
**Specifikacija za prenosne električne naprave za merjenje parametrov dimnih
plinov grelnih naprav - 1. del: Splošne zahteve in preskusne metode**

Specification for portable electrical apparatus designed to measure combustion flue gas
parameters of heating appliances - Part 1: General requirements and test methods

Anforderungen an tragbare elektrische Geräte zur Messung von
Verbrennungsparametern von Heizungsanlagen - Teil 1: Allgemeine Anforderungen und
Prüfverfahren

Spécification pour les appareils électriques portatifs conçus pour mesurer les paramètres
des gaz de combustion dans les conduits d'évacuation des appareils de chauffage -
Partie 1: Prescriptions générales et méthodes d'essai

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This document (EN 50379-1:2012) has been prepared by CLC/TC 216 "Gas detectors".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2013-03-19
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2015-03-19

This document supersedes EN 50379-1:2004.

EN 50379-1:2012 includes the following significant technical changes with respect to EN 50379-1:2004:

- 4.2.12 and 5.7.4 consider 15 min. average concentration for solid fuels;
- 4.3.3 for instructions was amended;
- 5.3.6 for flow indicators was amended;
- 5.5.7 considers calibration curves for sensors with nonlinear signal;
- 5.5.8 considers influence of pressure variations;
- 5.5.9 considers the influence of water vapour on the gas signal;
- 5.7.2 for calculated values was amended;
- 5.9.1 was amended to cover measurement at the circular orifice.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Introduction

This European Standard covers apparatus for measuring gas concentrations and other combustion parameters, as used in the installation and maintenance of heating appliances. It forms a specification for portable electrical apparatus designed to measure combustion flue gas parameters of heating appliances, and includes the following parts under the generic title *Specification for portable electrical apparatus designed to measure combustion flue gas parameters of heating appliances*:

Part 1: General requirements and test methods;

Part 2: Performance requirements for apparatus used in statutory inspections and assessments;

Part 3: Performance requirements for apparatus used in non-statutory servicing of gas fired heating appliances.

EN 50379-1 specifies general requirements for the construction, testing and performance of portable spot reading apparatus designed to give an assessment of specific combustion flue gas parameters, such as concentrations of gaseous compounds, temperature and/or pressure, to check the combustion performance of heating appliances for domestic residential and commercial applications, using commercially available fuels.

EN 50379-2 is for apparatus intended to be used for statutory measurement. In several European countries, legal requirements exist for the performance of heating appliances (see Annex A). Authorised inspectors use these apparatus to measure the flue gas parameters, in order to test compliance with national regulations. Due to the legal consequences resulting from the measurement, there are strict requirements regarding the measuring uncertainty of these apparatus, and EN 50379-2 therefore includes maximum values for measuring uncertainty. Tests with real flue gases form a key part of the verification of the performance of the apparatus for statutory measurement. The measuring uncertainty has to be justified by internationally accepted methods over the whole measuring range. The determination of measuring uncertainty is described in Annex C.

EN 50379-3 is for apparatus intended to be used for non-statutory applications. There are reduced performance requirements, because the apparatus are designed to decide whether maintenance for a gas fired appliance is required, and for adjusting the appliance during maintenance. There will be no determination of the measuring uncertainty for the apparatus.

1 Scope

This European Standard covers apparatus for measuring gas concentrations and other combustion parameters, as used in the installation and maintenance of heating appliances. Such apparatus may be used for testing the performance of appliances for different types of fuels, either by the installer, maintenance engineer or inspector.

The apparatus may consist of different functional modules, which may be tested separately for complying with this standard and will be combined in different ways according to the different applications. This part of EN 50379 specifies the general requirements and is supplemented by the requirements in EN 50379-2 and/or EN 50379-3.

This European Standard specifies general requirements for the construction, testing and performance of portable spot reading apparatus designed to give an assessment of specific combustion flue gas parameters, such as concentration of gaseous compounds, temperature and/or pressure, to check the combustion performance of heating appliances for domestic residential and commercial applications, using commercially available fuels.

