault condition of the CPSE control unit; or
- using a heating element which cannot exceed the lowest possible ignition temperature of the foreseeable combustibles, e.g. by using a thermal fuse not igniting the combustibles.

The design documentation should specify how this requirement is achieved.

If a Class B CPSE control unit is used this shall be assessed by the requirements of 6.6.3.

If a flame arrester is implemented it shall be designed in a way that prevents mechanical impact (e.g. widening of meshes) rendering it ineffective.

The installation and operating instruction shall state the combustibles for which the used flame arrester of the CPSD is suitable. Testing of CPSD incorporating a flame arrester shall be according to 6.3.102.2.

6.3.102.2 Testing of CPSD with flame arrester

The CPSD shall be installed into a test chamber (see Figure 3) with the following constraints:

- The volume of the test chamber shall be 200 times larger than the volume of the CPSD part containing the hot ignition source (CPSE, heating, etc.) including the gas volume of the flame arrester but at least 1 000 cm³.

- All distances between CPSD housing and chamber walls (except the mounting wall) shall be at least 50 mm to avoid wall effects.
- The flow in the test chamber shall be such that the gas exchange in the flame arrester is guaranteed without cooling down the CPSE.

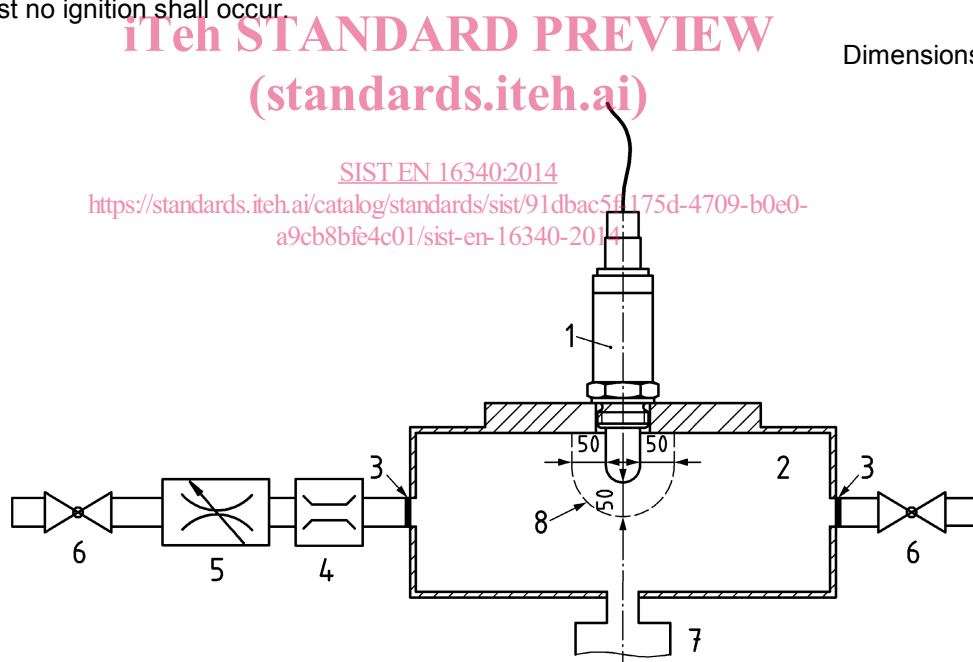
To reduce test gas consumption an explosion proof fan may be installed inside the test chamber. In that case a minimum distance of 50 mm between fan and CPSD shall be maintained.

- The test gas mixture shall consist of 5 % (V/V) propane and 95 % (V/V) air.
- The absolute air pressure inside the test chamber shall be $101 \text{ kPa} \pm 10 \%$.
- The gas temperature inside the test chamber shall be at least $20 \text{ }^\circ\text{C}$.

The installation shall be done as stated in the installation and operating instructions paying particular attention to immersion depth and angle to horizontal.

The test gas mixture shall flow continuously through or within the test chamber and the CPSE shall be operated in a way that causes the highest specified temperature of the CPSE (the 5/95 % propane/air mixture is the condition with the highest probability of ignition, so no additional requirements are needed). After temperature stabilisation, the test shall be performed for a minimum period of $5 \times T_{60}$ or 1 min, whichever is the longer.

During the test no ignition shall occur.



Key

- | | |
|---|------------------------------------|
| 1 | CPSD under test |
| 2 | Test chamber |
| 3 | flame arrester of the test chamber |
| 4 | flow metre |
| 5 | throttle |
| 6 | valve |
| 7 | burst foil |
| 8 | free space surrounding the CPSD |

Figure 3 — Ignition test fixture