INTERNATIONAL STANDARD

IEC 61779-4

First edition
1998-04

Electrical apparatus for the detection and measurement of flammable gases –

Part 4: Performance requirements for group II apparatus indicating a volume fraction up to 100 % lower explosive limit

Appareils électriques de détection et de mesure des gaz combustibles –

Partie 4: Règles de performance des appareils du groupe II pouvant indiquer une fraction volumique jusqu'à 100 % de la limite inférieure d'explosivité

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For general terminology, readers are referred to IEC 60050: *International Electrotechnical Vocabulary* (IEV).

For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to publications IEC 60027: *Letter symbols to be used in electrical technology*, IEC 60417: *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets* and IEC 60617: *Graphical symbols for diagrams.*

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTRICAL APPARATUS FOR THE DETECTION AND MEASUREMENT OF FLAMMABLE GASES –

Part 4: Performance requirements for group II apparatus indicating a volume fraction up to 100 % lower explosive limit

FOREWORD

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International Standard IEC 61779-4 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/50/FDIS	31L/55/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 4: Performance requirements for group II apparatus indicating a volume fraction up to 100 % lower explosive limit

1 Scope

1.1 This part of IEC 61779 specifies requirements for group II (as defined in part 1) portable, transportable and fixed apparatus for the detection and measurement of combustible gas or vapour concentrations with air. The apparatus, or parts thereof, may be installed or used in potentially explosive atmospheres, other than mines susceptible to firedamp (i.e. group I). The requirements and test methods applicable to the apparatus covered by this standard are specified in part 1.

1.2 This standard is restricted to apparatus intended for the detection and measurement of combustible gas or vapour concentrations with air up to 100 % lower explosive limit (LEL).

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 of this standard.

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)

4.3.1 Calibration curve

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 distributed over the measuring range, shall not differ

from these volume ratios by more than ±5 % of the measuring range or ±10 % of the indication, whichever is the greater.

4.3.2 Response to gases other than the test gas

The apparatus indication (after correction using the manufacturer's calibration curves, if necessary) obtained for each of the three gas volume ratios of each gas tested shall not differ from these volume ratios by more than ±7 % of the measuring range or ±15 % 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 ±5 % of the measuring range or ±10 % of the indication, whichever is the greater.

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

The long-term variation shall not exceed ±10 % of the measuring range or ±30 % of the indication, whichever is the greater.

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

The long-term variation shall not exceed ±5 % of the measuring range or ±10 % of the indication, whichever is the greater.

4.5 Stability (spot-reading apparatus)

The variation of the indication shall not exceed ±5 % of the measuring range or ±10 % 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, over the specified temperature ranges, shall not exceed the following:

a) for portable or transportable apparatus where the control unit and the sensor are used in the same general environment, the variation over the temperature range –10 °C to +40 °C shall not exceed ±5 % of the measuring range or ±10 % of the indication, whichever is the greater. Tests shall be carried out at temperatures of –10 °C, 20 °C and 40 °C;

b) for fixed apparatus with remote sensors, where the control unit and sensor are not used in the same general environment, the following temperatures shall be applied:

1) **Sensors**

With the control unit under normal ambient test conditions, the sensor shall be tested in air and in the standard test gas at –25 °C and +55 °C. The variation shall not exceed ±10 % of the measuring range or ±20 % of the indication, whichever is the greater.

2) **Control units**

With the sensor under normal ambient test conditions, the variation at +5 °C and +55 °C shall not exceed ±5 % of the measuring range or ±10 % of the indication, whichever is the greater;

c) for fixed apparatus with sensors and control units in the same general environment, the variation at –10 °C and +55 °C shall not exceed ±5 % of the measuring range or ±15 % of the indication, whichever is the greater.

4.8 Pressure

The variation of the indications at 80 kPa and 110 kPa from the indication at 100 kPa shall not exceed ±5 % of the measuring range or ±30 % of the indication, whichever is the greater.

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 ±7 % of the measuring range or ±15 % of the indication, whichever is the greater.

4.10 Air velocity

The variation of the indication shall not exceed ±5 % of the measuring range or ±10 % of the indication, whichever is the greater.

4.11 Flow rate

The variation of the indication shall not exceed ±5 % of the measuring range or ±10 % of the indication, whichever is the greater.

4.12 Orientation

The variation of the indication shall not exceed ±5 % of the measuring range or ±10 % 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.

At the conclusion of the vibration test and after the apparatus sensor has been exposed to clean air followed by the standard test gas mixture, the deviation of the indication from that determined prior to the test shall not exceed ±5 % of the measuring range or ±10 % 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 ±5 % of the measuring range or ±10 % 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 ±5 % of the measuring range in a time 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 ±5 % of the measuring range 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.

For aspirated apparatus using a sample line or probe, an additional 3 s per metre is permitted.

4.18 High gas concentration above the measuring range

4.18.1 Non-ambiguity test

When tested in accordance with 4.4.18.1 of part 1, all gas 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.

4.18.2 Residual effect test

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 ±7 % of the measuring range or ±15 % of the indication, whichever is the greater.

4.19 Battery capacity

4.19.1 Battery-powered portable continuous duty apparatus

The variation shall not exceed ±5 % of the measuring range or ±10 % 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 ±7 % of the measuring range or ±15 % of the indication, whichever is the greater.

4.19.2 Battery-powered portable spot-reading apparatus

4.19.2.1 No alarm, including low battery indication, shall result from this test.

4.19.2.2 The variation shall not exceed ±5 % of the measuring range or ±10 % 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 ±7 % of the measuring range or ±15 % of the indication, whichever is the greater.

4.20 Power supply variations

4.20.1 General

No requirements.

4.20.2 AC and external d.c. powered apparatus

The variation of the indication shall not exceed ±5 % of the measuring range or ±10 % of the indication, whichever is the greater.

4.20.3 Other power supply ranges

The variation of the indication shall not exceed ±5 % of the measuring range or ±10 % 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 ±5 % of the measuring range or ±10 % of the indication, whichever is the greater.

4.23 Dust

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

4.24 Poisons and other gases

4.24.1 Poisons

Not applicable.

4.24.2 Other gases

Not applicable.

4.25 Electromagnetic compatibility

When subjected to the electromagnetic compatibility test, the variation of the indication shall not exceed ±5 % of the measuring range. 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 ±5 % of the measuring range or ±10 % 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:

- ☐ clearly written
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- ☐ paper
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- ☐ raster image
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10A.

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- ☐ raster image
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My organization is in the following sector (e.g. engineering, manufacturing)

.....

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13.

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16.

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- ☐ French text only
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17.

Other comments:

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