

SLOVENSKI STANDARD
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Električna oprema za zaznavanje hladilnih plinov ali SF6 in merjenje njihove koncentracije - Zahteve za delovanje in preskusne metode

Electrical equipment used for detection and concentration measurement of refrigerant gases or SF6 - Performance requirements and test methods.

Elektrische Geräte zur Detektion und Konzentrationsmessung von Kältemittelgasen oder SF6 Anforderungen an das Betriebsverhalten und Prüfverfahren

Appareils électriques pour la détection et la mesure des hydrocarbures halogénés (gaz réfrigérants) ou du SF6 - Exigences de performance et méthodes d'essai

Ta slovenski standard je istoveten z: prEN 50676

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**Electrical equipment used for detection and concentration
measurement of refrigerant gases or SF6 Performance
requirements and test methods.**

Appareils électriques utilisés pour la détection et la mesure
de la concentration de gaz frigorigènes - Exigences de
performance et méthodes d'essai

Elektrische Geräte zur Detektion und
Konzentrationsmessung von Kältemittelgasen -
Anforderungen an das Betriebsverhalten und Prüfverfahren

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2019-05-10.

It has been drawn up by CLC/TC 216.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CENELEC in three official versions (English, French, German).
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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
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Contents

Page

European foreword	3
Introduction	4
1 Scope	5
2 Normative references	6
3 Terms and definitions	6
3.1 Gas properties	6
3.2 Types of equipment and components	9
3.3 Signals and alarms	10
3.4 Times	11
Figure 1 — Warm-up time in clean air (typical)	12
3.5 Miscellaneous	12
4 General requirements	12
4.1 Introduction	12
4.2 Construction	12
Table 1 — Measuring ranges and reference values	15
4.3 Adjustments	16
4.4 Battery-powered equipment	17
4.5 Gas detection transmitter for use with separate gas detection control units	17
4.6 Separate gas detection control units for use with gas detection transmitter(s)	17
4.7 Equipment using software and/or digital technologies	17
4.8 Labelling and marking	17
4.9 Instruction manual	18
5 Test methods	21
5.1 Introduction	21
5.2 General requirements for tests	21
5.3 Samples and sequence of tests	21
5.4 Normal conditions for test	24
5.5 Tests	25
Annex A (normative) Gas specific performance requirements (EN 45544-1)	31
Table A.1 — Gas specific performance requirements	31
Annex B (Informative) Performance requirements under standard test conditions	32
Table B.1 — Performance requirements under standard test conditions	32
Bibliography	39

European foreword

This document (prEN 50676:2019) has been prepared by CLC/TC 216 “Gas detectors”.

This document is currently submitted to the Enquiry.

The following dates are proposed:

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| • latest date by which the existence of this document has to be announced at national level | (doa) | dor + 6 months |
| • latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | dor + 12 months |
| • latest date by which the national standards conflicting with this document have to be withdrawn | (dow) | dor + 36 months
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prEN 50676:2019 (E)**Introduction**

PrEN 50676 will define test methods and performance requirements for all electrical equipment used for gas detection in refrigerant applications as defined in EN 378-1 by means of concentration measurement.

PrEN 50676 is addressed to the manufacturers of such equipment and test laboratories which validate it.

The tendency to use low-GWP refrigerant gases in the refrigeration and HVAC market (F-Gas Regulation) has intensified the considerations on safety measures for low-GWP gases as some are flammable, toxic and can cause lack of oxygen.

This standard covers all refrigerant gases mentioned in EN 378 series and defines performance requirements for the performance of gas detection equipment, mentioned in EN 378-3 as gas detectors, used in refrigerant applications. The level of safety shall be the same as in the already existing performance standards for general-purpose equipment, i.e. EN 60079-29-1 for flammable gases and EN 45544 series for toxic gases in atmospheres. Refrigerant gases not mentioned by EN 378-1 are also covered by this standard following the categorization scheme of EN 378-1.”

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1 Scope

This document specifies general requirements for the construction, testing and performance of electrically operated refrigerant fixed gas detection equipment in safety applications. This document will not specify requirements for portable locating leak detectors for refrigerant application.

This document is applicable to equipment whose primary purpose is to provide an indication, alarm and/or other output function to warn of the presence of refrigerant gases in an industrial or commercial environment and, in some cases, to initiate automatic or manual protective actions. It is applicable to equipment in which the sensor automatically generates an electrical signal when gas is present.

In accordance with the classification of the gas and the tasks covered in EN 60079-29-1, EN 45544-2 and EN 45544-3 for refrigeration application, three different types of equipment are provided (see also Table A.1).