This European Standard excludes apparatus for

- continuous emission, safety monitoring and control, and
- use in vessels with an international load line.

NOTE 1 When this apparatus is used in industrial premises national regulations may apply.

NOTE 2 Apparatus may contain functional modules which are not covered by this standard e.g. measurement of smoke spot number (see EN 267:2009+A1:2011, Annex A) and/or measurement of indoor ambient air (see EN 50543).

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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 267:2009+A1:2011, *Automatic forced draught burners for liquid fuels*

EN 297, *Gas-fired central heating boilers – Type B11 and B11BS boilers, fitted with atmospheric burners of nominal heat input not exceeding 70 kW*

EN 676, *Automatic forced draught burners for gaseous fuels*

EN 50270:2006, *Electromagnetic compatibility – Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen*

EN 50271:2010, *Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen – Requirements and tests for apparatus using software and/or digital technologies*

EN 50379-2:2012, *Specification for portable electrical apparatus designed to measure combustion flue gas parameters of heating appliances – Part 2: Performance requirements for apparatus used in statutory inspections and assessment*

EN 50379-3:2012, *Specification for portable electrical apparatus designed to measure combustion flue gas parameters of heating appliances – Part 3: Performance requirements for apparatus used in non-statutory servicing of gas fired heating appliances*

EN 50543, *Electronic portable and transportable apparatus designed to detect and measure carbon dioxide and/or carbon monoxide in indoor ambient air – Requirements and test methods*

EN 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal) (IEC 60068-2-6)*

EN 60335-1:2002, *Household and similar electrical appliances – Safety – Part 1: General requirements (IEC 60335-1:2001, mod.)*

EN 60359:2002, *Electrical and electronic measurement equipment – Expression of performance (IEC 60359:2001)*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

CR 1404:1994, *Determination of emissions from appliances burning gaseous fuels during type-testing*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement – Guide to the expression of uncertainty in measurement (GUM:1995)*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 60359:2002, 2.1 and the following apply.

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3.1

domestic residential and commercial premises

any place of residence of a household, family or person (whether temporary or permanent) and commercial premises whether residential or not and including recreational boats, caravans and mobile homes

3.2

ambient air

normal atmosphere surrounding the apparatus

3.3

clean air

ambient air which is essentially free of flue gas and of interfering or contaminating substances

3.4

synthetic air

technically produced air consisting of oxygen and nitrogen

3.5

sensor

assembly in which the sensing element is housed and which may contain associated circuit components

3.6

sensing element

device, the output of which will change with variation of the parameter of interest

3.7**spot reading**

apparatus intended to be used for short periods of time in the range of minutes, as required

3.8**volume ratio (V/V)**

ratio of the volume of a component to the volume of the gas mixture under specified conditions of temperature, pressure and relative humidity

3.9**mains powered apparatus**

apparatus designed to be powered by the domestic mains electrical supply with or without an additional power source

3.10**battery powered apparatus**

apparatus designed to be energised from batteries alone, whether disposable or rechargeable

3.11**probe**

part of the apparatus that is placed in the stack or flue of the heating appliance, for the purpose of sampling the gas and/or for measuring temperature or pressure

3.12**initial start up delay**

time taken for the apparatus to reach the operating mode from switch-on, or after replacing batteries, or following power failure in the case of mains powered equipment

3.13**calibration**

process of determining the deviation of an apparatus relative to a reference

3.14**reference**

in laboratory tests, a reference gas will be a certified calibration gas cylinder. For real gas measurement, the reference is a measuring device with high accuracy (e.g. as specified in EN 267). For temperature and pressure measurement, the reference is a measuring device with certification proving traceability to a national or international metrology institute

3.15**adjustment**

process of tuning the apparatus, in order to return the deviation found in calibration to within the admissible error

3.16**functional module**

all components required for one measurement task, including both hardware and software

Note 1 to entry: A functional module may consist of one or more separate pieces of equipment or may be completely integrated with the apparatus.

