SLOVENSKI STANDARD
SIST EN 50545-1:2011

01-december-2011

Električne naprave za odkrivanje in merjenje strupenih in gorljivih plinov na avtomobilskih parkiriščih in v predorih - 1. del: Splošne tehnične zahteve in preskusne metode za zaznavanje in merjenje ogljikovega monoksida in dušikovih oksidov

Electrical apparatus for the detection and measurement of toxic and combustible gases in car parks and tunnels - Part 1: General performance requirements and test methods for the detection and measurement of carbon monoxide and nitrogen oxides

Elektrische Geräte für die Detektion und Messung von toxischen (und brennbaren) Gasen in Tiefgaragen und Tunneln - Teil 1: Allgemeine Anforderungen an das Betriebsverhalten sowie Prüfverfahren für die Detektion und Messung von Kohlenmonoxid und Stickoxiden

Appareil électrique de détection de mesure de gaz combustible et toxique dans les parcs de stationnement et les tunnels - Partie 1: Exigences de performance générales et méthodes pour la détection et la mesure du monoxyde de carbone et d'oxyde d'azote

Ta slovenski standard je istoveten z: EN 50545-1:2011

ICS:

13.040.50	Emisije izpušnih plinov v prometu	Transport exhaust emissions

SIST EN 50545-1:2011 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50545-1

September 2011

ICS 13.040.50

English version

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Ref. No. EN 50545-1:2011 E

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Foreword

This document (EN 50545-1:2011) has been prepared by CLC Technical Body 216 "Gas detectors".

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2012-08-15
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2014-08-15

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Introduction

This European Standard does not give guidance on installation of a gas detection system.

This European Standard specifies unique ranges and alarm levels for type testing, specifying minimum requirements. All alarm levels are variable and may be adapted to national and/or local regulations.

Separate type testing of remote gas sensors and control units is permitted. It is common practice to use an integrated tunnel control system that includes processing of toxic gas measurement along with other monitoring functions. When remote gas detectors and control units are type tested separately, it is the responsibility of the manufacturer to ensure that the assembled system complies with the requirements of this European Standard. The maximum capacity of the assembled system should not exceed the capacity of the system that has been type tested.

Engineering companies or installers who buy equipment from different manufacturers are responsible for the proper integration of the system.

1 Scope

This European Standard applies to apparatus for the detection and/or the measurement of carbon monoxide (CO), nitrogen monoxide (NO) and nitrogen dioxide (NO_2) intended to control a ventilation system and/or to give an indication, alarm or any other signal to warn of a toxic hazard. These three gases are generically called “target gases” for the purpose of this European Standard.

National and local regulations might not require detection of NO or NO_2 and might require detection of other gases or vapours.

This European Standard includes requirements for remote gas sensors (RGS) to be used in car parks and tunnels and requirements for the control unit (CU) to be used in car parks.

This European Standard specifies general requirements for construction and testing and describes the test methods that apply to fixed apparatus for the detection and/or the measurement of the concentration of the target gases in car parks and tunnels. This European Standard may also be applied to similar applications where the concentration of the target gases could lead to a risk to health, for example loading areas for trucks and underground bus stations.

This European Standard also applies when an apparatus manufacturer makes any claims regarding superior performance that exceeds these minimum requirements.

This European Standard applies to apparatus, including the sampling system if applicable.

This European Standard does not specify requirements for apparatus to be installed in hazardous areas.

This European Standard does not apply for applications already covered by the following standards:

– domestic premises, covered by EN 50291-1;
– boats, craft, caravans or mobile homes, covered by EN 50291-2;
– workplace atmospheres, covered by EN 45544 series;
– emissions of heaters, covered by EN 50379 series;
– motor vehicles emissions, covered by ISO/PAS 3930;
– monitoring of the LEL level of combustible gases, covered by EN 60079-29-1.

This European Standard does not apply for the following applications and technologies:

– confined spaces not accessible to people;
– laboratory or analytical equipment;
– apparatus used to control industrial processes;
– portable and transportable apparatus;
– open path gas detection;
– tunnel construction;
– monitoring of particulates and dust;
– monitoring of combustible gases;
– CO monitoring for fire detection.

2 Normative references

The following referenced documents are indispensable for the application 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 50270, *Electromagnetic compatibility – Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen*

EN 50271, *Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen – Requirements and tests for apparatus using software and/or digital technologies*

EN 60073, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicators and actuators* (IEC 60073)

EN 60335-1:2002 + corr. Jul.2009 + corr. May.2010 + A1:2004 + corr. Jan.2007 + A2:2006 + A11:2004 + A12:2006 + corr. Feb.2007 + A13:2008 + A14:2010, *Household and similar electrical appliances – Safety – Part 1: General requirements* (IEC 60335-1:2001 + A1:2004 + A2:2006 + corrigendum Aug. 2006*)*

EN 60529, *Degrees of protection provided by enclosures (IP Code)* (IEC 60529)

3 Terms and definitions

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

3.1 Gas properties

3.1.1
clean air
air that is free of target gas, interfering gases or contaminating substances

3.1.2
hazardous area (potentially explosive atmosphere)
an atmosphere which could become explosive due to local and operational conditions

NOTE Operation in hazardous areas may require legislative measures for the approval, installation and construction requirements of the apparatus.

3.1.3
ppm.min
gas concentration multiplied by the time, in minutes, of gas application

NOTE Used for testing Time-weighted Average (TWA).

3.1.4
volume ratio
V/V
ratio of one component in a mixture divided by the sum of the volumes of all the components before they are mixed at specified temperature and pressure conditions

[ISO 7504]

NOTE 1 This is also known as concentration.