- Type I: Refrigerant gas detection equipment for A2, A2L, R717, A3, B3 refrigerants as per safety class in EN 378-1:2016 Annex E in accordance with explosion protection. The equipment shall follow the existing performances in EN 60079-29-1 for ranges up to 20 % LEL and or 0 % – 100 % LEL.”
- Type II: Refrigerant gas detection equipment for A1, A2L, B1, B2L refrigerants as per safety class in Annex E of EN 378-1:2016 in relation to OEL values. Performance of the equipment shall be in accordance with requirements in EN 45544-1 in combination with EN 45544-2.
- Type III: Refrigerant gas detection equipment for A1, A2L, B1, B2L refrigerants as per safety class in Annex E of EN 378-1:2016 not covered by Type I or Type II. Performance of the equipment shall be in accordance with requirements in EN 45544-1 in combination with EN 45544-3.

This standard does not apply to gas detection equipment:

- for non-refrigerant application;
- used for air pollution monitoring;
- external sampling systems;
- open path gas detection;
- residential applications;
- process control;
- for applications in mines susceptible to firedamp (Group I)
- portable locating leak detectors for refrigerant application

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 45544-1:2015, *Workplace atmospheres - Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours - Part 1: General requirements and test methods*

EN 50271:2018, *Electrical equipment for the detection and measurement of combustible gases, toxic gases or oxygen - Requirements and tests for equipment using software and/or digital technologies*

EN 60079-0, *Explosive atmospheres - Part 0: Equipment - General requirements*

EN 60079-29-1:2016, *Explosive atmospheres - Part 29-1: Gas detectors - Performance requirements of detectors for flammable gases*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Gas properties

3.1.1

ambient air

normal atmosphere surrounding the equipment

3.1.2

clean air

air that is free of refrigerant gases and interfering or contaminating substances

3.1.3

refrigerant

fluid used for heat transfer in a refrigerating system, which absorbs heat at a low temperature and a low fluid pressure and expels heat at a higher temperature and a higher pressure usually involving changes of the state of the fluid

[SOURCE: EN 378-1:2016 3.7.1]

3.1.4

flammable gas

gas or vapour which, when mixed with air in a certain proportion, will form an explosive atmosphere

3.1.5

toxic gas

general term for any gas or vapour that can be harmful to human health toxic

3.1.6**halocarbon**

halocarbon:

- CFC: fully halogenated halocarbon containing only chlorine, fluorine and carbon;
- HCFC: halocarbon containing hydrogen, chlorine, fluorine and carbon;
- HFC: halocarbon containing only hydrogen, fluorine and carbon;
- PFC: fully fluorinated halocarbon containing only fluorine and carbon
- HFO: hydrofluoroolefins

[SOURCE: EN 378-1:2016 3.7.14, modified]

3.1.7**hydrocarbon****HC**

hydrocarbon containing only hydrogen and carbon

[SOURCE: EN 378-1:2016 3.7.14, modified]

3.1.8**Lower flammable limit****LFL**

volume fraction of flammable gas or vapour in air below, which an explosive gas atmosphere does not form, expressed as a percentage

Note 1 to entry: This is also known as lower explosive (LEL).

3.1.9**global warming potential****GWP**

climatic warming potential of a greenhouse gas relative to that of carbon dioxide ('CO₂'), calculated in terms of the 100-year warming potential of one kilogram of a greenhouse gas relative to one kilogram of CO₂

3.1.10**poisons****poisons for sensors**

substances which lead to temporary or permanent loss of sensor sensitivity

3.1.11**volume fraction****v/v**

quotient of the volume of a specified component and the sum of the volumes of all components of a gas mixture before mixing, all volumes referring to the pressure and the temperature of the gas mixture

Note 1 to entry: The volume fraction and volume concentration take the same value if, at the same state conditions, the sum of the component volumes before mixing and the volume of the mixture are equal. However, because the mixing of two or more gases at the same state conditions is usually accompanied by a slight contraction or, less frequently, a slight expansion, this is not generally the case.

Note 2 to entry: This is also known as concentration.

prEN 50676:2019 (E)

Note 3 to entry: Assuming the ideal behaviour of gases, the volume ratio coincides with the molar ratio (mol/mol). The ppm units are equivalent to the International System of Units 10^{-6} vol/vol.