3.17**response time (t_{90})**

time interval with the apparatus in a warmed-up condition, between the time when an instantaneous variation of the parameter to be measured is produced at the apparatus inlet, and the time when the response reaches and remains beyond 90 % of the final indication

4 General requirements

4.1 General

The apparatus shall reliably measure specific combustion flue gas parameters and shall clearly display the result. If the apparatus is equipped with a sampling system (probe) the gas sample shall be drawn into the unit for analysis via the sampling system for all tests. All parts of the apparatus shall conform to the construction requirements of 4.2 and the performance requirements in EN 50379-2 and/or EN 50379-3.

4.2 Construction

4.2.1 General

All parts of the apparatus, including the sensor(s), shall be constructed of materials that will not be adversely affected by vapours and gases or chemical substances to be expected during normal operation of the apparatus, see 4.3.3 h). Similar consideration shall also be given to the sampling system and components that can be in contact with the gas, as appropriate. The probe shall be constructed of materials that will not be adversely affected by environmental conditions found in heating appliances within the scope of this standard.

4.2.2 Sampling system

The sampling system of the apparatus shall be so constructed as to prevent damage to the sensor(s) and pump by particulate matter and liquids that may be expected during normal operation of the apparatus. Means shall be provided to recognise and/or indicate the working mode of the pump by, for example

- pump noise,
- visual indication, or
- flow measurement.

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Condensation or absorption effects have to be considered, and shall have no significant influence on the indicated values, particularly when determining SO₂ and NO. The probe shall be constructed in such a manner that droplets of condensation will not influence the result of temperature measurements even when the probe is held vertically. In addition the temperature sensing element shall not touch the probe outer sheath. If simultaneous recording of temperature and gaseous compounds is required, the probe shall be constructed such that the distance between the sensing element for temperature and the gas inlet, is less than 8 mm. If probes of different lengths are provided the shortest and the longest shall be tested with the instrument.

NOTE For apparatus intended to measure heating combustion efficiency (see Annex A) reference should be made to national regulations where appropriate. Typically the following dimensions have been shown to be suitable:

- sampling probe immersion depth of at least 150 mm;
- probe external diameter between 6 mm and 13 mm (required for the measurement of heat loss only); and
- adjustable depth stop to be provided, to fix probe position and cover measuring aperture up to 21 mm diameter, to prevent air ingress.

The method of testing tightness of the complete gas sampling system, as specified by the manufacturer, shall be checked and verified for use in practice.

4.2.3 Adjustments

Access to sensitivity controls shall only be possible by the use of special tool or a software passcode or by destroying a special seal. Any regular checks shall be performed automatically or by access as described above.

4.2.4 Power supply

Apparatus which derives its power from internal batteries may give a visual warning before the battery capacity falls to a point where either the apparatus sensitivity or the stated display accuracy falls outside the requirements. When this point is actually reached, a clear indication shall be given to alert the user and the display shall switch out of normal operational mode.

4.2.5 Display

Indicators shall be provided to show the following:

- measured parameter(s), value(s) and physical unit;
- low battery warning;
- mode of operation or instrument status (e.g. warm-up, measurement);
- when values lie outside the indicating range; and
- software version.

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All values shall be indicated on a display with characters not less than 8 mm high unless adequate provision is made for enhancing the legibility (e.g. backlighting) in which case the minimum character height shall be 4 mm.

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For each separate parameter measured the apparatus shall display the value, the physical unit and parameter description. For a combination of parameters the display may switch automatically from one indication to another. If the display switches between information of simultaneous parameters it shall be clear and understandable. Displayed measured values shall be refreshed at intervals no greater than 3 s. If the apparatus is equipped with seven-segment displays it shall have a device or self testing function for checking the displays.

4.2.6 Measuring range and resolution

Table 1 lists the different parameters covered by this standard. For each parameter given it specifies

- minimum indication range;
- minimum display resolution;
- accuracy of the apparatus;
- the detection limit; and
- maximum response time.

4.2.7 Indication range

The indication ranges are the minimum ranges for the apparatus. Higher ranges are allowed, but will not change the values for accuracy or detection limit.