NOTE 2 Assuming ideal behaviour or gases, the volume ratio coincides with the molar ratio (mol/mol). The ppm units are equivalent to the International System units 10^{-6} vol/vol.

3.2 Types of apparatus and components

3.2.1
calibration mask
device that when applied to the sensor provides the continuous and renovated gas supply to the sensor such that the gas concentration reaching the sensing element remains unchanged

3.2.2
control unit
CU
part of the apparatus that receives and processes the analogue or digital signal generated by the sensors and also generates alarms and output functions

3.2.3
fixed apparatus
apparatus that is intended to have all parts permanently installed

3.2.4
power supply
device that, by means of mains electricity or one or more rechargeable batteries, provides the suitable power to the system or part of it

3.2.5
remote gas sensor
RGS
sensor that is not integral to the control unit of the apparatus

3.2.6
sample line
tubing and connection components by means of which the gas being sampled is conveyed to the sensor

3.2.7
special tool
tool required to gain access to, or to adjust controls

NOTE The design of the tool is intended to discourage unauthorized interference with the apparatus.

3.3 Sensors

3.3.1
aspirated sensor
sensor that accesses the gas by drawing it to the sensing element with a pump or by other means. If the device samples more than one point, it cycles through all related points

3.3.2
diffusion sensor
sensor that accesses the gas by convection and diffusion from the atmosphere to the sensing element, i.e. under conditions in which there is no aspirated flow

3.3.3
sensing element
device with an electric output signal that changes when it interacts with the target gas

3.3.4
sensor
assembly in which the sensing element is housed and that may also contain associated circuit components

NOTE The sensor may be integral with either the CU or remote (RGS).

3.4 Signals and alarms

3.4.1
activation levels
sensor signal levels that trigger outputs and/or an alarm indications

3.4.2
alarm indication
audible or visible indication activated when a pre-set concentration level is reached

3.4.3
alarm set point
adjustable setting of the apparatus that sets the level of concentration over a period of time at which the apparatus will automatically initiate an alarm indication and/or output

3.4.4
fault
dysfunction of a part of the system that does not disable the rest of the measure and control functions

3.4.5
fault signal
audible, visible or other type of output different from the alarm signal, signalling, directly or indirectly, a warning or indication that the apparatus is not working satisfactorily

3.4.6
indicators
means to provide visible and/or audible information

3.4.7
latching alarm
alarm that, once activated, requires deliberate action for deactivation

3.4.8
system fault
dysfunction of the system that disables the control function

3.4.9
output
physical interface that drives external actuators

EXAMPLES Air extractors, remote warning and alarm devices.

3.4.10
quiescent condition
normal operative condition where no alarm or fault or other abnormal condition occurs

3.5 Time

3.5.1
final indication
sensor signal indication given by the apparatus after stabilization

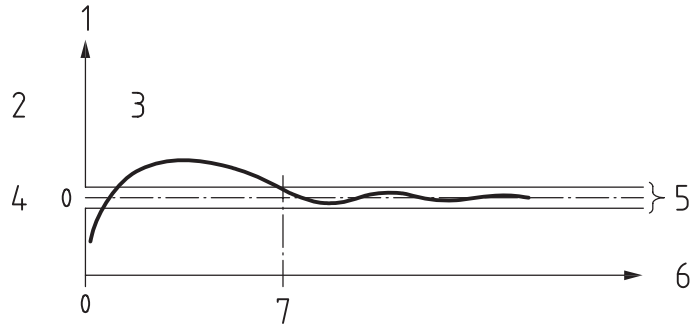
3.5.2
stabilized apparatus
state when three successive readings of an apparatus, taken at five-minute intervals, indicate no changes greater than ± 1 % of the measuring range

3.5.3
time of response
t_x
time interval, with the apparatus in a warmed-up condition, between the time when an instantaneous variation in volume ratio is produced at the apparatus inlet and the time when the response reaches a stated percentage (x) of the final indication

NOTE This European Standard refers to t_{90} as the time of response.

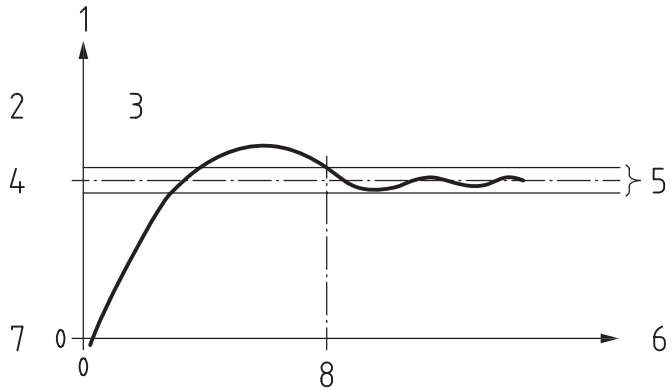
3.5.4
warm up time
time interval, with the apparatus in a stated atmosphere, between the time when the apparatus is switched on and the time when the indication reaches and remains within the stated tolerances

NOTE See Figures 1 and 2.



Key
1 indication
2 power off in clean air
3 power on in clean air
4 apparatus zero
5 specified tolerance band on zero indication
6 time
7 warm-up time

Figure 1 – Warm-up time in clean air (typical)



Key
1 indication
2 power off in standard test gas
3 power on in standard test gas
4 volume ratio of standard test gas
5 specified tolerances of the indication
6 time
7 zero in clean air
8 warm-up time

Figure 2 – Warm-up time in standard test gas (typical)