BRITISH STANDARD

BS EN
50055:1999

# Electrical apparatus for the detection and measurement of combustible gases — Performance requirements for Group I apparatus indicating up to 5 % (*V/V*) methane in air

The European Standard EN 50055:1998 has the status of a British Standard

ICS 13.320

# National foreword

This British Standard is the English language version of EN 50055:1998. It supersedes BS EN 50055:1991 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee GEL/31, Electrical apparatus for explosive atmospheres, to Subcommittee GEL/31/19, Gas detectors, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

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**Summary of pages**

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 5 and a back cover.

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EUROPEAN STANDARD

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# EN 50055

July 1998

ICS 13.220.60; 19.080

Descriptors: Electrical apparatus, explosive atmosphere, mine susceptible to firedamp, detector, measuring apparatus, flammable gas, combustible gas, characteristic

English version

# Electrical apparatus for the detection and measurement of combustible gases — Performance requirements for Group I apparatus indicating up to 5 % (*V/V*) methane in air

Appareils électriques de détection et de mesure des gaz combustibles — Régles de performances des appareils du Groupe I pouvant indiquer jusqu'à 5 % (*V/V*) de méthane dans l'air

Elektrische Geräte für das Aufspüren und die Messung brennbarer Gase — Anforderungen an das Betriebsverhalten von Geräten der Gruppe I mit einem Meßbereich bis zu 5 % (*V/V*) Methan in Luft

This European Standard was approved by CENELEC on 12 September 1996.



**CENELEC**

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

**Central Secretariat: rue de Stassart 35, B-1050 Brussels**



Ref. No. EN 50055:1998 E

## Foreword

This second edition of the European Standard was prepared by SC 31-9, Electrical apparatus for the detection and measurement of combustible gases to be used in industrial and commercial potentially explosive atmospheres, of Technical Committee CENELEC TC 31, Electrical apparatus for explosive atmosphere, on the basis of EN 50055:1991, its amendment A1:1995 and a second amendment.

This second amendment was approved by CENELEC on 1996-12-09 for incorporation into a new edition of EN 50055.

This European Standard replaces EN 50055:1991 +A1:1995.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1999-01-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1999-01-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and covers essential requirements of EC Directive 94/9/EC.

## Contents

## 1 Scope

**1.1** This European Standard specifies performance requirements for Group I (as defined in European Standard EN 50054) portable, transportable and fixed apparatus for the detection and measurement of methane concentrations in mine air. The apparatus, or parts thereof, are intended for use in mines susceptible to firedamps and shall meet the general requirements and test methods specified in EN 50054.

**1.2** This European Standard is restricted to apparatus intended for the detection and measurement of methane volume ratios in air from 0 % (*V/V*) up to but not exceeding 5 % (*V/V*).

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at 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 the European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 50054 1998, *Electrical apparatus for the detection and measurement of combustible gases — General requirements and test methods.*

## 3 Definitions

For the purposes of this European Standard, the definitions given in EN 50054 apply.

## 4 General requirements

The apparatus shall comply with the general requirements specified in EN 50054 and with the performance requirements specified in clause **4** of this European Standard.

Compliance shall be determined in accordance with the appropriate test requirements and methods, including initial calibration, specified in EN 50054.

## 5 Performance requirements

### 5.1 General

The normal conditions for test are specified in subclause **5.3** of EN 50054. Compliance shall be determined in accordance with the test methods specified in subclause **5.4** of EN 50054.

### 5.2 Unpowered storage

After being submitted to the conditions specified in subclause **5.4.2** of EN 50054, the apparatus shall meet the requirements specified in **5.3** to **5.25** of this European Standard.

### 5.3 Calibration curve (not applicable to alarm-only apparatus)

After initial adjustment with the standard test gas, each of the three indications (after correction using the manufacturer's calibration curve, if necessary) obtained for each of four gas volume ratios distributed over the measuring range shall not differ from these volume ratios by more than ±0,1 % (*V/V*) methane or ±5 % of the indication, whichever is the greater.

