SLOVENSKI STANDARD
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Zrak na delovnem mestu - Električne naprave za neposredno odkrivanje in neposredno merjenje koncentracije strupenih plinov in hlapov - 4. del: Vodilo za izbiro, vgraditev, uporabo in vzdrževanje

Workplace atmospheres - Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours - Part 4: Guide for selection, installation, use and maintenance

Arbeitsplatzatmosphäre - Elektrische Geräte für die direkte Detektion und direkte Konzentrationsmessung toxischer Gase und Dämpfe - Teil 4: Leitfaden für Auswahl, Installation, Einsatz und Instandhaltung

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 4: Guide de sélection, d'installation, d'utilisation et d'entretien

Ta slovenski standard je istoveten z: **EN 45544-4:2016**

ICS:

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

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EUROPEAN STANDARD

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EUROPÄISCHE NORM

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English Version

Workplace atmospheres - Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours - Part 4: Guide for selection, installation, use and maintenance

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European foreword

This document (EN 45544-4:2016) has been prepared by CEN/CENELEC Joint Working Group "Continuous Measuring Instruments" (JWG CMI).

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2017-01-25
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2019-01-25

This document supersedes EN 45544-4:1999.

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Introduction

National laws and regulations based on European Directives require the assessment of the potential exposure of a worker to chemical agents in workplace atmospheres.

EN 45544, Workplace atmospheres – Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours, consists of the following parts:

— *Part 1: General requirements and test methods;*

— *Part 2: Performance requirements for apparatus used for exposure measurement;*

— *Part 3: Performance requirements for apparatus used for general gas detection;*

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

1 Scope

This European Standard gives guidance on the selection, installation, use and maintenance of electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours in workplace atmospheres. The primary purpose of such apparatus is to measure the concentration of a toxic gas or vapour in order to provide an exposure measurement and/or detection and warning of its presence.

This European Standard is applicable to apparatus whose primary purpose is to provide an indication, alarm and/or other output function to give a warning of the presence of a toxic gas or vapour in the atmosphere and in some cases to initiate automatic or manual protective actions. It is applicable to apparatus in which the sensor automatically generates an electrical signal when gas is present.

This European Standard is not applicable, but may provide useful information, for apparatus

— used for the measurement of oxygen,

— used only in laboratories for analysis or measurement,

— used only for process measurement purposes,

— used in car parks or tunnels (fixed apparatus only),

— used in the domestic environment,

— used in environmental air pollution monitoring,

— used for the measurement of combustible gases and vapours related to the risk of explosion.

It also does not apply to open-path (line of sight) area monitors.

For apparatus used for sensing the presence of multiple gases, this European Standard applies only to the detection of toxic gas or vapour.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 482:2012+A1:2015, *Workplace exposure – General requirements for the performance of procedures for the measurement of chemical agents*

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 45544-2:2015, *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 exposure measurement*

EN 45544-3:2015, *Workplace atmospheres - Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours - Part 3: Performance requirements for apparatus used for general gas detection*

3 Terms and definitions

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

3.1
toxic gas
general term for any gas or vapour that can be harmful to human health

Note 1 to entry: The term “gas” is used for both gases and vapours

3.2
interfering gases
any gas other than the gas to be detected, including water vapour, which affects the indication

3.3
clean air or zero gas
air free of gases to which the sensor is sensitive, or which influences the performance of the sensor

3.4
standard test gas
test gas with a composition specified for each apparatus and gas to be tested

3.5
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

3.6
limit value
occupational exposure 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

[SOURCE: Council Directive 98/24/EC Art. 2(d) [1]]

Note 1 to entry: Limit values are mostly set for reference periods of 8 h, but can also be set for shorter periods or concentration excursions, e.g. short-term exposure limit (STEL). Limit values for gases and vapours are stated in terms independent of temperature and air pressure variables in ml/m^3, and in terms dependent on those variables in mg/m^3 for a temperature of 20 °C and a pressure of 101,3 kPa.