3.1.12**zero gas**

gas recommended by the manufacturer, which is free of refrigerant gases (or SF₆) and interfering and contaminating substances, the purpose of which is calibration/adjustment of the equipment zero

3.1.13**standard test gas**

test gas with a composition specified for each piece of equipment and gas to be used for all tests unless stated otherwise

3.1.14**reference value**

value used as the basis to specify requirements such as measuring range, resolution and alarm set point

3.1.15**measuring range**

range of measured values of gas concentration over which the accuracy of the equipment lies within specified limits

3.1.16**lower limit of measurement**

smallest measured value within the measuring range

3.1.17**upper limit of measurement**

largest measured value within the measuring range

3.1.18**group of gases**

group of different gases defined by the manufacturer to be measured with one piece of equipment without modification of hardware or software which can be represented by a reference gas also defined by the manufacturer

3.1.19**reference gas**

reference gas is the representative gas of a group of gases

Note 1 to entry: Only the reference gas is specifically tested in correspondence with the performance requirements of this present standard.

3.1.20**correction factor**

factor defined by the manufacturer to convert the measurement values of a given gas from a group in relation to the defined reference gas

3.1.21**acute-toxicity exposure limit****ATEL**

maximum recommended refrigerant concentration determined in accordance with EN 378-1 and intended to reduce the risks of acute toxic hazards to humans in the event of a refrigerant release

[SOURCE: EN 378-1:2016 3.7.5, modified]

3.1.22**occupational exposure limit value****OELV**

limit of the time-weighted average of the concentration of a chemical agent in the air within the breathing zone of a worker in relation to a specified reference period

Note 1 to entry: The term “limit value” is often used as a synonym for “occupational exposure limit value”, but the term “occupational exposure limit value” is preferred because there is more than one limit value (e.g. biological limit value and occupational exposure limit value).

Note 2 to entry: Occupational exposure limit values (OELVs) are often set for reference periods of 8 h, but can also be set for shorter periods or concentration excursions.

3.1.24**machinery room**

space that is designed to house compressors and pressure vessels

3.2 Types of equipment and components**3.2.1****aspirated equipment**

equipment that samples the gas by drawing it to the gas sensor, e.g. by means of a hand-operated or electric pump

3.2.2**continuous duty equipment**

equipment that is powered for long periods of time, but may have either continuous or intermittent sensing

3.2.3**diffusion equipment**

equipment in which the transfer of gas from the atmosphere to the gas sensor takes place by random molecular movement, i.e. under conditions in which there is no aspirated flow

3.2.4**fixed equipment**

equipment that is intended to have all parts permanently installed

3.2.5**portable equipment**

battery powered, spot-reading or continuous duty equipment that has been designed to be readily carried from place to place and to be used while it is being carried and includes but is not limited to:

- a) hand-held equipment, typically less than 1 kg, which requires use of only one hand to operate,
- b) personal monitors, similar in size and mass to hand-held equipment, that are continuously operating (but not necessarily continuously sensing) while they are attached to the user, and
- c) larger equipment that can be operated by the user while it is carried either by hand, by a shoulder strap or carrying harness and which may or may not have a hand directed probe

3.2.6**transportable equipment**

equipment not intended to be portable but which can be readily moved from one place to another

prEN 50676:2019 (E)**3.2.7****gas detection transmitter**

fixed gas detection equipment that provide a conditioned electronic signal or output indication to a generally accepted industry standard (such as 4 mA to 20 mA), intended to be utilized with separate gas detection control units or signal processing data acquisition, central monitoring and similar systems, which typically process information from various locations and sources including, but not limited to gas detection equipment

3.2.8**alarm-only equipment**

equipment having an alarm but not having a display or other device to indicate the measured gas concentration

3.2.9**gas detection control unit**

equipment intended to provide a display indication, alarm functions, output contacts and/or alarm signal outputs or any combinations when operated with remote sensor(s)

3.2.10**separate gas detection control unit**

equipment intended to provide a display indication, alarm functions, output contacts or alarm signal outputs or any combination when operated with gas detection transmitter(s)

3.2.11**field calibration kit**

means of presenting test gas to the equipment for the purpose of calibrating, adjusting or verifying the operation of the equipment

Note 1 to entry: The field calibration kit can be used for verifying the operation of the alarms if the concentration of the test gas is above the alarm set-point.

Note 2 to entry: A mask for calibration and test is an example of a field calibration kit.

3.2.12**mask for calibration and test**

device that can be attached to the equipment to present a test gas to the sensor in a reproducible manner

3.2.13**remote sensor**

sensor that is separated from the equipment body and is connected to a gas detection control unit or to a gas detection transmitter

3.2.14**sensor**

assembly in which the sensing element is housed and that may also contain associated circuit components

3.2.15**sensing element**

part of the sensor which is sensitive to the gas/vapour to be measured

3.3 Signals and alarms**3.3.1****alarm set point**

setting of the equipment at which the measured concentration will cause the equipment to initiate an indication, alarm or other output function