### 5.4 Drift (continuous duty apparatus)

The medium term variation shall not exceed ±0,1 % (*V/V*) methane or ±5 % of the indication, whichever is the greater, in air and in the standard test gas.

In addition, the apparatus shall be run in a methane-air mixture [methane volume ratio 1,0 % (*V/V*) to 1,5 % (*V/V*)] for 5 days, readings being taken daily in clean air and in the standard test gas and the variation of the indication in the standard test gas shall not exceed ±0,1 % (*V/V*) methane.

### 5.5 Drift (spot reading apparatus)

The variation of the indication shall not exceed ±0,1 % (*V/V*) methane or 5 % of the indication, whichever is the greater, in air and in the standard test gas.

### 5.6 Alarm

The alarm shall operate during every cycle of the test. If a latching alarm is provided, the manual reset action shall be checked during every cycle.

### 5.7 Temperature

The variation of the indication from that at 20 °C, over the temperature range −10 °C to +40 °C, shall not exceed ±0,2 % (*V/V*) methane or ±10 % of the indication, whichever is the greater, in air and in the standard test gas.

### 5.8 Pressure

The variation of the indication from that at 101,3 kPa, over a pressure range of 92 kPa to 115 kPa, shall not exceed ±0,25 % (*V/V*) methane or ±15 % of the indication, whichever is the greater, in air and in the standard test gas.

### 5.9 Humidity

The variation of the indication over a humidity range of 5 % relative humidity (r.h.) to 90 % r.h., at +40 °C, shall not exceed ±0,2 % (*V/V*) methane or ±10 % of the indication, whichever is the greater.

### 5.10 Air speed

The variation of the indication shall not exceed ±0,1 % (*V/V*) methane or ±5 % of the indication whichever is the greater.

### 5.11 Pumping rate

The variation of the indication shall not exceed ±0,1 % (*V/V*) methane or ±5 % of the indication, whichever is the greater.

### 5.12 Orientation

The variation of the indication shall not exceed +0,1 % (*V/V*) methane or ±5 % of the indication, whichever is the greater.

### 5.13 Vibration (applicable only to machine-mounted apparatus)

During the vibration test, the apparatus shall not suffer any loss of function and shall not give a false alarm or fault signal. The apparatus shall not suffer damage resulting in hazard or loss of function.

At the conclusion of the vibration test and after the apparatus sensor has then been exposed to clean air followed by the standard test gas, the deviation of the indication from that determined prior to the test shall not exceed ±0,1 % (*V/V*) methane or ±5 % of the indication, whichever is the greater.

### 5.14 Drop test (applicable to portable apparatus and remote sensors)

The apparatus shall not suffer damage resulting in hazard or loss of function.

The variation of the indication shall not exceed ±0,1 % (*V/V*) methane or ±5 % of the indication, whichever is the greater.

### 5.15 Warm-up time (not applicable to spot-reading apparatus)

#### 5.15.1 *Fixed and transportable apparatus*

The apparatus shall warm-up in clean air to indicate zero to within ±0,1 % (*V/V*) methane, in a time not exceeding 5 min, or longer if specified by the manufacturer, and no false alarms shall be generated.

The apparatus shall warm-up in the standard test gas to give a final indication to within ±0,1 % (*V/V*) methane, in a time not exceeding 5 min, or longer if specified by the manufacturer.

#### 5.15.2 *Continuous duty portable apparatus*

The apparatus shall warm-up in clean air to indicate zero to within ±0,1 % (*V/V*) methane, in a time not exceeding 60 s, and no false alarms shall be generated.

The apparatus shall warm-up in the standard test gas to give a final indication to within ±0,1 % (*V/V*) methane, in a time not exceeding 60 s, no false alarms shall be generated.

### 5.16 Time of response (not applicable to spot-reading apparatus)

The time of response $t_{50}$ shall not be greater than 10 s, and $t_{90}$ shall not be greater than 30 s.

The specified time of response shall apply to apparatus in the as-supplied condition and without optional accessories attached to the sensors for special purposes, e.g. collecting cones, weather protection.

