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Električne naprave za odkrivanje prisotnosti vnetljivega plina v gospodinjstvih- Vodilo za izbiro, vgraditev, uporabo in vzdrževanje

Electrical apparatus for the detection of combustible gases in domestic premises - Guide on the selection, installation, use and maintenance

Elektrische Geräte für die Detektion von brennbaren Gasen in Wohnhäusern - Leitfaden für Auswahl, Installation, Einsatz und Wartung

Appareils électriques pour la détection des gaz combustibles dans les locaux à usage domestique - Guide de sélection, d'installation, d'utilisation et de maintenance

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Electrical apparatus for the detection of combustible gases in domestic premises Guide on the selection, installation, use and maintenance

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CENELEC

European Committee for Electrotechnical Standardization
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Foreword

This European Standard was prepared by the Technical Committee TC 216, Gas detectors.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50244 on 1999-08-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2000-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2002-08-01

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Introduction

This European Standard is intended to be a guide for people who, in the course of their professional activities, are required to install combustible gas detectors in domestic premises. It is also aimed at anyone who might supply such gas detectors to members of the public for subsequent installation by competent persons according to national regulations, so that advice may be given based on good engineering practice.

Apparatus for the detection of combustible gases are not a substitute for good gas installation and regular servicing of gas appliances, although they may provide an added margin of reassurance for users of gaseous fuels. Apparatus for the detection of combustible gas with or without some form of executive function may overcome fears of the use of gaseous fuels and may be beneficial in certain circumstances.

1 Scope

This guide provides information on the selection, installation, use and maintenance of apparatus for the detection of combustible gas designed for continuous operation in a fixed installation in domestic premises as described in EN 50194. This guide should be read in conjunction with any additional relevant national or local regulations.

The guide refers to the installation of two types of apparatus designed to operate in the event of an escape of town gas, natural gas or liquefied petroleum gas:

Type A apparatus - to provide a visual and audible alarm and an executive action in the form of an output signal that may actuate directly or indirectly a shut-off device and/or other ancillary device.

Type B apparatus - to provide visual and audible alarm only.

This guide is not applicable to the use of apparatus:

- used in boats, caravans or mobile homes;
- for the detection of toxic gases such as carbon monoxide, see EN 50292;
- for industrial or commercial premises, see EN 50073.

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 1775	1998	Gas supply - Gas pipework for buildings - Maximum operating pressure ≤ 5 bar Functional recommendations
EN 50073	1999	Guide for selection, installation, use and maintenance of apparatus for the detection and measurement of combustible gases or oxygen
EN 50194	2000	Electrical apparatus for the detection of combustible gases in domestic premises - Test methods and performance requirements
EN 50292	[1)]	Electrical apparatus for the detection of carbon monoxide in domestic premises Guide on the selection, installation, use and maintenance

1) In preparation

3 Definitions

For the purposes of this Guide the following definitions apply :

3.1
lower explosive limit (LEL)
the volume ratio of combustible gas or vapour in air below which an explosive gas atmosphere will not be formed

3.2
upper explosive limit (UEL)
the volume ratio of combustible gas or vapour in air above which an explosive gas atmosphere will not be formed

3.3
continuous operation
apparatus which is continuously powered with continuous or intermittent automatic sensing

3.4
sensor
an assembly in which the sensing element is housed that may contain associated circuit components

3.5
sensing element
a device, the output of which will change in the presence of combustible gas

3.6
ventilation
movements and replacement of air resulting from wind, temperature gradients, or artificial means (e.g. fans or extractors)

3.7
relative density
the density of gas or vapour relative to the density of air at the same pressure and at the same temperature (air is equal to 1,0)

3.8
gas detection apparatus
apparatus comprising the sensor, remote sensor if applicable, alarm and other circuit components, power supply and for type A apparatus a means of providing an output signal

3.9
domestic premises
any house or building being the place of residence or home of a household, family or person

3.10
fixed installation
an apparatus which is intended to have all parts except replaceable batteries permanently installed

3.11
output signal
signal characterized by a standby state and an activated state by which action may be initiated (for example, triggering of a shut-off device)

3.12
warm-up time
the time interval between the time when the apparatus is switched on and the time when the apparatus is fully operational

3.13
volume ratio (v/v)(commonly referred to as concentration)
ratio of the volume of a component to the volume of the gas mixture

4 Sensing of combustible gas

There are three main hazards arising from combustible gases; explosion, poisoning and annoxia (insufficient oxygen). This document deals only with the explosion hazard of combustible gases.

