BS EN 50379-2:2012

BSI Standards Publication

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

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 50379-2:2012. It supersedes BS EN 50379-2:2004 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EXL/31/1, Gas detectors.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 74637 6

ICS 13.040.40; 91.140.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 April 2012.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50379-2

April 2012

ICS 13.320

Supersedes EN 50379-2:2004

English version

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

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 2: Prescriptions des caractéristiques des appareils utilisés au cours des inspections et évaluations réglementaires

Anforderungen an tragbare elektrische Geräte zur Messung von Verbrennungsparametern von Heizungsanlagen - Teil 2: Anforderungen an das Betriebsverhalten von Geräten für den Einsatz bei gesetzlich geregelten Messungen und Beurteilungen

This European Standard was approved by CENELEC on 2012-03-19. CENELEC 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 CENELEC 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 CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Contents

Foreword

This document (EN 50379-2:2012) has been prepared by CENELEC 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 50379-2:2004.

EN 50379-2:2012 includes the following significant technical changes with respect to EN 50379-2:2004:

— 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;

— 5.7.4 considers 15 min. average concentration for solid fuels;

— 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 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.

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. 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. Therefore EN 50379-2 includes maximum values for measuring uncertainty of the apparatus. 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.

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 if 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 designed to measure flue gas parameters of heating appliances for domestic residential and commercial applications using commercially available fuels in compliance with metrological specification.

The apparatus may consist of different functional modules that may be tested separately for complying with this standard and will be combined in different ways according to the different applications. Part 1 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 the performance requirements of portable spot reading apparatus designed to give a measurement of specific combustion flue gas parameters such as concentration of gaseous compounds, temperature and/or pressure to be used for testing the compliance with national regulations for the above mentioned appliances.

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 should be observed.

NOTE 2 Apparatus may contain functional modules that 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).

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 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 50379-1:2012, *Specification for portable electrical apparatus designed to measure combustion flue gas parameters of heating appliances – Part 1: General requirements and test methods*

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 50379-1:2012 apply.

4 General requirements

Unless otherwise stated, the general requirements of EN 50379-1:2012 are applicable and shall be checked by visual inspection.

5 Test methods and performance requirements

5.1 General requirements for tests

5.1.1 General

The requirements specified in EN 50379-1:2012, 5.1.1 are applicable.

5.1.2 Samples and sequence of tests

For the purposes of type testing, for each sample the first test to be carried out shall be the initial performance test (5.5.3). One sample of the apparatus shall be subjected to the relevant tests given in 5.3 and 5.4. The mechanical tests of 5.3 shall be carried out before the tests of 5.4 to 5.9. After finishing the mechanical tests of 5.3 the initial performance test shall (5.5.3) be repeated at room temperature.

NOTE Due to the use of different calibration gases at pre-calibration by the manufacturer and type testing according to this standard the instruments may show a discrepancy. In this case, it is permissible to make minor adjustments to the apparatus during the initial performance test (5.5.3).

The EMC testing according to 5.4.1 may be carried out independently from all other tests of the standard.

A further sample, or the same if desired, may be used for the tests in 5.5, 5.7, 5.8 and 5.9. Two samples shall be used for the tests in 5.6, of which one may be the sample used for the earlier tests.

At least two specimens are required for 5.6, to determine the standard deviation in performance between samples, in order to specify the measurement uncertainty and the reproducibility of the apparatus compared to reference analytical equipment, in accordance with EN 60359 and the international standard for mathematical procedures ISO/IEC Guide 98-3 (GUM).

The tests within 5.3, 5.4 and 5.5 may be performed in any sequence, but 5.6 to 5.9 shall be performed in the sequence listed in this standard, where relevant. For calculating the uncertainty in measurement during type testing, it may be necessary to obtain readings of measured values at a higher resolution than that displayed by the apparatus. If necessary, the manufacturer shall provide the means of obtaining such signals by modification of the apparatus used for type testing.

5.1.3 Preparation of samples

The requirements specified in EN 50379-1:2012, 5.1.3 are applicable.

5.1.4 Test facility

The requirements specified in EN 50379-1:2012, 5.1.4 are applicable.

5.2 Normal conditions for tests

The requirements specified in EN 50379-1:2012, 5.2 are applicable.

5.3 Mechanical tests

5.3.1 General

The requirements specified in EN 50379-1:2012, 5.3.1 are applicable.

5.3.2 Degree of protection

The enclosure of the apparatus shall provide at least an IP40 degree of protection when all probes etc. are connected, in accordance with EN 60529:1991, Clauses 12 and 14. If an apparatus is designed for outdoor use it shall provide at least an IP42 degree of protection when connected similarly.

5.3.3 Impact strength

The apparatus shall meet the requirements specified in EN 60335-1:2002, Clause 21, as modified by EN 50379-1:2012, 5.3.3. The function of the apparatus shall not be affected after the test. Visible damage to parts of the housing are acceptable, providing the functionality remains unimpaired.

5.3.4 Vibration

The function of the apparatus shall not be affected after the test. Visible damage to parts of the housing are acceptable, providing the functionality remains unimpaired.

5.3.5 Drop

The function of the apparatus shall not be affected after the test. Visible damage to parts of the housing are acceptable, providing the functionality remains unimpaired.

