

# INTERNATIONAL STANDARD

**IEC**  
**61779-5**

First edition  
1998-04

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**Electrical apparatus for the detection  
and measurement of flammable gases –  
Part 5:  
Performance requirements for group II apparatus  
indicating a volume fraction up to 100 % gas**

*Appareils électriques de détection et de mesure  
des gaz combustibles –*

*Partie 5:*

*Règles de performance des appareils du groupe II pouvant indiquer  
une fraction volumique jusqu'à 100 % de gaz*



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\* See web site address on title page.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICAL APPARATUS FOR THE DETECTION AND MEASUREMENT OF FLAMMABLE GASES –**

**Part 5: Performance requirements for group II apparatus indicating a volume fraction up to 100 % gas**

FOREWORD

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International Standard IEC 61779-5 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/51/FDIS	31L/56/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 5: Performance requirements for group II apparatus indicating a volume fraction up to 100 % gas

### 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 volume ratios of combustible gas or vapour in air in volume fractions from 0 % to 100 % .

NOTE 1 – Apparatus covered by this standard will normally be intended to operate in volume ratios greater than 100 % LEL.

NOTE 2 – Although apparatus of the types covered by this standard may be suitable for detecting a wide range of combustible gases, particular gases (e.g. methane or propane) are specified in part 1 as the components of the test gases for the purpose of practical convenience. The performance requirements specified in this standard should therefore be considered with caution when the apparatus is used to detect other combustible gases, as some parameters – such as time of response – will be modified.

### 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 curves, 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  $\pm 5\%$  of the measuring range or  $\pm 10\%$  of the indication, whichever is the greater.

#### 4.3.2 Response to gases other than the test gas

The apparatus indications (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  $\pm 7\%$  of the measuring range or  $\pm 15\%$  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  $\pm 3\%$  of the measuring range or  $\pm 10\%$  of the indication, whichever is the greater.

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

The long-term variation shall not exceed  $\pm 7\%$  of the measuring range or  $\pm 15\%$  of the indication, whichever is the greater.

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

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

### 4.5 Stability (spot-reading apparatus)

The variation of the indication shall not exceed  $\pm 3\%$  of the measuring range or  $\pm 10\%$  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

#### 4.7.1 Apparatus where the control unit and sensors are used in the same environment

The variation of the indication from that at  $20\text{ }^{\circ}\text{C}$

- a) shall not, at  $-10\text{ }^{\circ}\text{C}$ , exceed  $\pm 7\%$  of the measuring range or  $\pm 10\%$  of the indication, whichever is the greater.
- b) shall not, at  $+40\text{ }^{\circ}\text{C}$ , exceed  $\pm 5\%$  of the measuring range or  $\pm 10\%$  of the indication, whichever is the greater.

#### **4.7.2 Remote sensors of apparatus where the control unit and sensor are not used in the same environment**

The variation of the indication from that at 20 °C, over the temperature range of –25 °C to +55 °C shall not exceed  $\pm 2$  % of the measuring range or  $\pm 3,5$  % of the indication per 10 °C, whichever is the greater.

NOTE — The control unit shall be at ambient temperature.

#### **4.7.3 Control units, of apparatus where the control unit and sensor are not used in the same environment**

The variation of the indication from that at 20 °C, at temperatures of +5 °C to +55 °C, shall not exceed  $\pm 3$  % of the measuring range or  $\pm 10$  % 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  $\pm 7,5$  % of the measuring range or  $\pm 30$  % 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  $\pm 5$  % of the measuring range or  $\pm 10$  % of the indication, whichever is the greater.

#### **4.10 Air velocity**

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

#### **4.11 Flow rate**

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

#### **4.12 Orientation**

The variation of the indication shall not exceed  $\pm 5$  % of the measuring range or  $\pm 10$  % 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  $\pm 5$  % of the measuring range or  $\pm 15$  % 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  $\pm 5$  % of the measuring range or  $\pm 15$  % 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  $\pm 5\%$  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  $\pm 5\%$  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  $t(50)$  shall be not greater than 20 s, and  $t(90)$  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 concentrations above the measuring range**

Not applicable.

#### **4.19 Battery capacity**

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

The variation shall not exceed  $\pm 3\%$  of the measuring range or  $\pm 10\%$  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  $\pm 6\%$  of the measuring range or  $\pm 20\%$  of the indication, whichever is the greater.

##### **4.19.2 Battery-powered portable spot-reading apparatus**

The variation shall not exceed  $\pm 3\%$  of the measuring range or  $\pm 10\%$  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  $\pm 6\%$  of the measuring range or  $\pm 20\%$  of the indication, whichever is the greater.

#### **4.20 Power supply variations**

##### **4.20.1 General**

No requirement.

##### **4.20.2 AC powered apparatus**

The variation of the indication shall not exceed  $\pm 3\%$  of the measuring range or  $\pm 10\%$  of the indication, whichever is the greater.

#### 4.20.3 External d.c. powered apparatus

The variation of the indication shall not exceed  $\pm 3\%$  of the measuring range or  $\pm 10\%$  of the indication, whichever is the greater.

#### 4.20.4 Other power supply ranges

The variations of the indication shall not exceed  $\pm 3\%$  of the measuring range or  $\pm 10\%$  of the indication, whichever is the greater.

#### 4.20.5 Battery-powered apparatus

The variation of the indication shall not exceed  $\pm 3\%$  of the measuring range or  $\pm 10\%$  of the indication, whichever is the greater.

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

#### 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 change of voltage occur.

#### 4.22 Addition of sampling probe

The variation of the indication shall not exceed  $\pm 2\%$  of the measuring range or  $\pm 5\%$  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

Not applicable.

##### 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  $\pm 3\%$  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  $\pm 5\%$  of the span or  $\pm 10\%$  of the indication, whichever is the greater.

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