
Workplace atmospheres - Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours - Part 2: Performance requirements for apparatus used for measuring concentrations in the region of limit values

Workplace atmospheres - Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours - Part 2: Performance requirements for apparatus used for measuring concentrations in the region of limit values

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Arbeitsplatzatmosphäre - Elektrische Geräte für die direkte Detektion und direkte Konzentrationsmessung toxischer Gase

<https://standards.iteh.ai/catalog/standards/sist/afe22b9f-86aa-4468-a7e4-5b2adb2ef8dd/sist-en-45544-2-2004>

Atmospheres des lieux de travail - Appareillage électrique utilisé pour la détection directe des vapeurs et gaz toxiques et le mesurage direct de leur concentration - Partie 2: Exigences de performance pour les appareillages utilisés pour le mesurage des concentrations de l'ordre des valeurs limites

Ta slovenski standard je istoveten z: EN 45544-2:1999

ICS:

- | | | |
|-----------|----------------------------------|---------------------------|
| 13.040.30 | Kakovost zraka na delovnem mestu | Workplace atmospheres |
| 13.320 | Alarmni in opozorilni sistemi | Alarm and warning systems |

SIST EN 45544-2:2004

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 45544-2:2004](#)

<https://standards.iteh.ai/catalog/standards/sist/afe22b9f-86aa-4468-a7e4-5b2adb2ef8dd/sist-en-45544-2-2004>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 45544-2

November 1999

ICS 13.040.30; 13.320

English version

Workplace atmospheres - Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours - Part 2: Performance requirements for apparatus used for measuring concentrations in the region of limit values

Atmosphères des lieux de travail - Appareillage électrique utilisé pour la détection directe des vapeurs et gaz toxiques et le mesurage direct de leur concentration - Partie 2: Exigences de performance pour les appareillages utilisés pour le mesurage des concentrations de l'ordre des valeurs limites

Arbeitsplatzatmosphäre - Elektrische Geräte für die direkte Detektion und direkte Konzentrationsmessung toxischer Gase und Dämpfe - Teil 2: Anforderungen an das Betriebsverhalten von Geräten für Konzentrationsmessungen im Bereich von Grenzwerten

This European Standard was approved by CEN on 5 September 1999 and by CENELEC on 15 November 1999.

CEN/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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN/CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN/CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN/CENELEC members are the national standards bodies and national electrotechnical committees, respectively, of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



CEN Central Secretariat:
rue de Stassart, 36 B-1050 Brussels

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

Contents

Foreword	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Definitions	6
4 General requirements	6
5 Test conditions	6
6 Performance requirements	6
6.1 Standard requirements	6
6.2 Unpowered storage	6
6.3 Measurement of deviations	7
6.4 Mechanical tests	7
6.4.1 Vibration	7
6.4.2 Droptest	7
6.5 Environmental tests	7
6.5.1 Temperature	7
6.5.2 Pressure	7
6.5.3 Humidity	7
6.5.4 Air speed	7
6.6 Performance tests	7
6.6.1 Audible alarm (personal, portable, and transportable apparatus)	7
6.6.2 Alarm set point(s)	8
6.6.3 Alarm response time (applicable to all alarm instruments)	8
6.6.4 Flow failure warning	8
6.6.5 Warm-up time	8
6.6.6 Time of response	8
6.6.7 Time of recovery	8
6.6.8 Addition of sampling probe (portable and transportable apparatus only)	8
6.6.9 Field verification kit	8
6.6.10 Gas concentrations above the upper limit of the measuring range	8
6.6.11 Extended operation in standard test gas	8
6.6.12 Orientation tests	8
6.7 Electrical tests	8
6.7.1 Battery capacity	8
6.7.2 Mains power supply	8
6.7.3 Electrical fault signal	8
6.7.4 Electromagnetic compatibility	9
6.7.5 Time-weighted average (TWA) function	9

6.8	Drift tests	9
6.8.1	Personal, portable, transportable and fixed apparatus	9
6.8.2	Spot reading apparatus	9

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 45544-2:2004

<https://standards.iteh.ai/catalog/standards/sist/afe22b9f-86aa-4468-a7e4-5b2adb2ef8dd/sist-en-45544-2-2004>

Foreword

This European Standard has been prepared by Technical Committee CEN/CLC/WG CMI "Continuous measuring instruments", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2000, and conflicting national standards shall be withdrawn at the latest by May 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 45544-2:2004](https://standards.iteh.ai/catalog/standards/sist/afe22b9f-86aa-4468-a7e4-5b2adb2ef8dd/sist-en-45544-2-2004)

<https://standards.iteh.ai/catalog/standards/sist/afe22b9f-86aa-4468-a7e4-5b2adb2ef8dd/sist-en-45544-2-2004>

Introduction

This European Standard specifies general requirements and test methods for the determination of the performance characteristics of electrical apparatus used for the direct detection and direct concentration measurement of toxic¹ gases and vapours in workplace atmospheres. It also provides guidance for the selection, installation, use and maintenance of such apparatus.

This European Standard includes the following parts:

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.

Part 2: Performance requirements for apparatus used for measuring concentrations in the region of limit values.

Part 3: Performance requirements for apparatus used for measuring concentrations well above limit values.

Part 4: Guide for selection, installation, use and maintenance.