3.7
exposure (by inhalation)
situation in which a chemical agent is present in air that is inhaled by a person

3.8
time weighted average (TWA) concentration
concentration of gas in air integrated over time and divided by the specified reference period

3.9
fixed apparatus
apparatus intended to have all parts permanently installed

3.10
transportable apparatus
apparatus not intended to be a portable apparatus, but which can readily be moved from one place to another

3.11
portable apparatus
apparatus that has been designed to be readily carried from place to place and to be used while being carried

Note 1 to entry: Portable apparatus is generally battery powered.

3.12
personal apparatus
portable apparatus attached to a person that monitors the atmosphere in their breathing zone so that their exposure to toxic gases can be determined

Note 1 to entry: Also known as a personal monitor.

3.13
aspirated apparatus
apparatus that samples the atmosphere by drawing it to the sensor

EXAMPLE A hand operated or electric pump can draw gas to the sensor.

3.14
alarm-only apparatus
apparatus having an alarm but not having a display or other device to indicate the measured gas concentration

3.15
sensing element
part of the sensor that is sensitive to the gas/vapour to be measured

3.16
sensor
assembly in which the sensing element is housed and which can contain associated circuit components

3.17
remote sensor
sensor that is not an integral part of the apparatus

Note 1 to entry: A remote sensor is connected to a control unit or to a gas detection transmitter.

3.18
gas detection transmitter
fixed gas detection apparatus that provides a conditioned electronic signal or output indication to a generally accepted industry standard, intended to be utilized with separate 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 apparatus

EXAMPLE An example of a generally accepted industry standard for an electronic signal or output indication is 4 mA - 20 mA.

3.19
control unit
apparatus intended to provide display indication, alarm functions, output contacts and/or alarm signal outputs when operated with remote sensor(s) and/or gas detection transmitter(s)

3.20
alarm set point
setting of the apparatus at which the measured concentration will cause the apparatus to initiate an indication, alarm or other output function

3.21
fault signal
audible, visible or other type of output, different from the alarm signal that permits, directly or indirectly, a warning or indication that the apparatus is not working satisfactorily

3.22
sample line
means by which the gas being sampled is conveyed to the sensor including accessories

EXAMPLE Examples of accessories: filter, water trap.

3.23
sampling probe
separate sample line that is attached to the apparatus as required

Note 1 to entry: It can be supplied with or without the apparatus. It is usually short (e.g. of the order of 1 m) and rigid, although it can be telescopic. It can also be connected by a flexible tube to the apparatus.

3.24
field calibration kit
means of calibrating or adjusting the apparatus

EXAMPLE This can be a calibration mask.

Note 1 to entry: The field calibration kit can also be used for verifying the operation of the apparatus.

3.25
zero indication
indication given by an apparatus when exposed to zero gas in normal operating conditions

3.26
indication range
range of measured values of gas concentration over which the apparatus is capable of indicating

Note 1 to entry: See Figure 2.

3.27
zero scale indication
smallest value of the measured quantity within the indication range

Note 1 to entry: This is typically zero.

Note 2 to entry: See Figure 2.

3.28
full scale indication
largest value of the measured quantity within the indication range

Note 1 to entry: See Figure 2.

3.29
measuring range
range of measured values of gas concentration over which the accuracy of the apparatus lies within specified limits

Note 1 to entry: For apparatus conforming to EN 45544–2, the requirements for expanded uncertainty in EN 482:2012+A1:2015, Table 1, are met. For apparatus conforming to EN 45544–3, the requirements for accuracy in EN 45544–3 are met. The measuring range is a subset of the indication range.

Note 2 to entry: See Figure 2.

3.30
lower limit of measurement
smallest value of the measured quantity within the measuring range

Note 1 to entry: Indications below the lower limit of measurement will not necessarily meet the uncertainty requirements of this European Standard.

Note 2 to entry: See Figure 2.

3.31
upper limit of measurement
largest value of the measured quantity within the measuring range

Note 1 to entry: Indications above the upper limit of measurement will not necessarily meet the uncertainty requirements of this European Standard.

