INTERNATIONAL STANDARD

IEC 61779-3

First edition
1998-04

Electrical apparatus for the detection and measurement of flammable gases –

Part 3: Performance requirements for group I apparatus indicating a volume fraction up to 100 % methane in air

Appareils électriques de détection et de mesure des gaz combustibles –

Partie 3:
Règles de performance des appareils du groupe I pouvant indiquer une fraction volumique jusqu'à 100 % de méthane dans l'air

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTRICAL APPARATUS FOR THE DETECTION AND MEASUREMENT OF FLAMMABLE GASES –

Part 3: Performance requirements for group I apparatus indicating a volume fraction up to 100 % methane in air

FOREWORD

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International Standard IEC 61779-3 has been prepared by subcommittee 31L: Electrical apparatus for the detection of flammable gases, of IEC technical committee 31: Electrical apparatus for explosive atmospheres.

This standard should be read in conjunction with IEC 61779-1.

The text of this standard is based on the following documents:

FDIS	Report on voting
31L/49/FDIS	31L/54/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

A bilingual version of this standard may be issued at a later date.

ELECTRICAL APPARATUS FOR THE DETECTION AND MEASUREMENT OF FLAMMABLE GASES –

Part 3: Performance requirements for group I apparatus indicating a volume fraction up to 100 % methane in air

1 Scope

1.1 This part of IEC 61779 specifies requirements for group I (as defined in part 1) 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 firedamp. The requirements and test methods applicable to the apparatus covered by this standard are specified in part 1.

NOTE — The use of group I apparatus may not be permitted without the additional and prior approval of the relevant authority in mines under its jurisdiction, see note 1 of 1.1.1 of part 1.

1.2 This standard is restricted to apparatus intended for the detection and measurement of volume ratios of methane in air from a volume fraction of 0 % up to a volume fraction of 100 %.

NOTE — Apparatus covered by this standard will normally be intended to operate in volume ratios greater than a volume fraction of 5 %.

2 Definitions

For the purpose of this part of IEC 61779, the definitions given in part 1 apply.

3 General requirements

The apparatus shall comply with the general requirements specified in part 1 and with the performance requirements specified in clause 4 below.

Compliance shall be determined in accordance with the appropriate test requirements and methods, including initial calibration, specified in part 1.

It shall be verified that the contents of the manufacturer's instruction manual are in accordance with the requirements specified in part 1.

4 Performance requirements

4.1 General

The normal conditions for tests are specified in 4.3 of part 1. Compliance shall be determined in accordance with the test methods specified in 4.4 of part 1.

4.2 Unpowered storage

After being submitted to the conditions specified in 4.4.2 of part 1, the apparatus shall meet the requirements specified in 4.3 to clause 5 of this standard.

4.3 Calibration curve (not applicable to alarm-only apparatus)

After initial adjustment with the standard test gas, each individual indication in the three sets of indications (after correction using the manufacturer's calibration curve, if necessary) obtained for each of the four gas volume ratios shall not differ from these volume ratios by more than a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

4.4 Stability (continuous duty apparatus)

Continuous duty apparatus shall comply with the following requirements:

a) **short-term stability**

The short-term variation shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

b) **long-term stability (fixed and transportable apparatus)**

The long-term variation shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

c) **long-term stability (portable apparatus)**

The long-term variation shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

4.5 Stability (spot-reading apparatus)

The variation shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

4.6 Alarm

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

4.7 Temperature

The variation of the indication from that at 20 °C

a) shall not, at –10 °C, exceed a volume fraction of ±7 % methane or ±15 % of the indication, and

b) shall not, at +40 °C, exceed a volume fraction of ±5 % methane or ±10 % of the indication, whichever is the greater.

Tests shall be carried out at temperatures of –10 °C, 20 °C and 40 °C.

4.8 Pressure

The variation of the indications at 80 kPa and 120 kPa from the indication at 100 kPa shall not exceed a volume fraction of ±5 % methane or ±30 % of the indication, whichever is the greater, in air and in the standard test gas.