5.3.6 Flow indicator (if fitted)

If an apparatus is fitted with an integral flow proving device, after the simulation of the blockage function of the integral flow indicator shall be checked by visual inspection.

5.3.7 Dust filter and water trap

After measuring times of 1 h the dust filter shall still be usable, as specified in the manufacturer's instruction manual, and the maximum level of the condensate separator shall not be reached.

The flow of the apparatus shall continuously be above the minimum flow, specified by the manufacturer, within the 1 h testing period.

5.4 Electrical and software tests

5.4.1 Electromagnetic Compatibility (EMC)

The apparatus, including the probe and any interconnecting wiring and tubing, shall meet the requirements for electromagnetic compatibility in accordance with EN 50270 for Type 1 (domestic) and shall meet the requirements of EN 50270:2006, Table 5.

5.4.2 Supply voltage variations (not applicable to battery powered apparatus)

The apparatus shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.4.3 Battery fault condition (applicable only to battery powered apparatus)

The apparatus shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.4.4 Battery reversal (applicable only to battery powered apparatus)

The apparatus shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.4.5 Software and digital techniques

The requirements specified in EN 50379-1:2012, 5.4.5 are applicable.

5.5 Tests with test gases

5.5.1 General

The requirements specified in EN 50379-1:2012, 5.5.1 are applicable.

5.5.2 Unpowered storage

The apparatus shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.5.3 Initial performance test

The apparatus shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.5.4 Response time

The apparatus shall meet the requirements for response time listed in EN 50379-1:2012, Table 1 for each relevant test gas.

5.5.5 Cold start

The apparatus shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1 for each relevant test gas.

5.5.6 Zero reading

The display reading for each gas (except CO_2 calculation from O_2 measurement or O_2 calculation from CO_2 measurement) shall be below the detection limit listed in EN 50379-1:2012, Table 1.

5.5.7 Calibration curve for sensors with non-linear signal

The apparatus shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1 for each relevant test gas at each test point.

5.5.8 Pressure variation

The apparatus shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1 for each relevant test gas.

5.5.9 Influence of water vapour

The maximum deviation for the relevant gas mixture shall be within the detection limits listed in in EN 50379-1:2012, Table 1 for each relevant indication range.

5.6 Tests with real flue gases

5.6.1 General

The requirements specified in EN 50379-1:2012, 5.6.1 are applicable.

5.6.2 Measurement uncertainty

The apparatus shall meet the requirements for uncertainty over the entire indication range.

5.6.3 Low temperature (applicable only to apparatus designed for outdoor use)

The apparatus shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1 for each gas the apparatus is intended to measure.

5.6.4 Stability under practical conditions

On completion, the apparatus shall comply with 5.6.5 and 5.6.6.

For apparatus intended to be used in appliances burning gaseous and liquid fuels, the heating appliance chosen to generate the flue gas shall be an atomizing oil burner of monobloc type (for extra light fuel oil) for 1 000 cycles and a gas burner for 1 000 cycles.

5.6.5 Test of filter capacity

The display indication(s) for CO shall be within the detection limit(s) listed in EN 50379-1:2012, Table 1.

5.6.6 Final test with cylinder gases

The apparatus shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.6.7 Sensor replacement (where applicable)

The apparatus shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.7 Calculated values

5.7.1 General

The requirements specified in EN 50379-1:2012, 5.7.1 are applicable.

5.7.2 Calculation of CO_2 gas volume ratio from O_2 measurement or vice versa

The calculation method shall be checked in accordance with EN 50271. The apparatus shall display the calculated O_2 or CO_2 value within the accuracies listed in EN 50379-1:2012, Table 1.

5.7.3 CO/CO_2 ratio

When provided with a facility for displaying the CO/CO_2 ratio, the calculation method shall be checked in accordance with EN 50271, and the results shall be within the accuracies listed in EN 50379-1:2012, Table 1.

5.7.4 O_2 and CO on heating installations burning solid fuels

The indication after 15 min averaging shall be the nominal value ± 10 %.

5.8 Temperature

5.8.1 Temperature measurement (flue gas)

In each case, the displayed reading at the end of the exposure period shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.8.2 Flue gas temperature response time

Response time shall be as listed in EN 50379-1:2012, Table 1.

5.8.3 Temperature measurement (inlet air)

In each case, the displayed reading at the end of the exposure period shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.8.4 Inlet air temperature response time

Response time shall be as listed in EN 50379-1:2012, Table 1.

5.8.5 Cold start

The displayed reading at the end of the exposure period shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.8.6 Thermocouple compensation

The displayed reading shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.8.7 High temperature

Where applicable, either

a) in each case, the displayed reading at the end of the exposure period shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1, or

b) operation of the separate permanent over-range indicator shall be checked and verified.

5.9 Pressure

5.9.1 Pressure measurement (draught or circular orifice measurement)

In each case, the displayed reading at the end of the exposure period shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

5.9.2 Pressure measurement (differential)

In each case, the displayed reading at the end of the exposure period shall meet the requirements for accuracy listed in EN 50379-1:2012, Table 1.

Bibliography

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

EN 676:2003, *Automatic forced draught burners for gaseous fuels*

EN 50543:2011, *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 60359:2002, *Electrical and electronic measurement equipment – Expression of performance (IEC 60359:2001)*

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

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™