Distributed gas has an odour to ensure that the general public may recognise any leakages by a characteristic smell. Most people may detect this odour at quite low gas concentration levels (2 % LEL, or less) but some medical infirmities and increasing age may result in a reduction in the sense of smell. A gradually increasing gas concentration may also go unnoticed due to olfactory fatigue.

The conditions under which combustion occurs are variable and depend on gas composition. When the concentration level of gas is between the LEL and UEL and there is a source of ignition, the gas mixture will burn or explode. For natural gas the LEL is about 4 % V/V to 5 % V/V of gas in air (UEL is about 15 % V/V of gas in air). For LPG the LEL is about 1 % V/V to 2 % V/V of gas in air (UEL is about 10 % V/V of gas in air). Each apparatus is specifically designed and calibrated for a specific gas hence it is essential that an apparatus, calibrated for one gas, is not used to detect another.

There are many different sorts of gas sensors available for example, catalytic, semiconductor and infra-red, details of which may be found in EN 50073.

5 Installation

5.1 General

The manufacturer is required to provide suitable instructions for the correct and safe installation of the apparatus. These should be read carefully before installing or operating the apparatus.

Generally, the same considerations apply to both type A and type B apparatus.

Combustible gases used in domestic premises generally fall into two categories, lighter than air and heavier than air. For lighter than air see 5.2, for heavier than air see 5.3.

To select a position for a gas detector, the source and nature of the possible gas release should be considered.

5.2 Natural gas and town gas

5.2.1 Source of the gas escape

The most likely origin for an escape in domestic premises are the appliances and the connections between appliances and the fixed installation in the buildings. Appliances are the more common origin of escapes because they may be moved and suffer damage. Another cause of gas release, especially if cookers or boilers without flame failure control are in use, is the extinction of the flame, or its non ignition, whether by spilling of liquid, or draughts.

The fixed distribution system inside the building, assuming that it has been correctly installed, and tested, is usually gas-tight as long as the building integrity is maintained or the pipes are not damaged by works, shocks, etc. Except when earth movement may damage the building, an escape on these installations is very unlikely.

It is possible that gas may penetrate inside a building by migrating along pipes or cables from an escape in the mains. In this case, gas may be released in any ground-floor or underground room in the building depending on the escape position and the underground structure, etc. There is a possiblity that the gas detector will be located in another room where there is no significant gas concentration and therefore will not detect the gas.

In the majority of the cases, gas will be released at low pressure, even if the flow is high hence the effect of pressure on its dispersion behaviour will be unimportant.

5.2.2 Examples of behaviour of gas releases

5.2.2.1 Room having poor or no ventilation

The typical case is the one of a single room, with its doors and windows closed and without any ventilation. In this case, gas will tend to fill all the volume above the level of the escape. The gas concentration below the level of the escape will be much lower than the concentration above the escape. The speed at which the gas concentration increases depends upon the gas flow rate and the volume of the room. Eventually if there is no ventilation the gas concentration may reach a very high value. However it may be considered that above the level of the escape the gas concentration is rather uniform wherever it is measured.

Such poorly ventilated areas will contravene the requirements of EN 1775 regarding new installations and extensions to existing installations.

5.2.2.2 Ventilated room

This case describes a room with ventilation or with its doors or windows open or slightly open. The airflow, which brings clean air into the room, will limit the maximum concentration of the gas to a value depending upon the gas to airflow ratio. The size of the room will only have an influence on the time needed to reach this maximum concentration, i.e. the smaller the room, the shorter is this time.

The same distribution of concentration with height as described in 5.2.2.1 will be observed. An upward airflow will tend to accentuate the concentration difference between the ground and the ceiling, conversely, a downward airflow will tend to make the concentration more uniform along the height of the room. The same effect may be observed with a heat source such as a radiator which will create an upward draught due to the heat generated and a downward draught along the walls thereby mixing the air.