4.9 Humidity

The variation of the indications at 20 % RH and 90 % RH from the indication at 50 % RH, at +40 °C, shall not exceed a volume fraction of ±5 % methane or ±10 % of the indication, whichever is the greater.

4.10 Air velocity

The variation of the indication shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

4.11 Flow rate

The variation of the indication shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

4.12 Orientation

4.12.1 Portable apparatus

The variation of the indication shall not exceed a volume fraction of ±5 % methane or ±10 % of the indication, whichever is the greater.

4.12.2 Fixed and transportable apparatus

The variation of the indication shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

4.13 Vibration

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 a hazard or loss of function.

The variation of the indication from that determined prior to the test shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

4.14 Drop test (applicable to portable apparatus and remote sensors)

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

The variation of the indication shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

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

4.15.1 Fixed and transportable apparatus

The apparatus shall warm up in clean air to indicate zero to within a volume fraction of ±3 % methane, in a time not exceeding 5 min or as 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 a volume fraction of ±3 % methane in a time not exceeding 5 min or as specified by the manufacturer, and no false alarms shall be generated.

4.15.2 Continuous duty portable apparatus

The apparatus shall warm up in clean air to indicate zero to within a volume fraction of ±3 % methane in a time not exceeding 2 min, and no false alarms shall be generated.

The apparatus shall warm up in the standard test gas to give a final indication to within a volume fraction of ±3 % methane in a time not exceeding 2 min, and no false alarms shall be generated.

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

The time of response $t(50)$ in either direction shall be not greater than 20 s, and $t(90)$ in either direction shall be not greater than 60 s.

4.17 Minimum time to operate (spot-reading apparatus)

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

4.18 High gas concentration above the measuring range

Not applicable.

4.19 Battery capacity

4.19.1 Battery-powered portable continuous duty apparatus

The variation shall not exceed a volume fraction of ±3 % 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 a further 10 min following the indication of low battery condition, the variation shall not exceed a volume fraction of ±6 % methane or ±10 % of the indication, whichever is the greater.

4.19.2 Battery-powered portable spot-reading apparatus

The variation shall not exceed a volume fraction of ±3 % 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 a volume fraction of ±6 % methane or ±10 % of the indication, whichever is the greater.

4.20 Power supply variations

4.20.1 General

No requirement.

4.20.2 AC and external d.c. powered apparatus

The variation of the indication shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

4.20.3 Other power supply ranges

The variation of the indication shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

4.21 Power supply interruptions, voltage transients and step changes of voltage

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

4.22 Addition of sampling probe

The variation of the indication shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

4.23 Dust

The variation of the indication shall not exceed a volume fraction of ±5 % methane or ±10 % of the indication, whichever is the greater.

The increase in *t*(90) shall be not more than 10 s.

4.24 Poisons and other gases

4.24.1 Poisons

The variation of the indication from the actual methane concentration shall not exceed a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

Claimed poison tolerances shall be verified.

4.24.2 Other gases

The indications obtained for each of the three gas mixtures in b) 1), b) 2), and b) 3) according to 4.4.24.3 of part 1 shall not be lower than the actual volume ratio of methane by more than 10 % of the indication.

4.25 Electromagnetic compatibility

When subjected to the electromagnetic compatibility test, the variation of the indication shall not exceed a volume fraction of ±3 % methane. The apparatus shall suffer no loss of function or spurious alarm.

5 Field calibration kit

The meter or output indication observed during the use of the field calibration kit shall not differ from the specified concentration by more than a volume fraction of ±3 % methane or ±5 % of the indication, whichever is the greater.

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- ☐ not at all
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Please rate the standard in the following areas as (1) bad, (2) below average, (3) average, (4) above average, (5) exceptional, (0) not applicable:

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- ☐ other.....

16.

My organization uses (check one)

- ☐ French text only
- ☐ English text only
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17.

Other comments:

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