This European Standard is based on EN 482 which specifies general performance requirements for procedures for determining the concentration of chemical agents in workplace atmospheres. These performance requirements include maximum values for overall uncertainty (a combination of precision and bias) that should be met under prescribed laboratory conditions and also in the environment representative of the workplace and other areas. For a given measurement task the range over which the requirements for the overall uncertainty have to be met is a function of the limit value. However, for most chemical agents the limit values have not been harmonized at the European level. Therefore, it was decided to use a reference value (standard test gas concentration) instead of the limit value for the performance tests. The list of standard test gas concentrations is given in annex A of EN 45544-1. The values chosen are close to the limit values used in different European countries but are intended to be used only for type testing apparatus without any legal implications.

EN 45544-2 is intended to be used for measuring concentrations up to 10 times the concentrations given in annex A of EN 45544-1. EN 45544-3 is intended to be used for measuring concentrations greater than 10 times the concentrations given in annex A of EN 45544-1.

This standard will help manufacturers, test laboratories and users of apparatus to adopt a consistent approach to, and provide a framework for, the assessment of performance criteria. It is the manufacturer's primary responsibility to ensure that the apparatus meets the requirements laid down in this European Standard including environmental influences which can be expected to affect performance.

¹ For the purposes of this standard the word "toxic" should be taken to include: very toxic, toxic, harmful, corrosive, irritating, sensitising, carcinogenic, mutagenic, teratogenic.

1 Scope

This European Standard specifies the performance requirements for electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours in workplace atmospheres.

The standard test gas concentration (STGC) to be used for the tests are given in annex A of EN 45544-1. In the instances in which no STGC is assigned in 5.6 of EN 45544-1:1999, a STGC may be agreed between the manufacturer and test laboratory considering the National limit values. Otherwise, the performance requirements of EN 45544-3 apply.

NOTE There may be cases, where national limit values differ in some countries considerably from the STGC values specified in annex A of EN 45544-1. In these cases it may be necessary to test the apparatus at these limit values.

2 Normative references

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

EN 45544-1:1999, *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 50270, *Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen*

3 Definitions

For the purposes of this European Standard the definitions of EN 45544-1 apply.

4 General requirements (standards.iteh.ai)

Unless otherwise stated, the general requirements of EN 45544-1 are applicable and shall be checked by visual inspection.

Compliance shall be determined in accordance with the appropriate test methods including initial calibration specified in EN 45544-1.

5 Test conditions

Clause 5 of EN 45544-1:1999 is applicable.

6 Performance requirements

6.1 Standard requirements

When specified, the performance requirements in 6.3 to 6.8 shall be as follows:

- a) in clean air, the difference between the measured values before and after the test shall be less than or equal to \pm the zero variation.

$$|m_b - m_a| \leq \text{zero variation}$$

- b) in the STG, the modulus of the difference between the measured values before and after the test shall be less than or equal to (30 less the measured precision at STGC) as a percentage of the measured value.

$$\frac{|m_b - m_a|}{m_b} \times 100 \leq \left(30 - \frac{2s_{STGC}}{m_b} \times 100 \right)$$

where:

m_b is the measured value before the test;

m_a is the measured value after the test;

s_{STGC} is the standard deviation of measurements at the STGC.

6.2 Unpowered storage

All apparatus shall meet the relevant requirements of 6.3 to 6.8 after storage.

6.3 Measurement of deviations

Zero variation and overall uncertainty shall be calculated according to 3.34 and 3.31 of EN 45544-1:1999.

The lower limit of the measuring range is determined by 0,5 times the zero variation for zero variations less than or equal to 0,25 STGC and is determined by 0,8 times the zero variation for zero variations greater than 0,25 STGC. The lower limit of the measuring range shall not exceed that quoted in the manufacturer's instruction manual.

For the most sensitive range which includes the STGC, the overall uncertainty shall be within the following limits:

- For test gas concentrations less than 0,1 STGC or the lower limit of the measuring range, whichever is the greater, to 0,5 STGC, the overall uncertainty shall be less than or equal to 50 %.
- For test gas concentrations greater than 0,5 STGC to 10 STGC, the overall uncertainty shall be less than or equal to 30 %.

6.4 Mechanical tests

6.4.1 Vibration

During the vibration test, the apparatus shall not suffer any loss of function nor give any false alarm or fault signal. The apparatus shall not suffer damage resulting in hazard or loss of function.

The performance requirements shall be as stated in 6.1.

6.4.2 Droptest

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

The performance requirements shall be as stated in 6.1.

6.5 Environmental tests

6.5.1 Temperature

In clean air:

- The difference between the measured values at 5 °C and 40 °C from that at 20 °C shall be less than or equal to \pm the zero variation or \pm 5 % of STGC whichever is the greater.
- The difference between the measured value at -10 °C from that at 20 °C shall be less or equal to \pm twice the zero variation or \pm 5 % of STGC whichever is the greater.

In the STG:

- The modulus of the difference between the measured values at 5 °C and 40 °C from that at 20 °C shall be as stated in 6.1b).
- The modulus of the difference between the measured value at - 10 °C from that at 20 °C shall be less than or equal to (45 less the measured precision at STGC) as a percentage of the measured value (i. e. replace 30 by 45 in 6.1b).

6.5.2 Pressure

The difference between the measured values at 90 kPa and 110 kPa from that at 100 kPa shall be as stated in 6.1.

6.5.3 Humidity

The difference between the measured values at 20 % relative humidity and 90 % relative humidity from that at 50 % relative humidity shall be as stated in 6.1.

6.5.4 Air speed

The difference between the measured values at 0,5 m/s and 4,0 m/s from that under static conditions shall be as stated in 6.1.