Note 2 to entry: See Figure 2.

3.32
expanded uncertainty

quantity defining an interval around a result of a measurement, expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand

3.33
zero uncertainty
quantity defining an interval about the zero that might be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurement in clean air

Note 1 to entry: In Figure 3, the mean value of the measured values in clean air is not equal to the zero scale indication to illustrate that there can be an offset due to drift. The mean value can be above or below the zero scale indication.

3.34
selectivity
degree of independence from interfering gases

3.35
averaging time
period of time for which the measuring procedure yields an averaged value

3.36
drift
variation in the apparatus indication with time at any fixed gas volume fraction under constant environmental conditions

3.37
time of recovery (t_x)
time interval, with the apparatus in a warmed-up condition, between the time when an instantaneous decrease in volume fraction is produced at the apparatus inlet and the time when the response reaches a stated indication of x % of the initial indication

Note 1 to entry: For alarm-only apparatus, the stated indication can be represented by the de-activation of the alarm set at a stated value.

3.38
time of response (t_x)
time interval, with the apparatus in a warmed-up condition between the time when an instantaneous increase in volume fraction is produced at the apparatus inlet and the time when the response reaches a stated indication of x % of the final indication

Note 1 to entry: For alarm-only apparatus, the stated indication can be represented by the activation of the alarm set at a stated value.

3.39
warm-up time
time interval, with the apparatus in a stated atmosphere, between the time when the apparatus is switched on and the time when the indication reaches and remains within the stated tolerances

Note 1 to entry: See Figure 1.

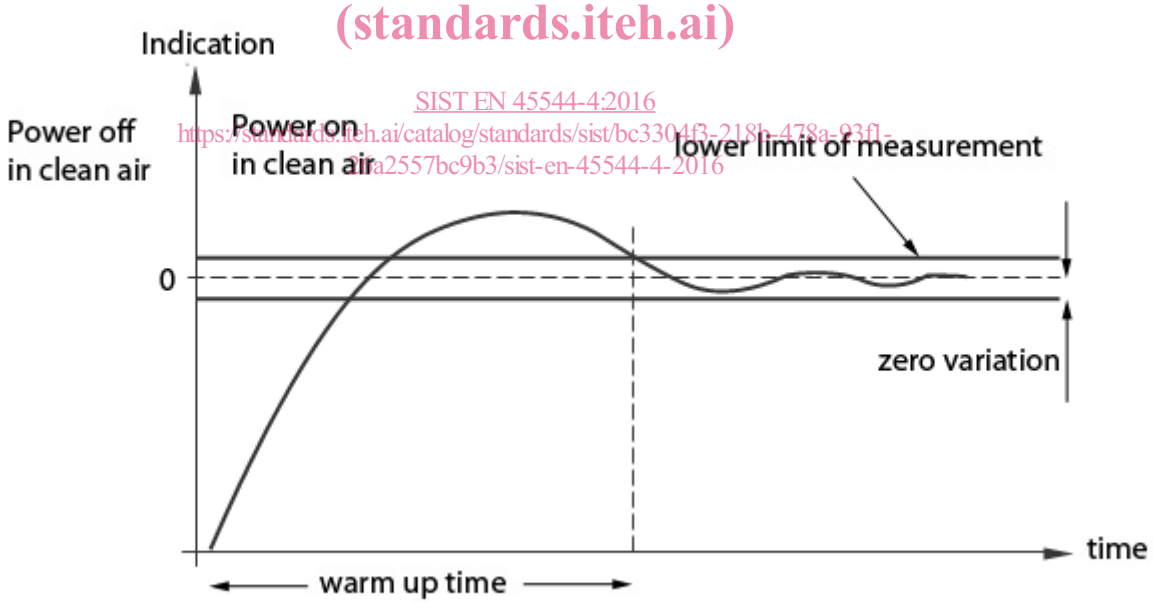

Figure 1 — Example of warm-up time in clean air

3.40
calibration
procedure that establishes the relationship between a measured value and the volume fraction of a test gas