### 5.17 Minimum time of operation (spot reading apparatus)

For apparatus without probe or sample line, the indication shall reach 90% of the final value in a time not exceeding 15 s.

For aspirated apparatus using a sample line or probe length of not more than 3 m, an additional 10 s is permitted.

### 5.18 High gas concentrations above the measuring range

#### 5.18.1 *Non-ambiguity test*

When tested in accordance with **5.4.18.2** of EN 50054, all methane concentrations above full scale shall be indicated by a full scale meter indication and, where fitted, an alarm. If the indication is digital, a clear indication shall be given that the upper limit of the measuring range has been exceeded.

#### 5.18.2 *Residual effect*

The variations of the indications from those recorded in clean air and in the standard test gas at the beginning of the test shall not exceed ±0,2 % (*V/V*) methane or ±10 % of the indication, whichever is the greater.

### 5.19 Battery capacity

#### 5.19.1 *Battery-powered portable continuous duty apparatus*

The variation shall not exceed ±0,1 % (*V/V*) methane or ±5 % of the indication, whichever is the greater, at the end of the 8 h or 10 h period as appropriate.

At the end of the further 15 min following the indication of low battery condition, the variation shall not exceed ±0,2 % (*V/V*) methane or ±10 % of the indication, whichever is the greater.

#### 5.19.2 *Portable spot-reading apparatus*

The variation shall not exceed ±0,1 % (*V/V*) methane, or ±5 % of the indication, whichever is the greater, at the end of 200 operations.

After a further 10 operations following the indication of low battery condition, the variation shall not exceed ±0,2 % (*V/V*) methane or ±10 % of the indication, whichever is the greater.

### 5.20 Power supply variations

#### 5.20.1 *A.C. powered apparatus*

The variation of the indication shall not exceed ±0,1 % (*V/V*) methane or ±5 % of the indications, whichever is the greater.

#### 5.20.2 *External d.c. powered apparatus*

The variation of the indication shall not exceed +0,1 % (*V/V*) methane or +5 % of the indication, whichever is the greater.

#### 5.20.3 *Battery powered apparatus*

The variation of the indication shall not exceed ±0,1 % (*V/V*) methane or ±5 % of the indication, whichever is the greater, when the apparatus is subjected to a change from the maximum terminal voltage of a new or fully charged battery to the minimum recommended operating voltage of that battery as determined by the built-in battery condition indicator.

For spot reading apparatus, it shall be possible to carry out at least 10 measurements at the minimum operating voltage within the above stated tolerances.

**5.21 Power supply interruptions, voltage transients and step changes of voltage**

The apparatus shall not yield spurious alarms when the specified interruption, voltage transient or step changes of voltage occur.

**5.22 Addition of sampling probe**

The addition of a sampling probe shall not introduce a variation of the indication exceeding ±0,1 % (*V/V*) methane or ±5 % of the indication, whichever is greater.

**5.23 Dust**

The functioning of the apparatus shall not be impaired by dust.

For apparatus where the atmosphere is sampled by diffusion, a 50 % reduction of the cross-sectional area of the apparatus inlet shall not produce a variation of indication exceeding ±0,1 % (*V/V*) methane or ±5 % of the indication, whichever is the greater.

**5.24 Poisons and other gases**

The variation of the indication shall not exceed ±0,2 % (*V/V*) methane or ±10 % of the indication, whichever is the greater.

The indications obtained for each of the three gas mixtures (a), (b) and (c) shall not be lower than the actual methane volume ratio by more than 10 % of the indication.

**5.25 Electromagnetic immunity**

When subjected to the electromagnetic immunity test, the variation of the indication shall not exceed ±0,1 % (*V/V*) methane, or ±5 % of the indication, whichever is the greater. The apparatus shall suffer no loss of function nor spurious alarm.

## 6 Field calibration kit

The meter or output indication observed during the use of the field calibration kit in a manner corresponding to the manufacturer's instruction, shall not differ from the correct indication by more than ±5 % of the measuring range.

## 7 Information for use

It shall be verified that the contents of the instruction manual are in accordance with the requirements specified in EN 50054.

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