SLOVENSKI STANDARD
SIST EN 16750:2017

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Vgrajeni gasilni sistemi - Sistemi z zmanjšano koncentracijo kisika - Projektiranje, vgradnja, načrtovanje in vzdrževanje

Fixed firefighting systems - Oxygen reduction systems - Design, installation, planning and maintenance

Ortsfeste Löschanlagen - Sauerstoffreduktionsanlagen - Konstruktion, Einbau, Planung und Instandhaltung

Installations fixes de lutte contre l'incendie - Systèmes d'appauvrissement en oxygène - Conception, installation, planification et maintenance

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13.220.10	Gašenje požara	Fire-fighting

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Fixed firefighting systems - Oxygen reduction systems - Design, installation, planning and maintenance

Installations fixes de lutte contre l'incendie - Systèmes d'appauvrissement en oxygène - Conception, installation, planification et maintenance

Ortsfeste Löschanlagen - Sauerstoffreduktionsanlagen - Konstruktion, Einbau, Planung und Instandhaltung

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 16750:2017) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by March 2018, and conflicting national standards shall be withdrawn at the latest by March 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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Introduction

Oxygen reduction systems are designed to prevent fires from starting or spreading, by means of the introduction of oxygen reduced air. Oxygen reduction systems are not designed to extinguish fires. The design and installation shall be based on detailed knowledge of the protected area, its occupancy and the materials in question. It is important to suit the fire protection measures to the hazard as a whole.

It is important to emphasize that across the European Union there are several regulatory and legislative limitations for access and working in areas with lower oxygen concentration, so it is important to take these limitations into account. Use of this European Standard can vary based on the national legislation in each country of the European Union.

1 Scope

This European standard specifies oxygen reduction systems that are used as fire prevention systems by creating an atmosphere in an area which is having a lower permanent oxygen concentration as in ambient conditions. The level of oxygen reduction is defined by the individual risks of these areas (see Annex A). Oxygen reduction is achieved by technical systems which are providing a flux of air containing a reduced concentration of oxygen.

This European standard specifies minimum requirements and defines the specifications governing the design, installation and maintenance of fixed oxygen reduction systems with oxygen reduced air in buildings and industrial production plants. The standard also applies to the extension and modification of existing systems.

This European standard applies to oxygen reduction systems using nitrogen which are designed for continual oxygen reduction in enclosed spaces.

NOTE Nitrogen is today the most suitable gas to be used for oxygen reduction. For other gases this European standard can be used as basis.

This European standard does not apply to oxygen reduction systems that use water mist or combustion gases.

The European standard does not apply to:

— explosion suppression systems;

— explosion prevention systems;

— fire extinguishing systems using gaseous extinguishing agents;

— inertization of portable containers;

— systems in which oxygen levels are reduced for reasons other than fire prevention (e.g. steel processing in the presence of inert gas to avoid the formation of oxide film);

— inerting required during repair work on systems or equipment (e.g. welding) in order to eliminate the risk of fire or explosion.

In addition to the conditions for the actual oxygen reduction system and its individual components this European standard also covers certain structural specifications for the protected area.

The space protected by an oxygen reduction system is a controlled and continuously monitored indoor climate for extended occupation. This standard does not cover unventilated confined spaces that may contain hazardous gases.

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 54 (all parts), *Fire detection and fire alarm systems*

EN 12094-1, *Fixed firefighting systems - Components for gas extinguishing systems - Part 1: Requirements and test methods for electrical automatic control and delay devices*

EN 50104, *Electrical apparatus for the detection and measurement of oxygen - Performance requirements and test methods*

3 Terms and definitions

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

3.1
Alarms
3.1.1
external alarm
alarm to emergency services such as fire brigade or permanently attended location

3.1.2
local alarm
acoustic and possibly additional visual alarm in protected areas or their immediate surroundings

3.1.3
internal alarm
acoustic and visual displays at the detection panel, possibly with additional displays at other signalling equipment

3.1.4
alarm threshold
value of a process parameter which, when reached, triggers an alarm and, where necessary, initiates automatic protection measures

3.1.5
alarm signal
signal to warn people at risk and/or to summon help from the emergency services and/or to provide information about automatic response measures

3.2
design concentration
ignition threshold including a safety margin

Note 1 to entry: See also Figure 1.

Note 2 to entry: The design concentration represents the maximum oxygen concentration which cannot be exceeded in any time.

3.3
emergency situation
deviation from normal operation

EXAMPLE For example a significant deviation from the threshold value (scale of risk).

3.4
operating pressure
pressure of a system under normal operating conditions

3.5
combustible material
A material capable of combustion or being ignited

Note 1 to entry: For the purposes of this standard, whether the quantity of a combustible material is to be regarded as significant or not can be determined by means of a risk analysis as part of the fire protection design.

3.6
ignition threshold
maximum oxygen concentration in a mixture of a combustible material with air and inert gas, in which there can be no ignition, determined under established test conditions

Note 1 to entry: This is a specific characteristic of combustible material and inert gas (see A.1).

3.7
detection and alarm installation
remote detection system for the reliable detection of risk to people and property

Note 1 to entry: It creates alarm reports from automatic or manually input information, issues these and detects any faults. The transmission channels for information and alarms are monitored. Special measures are in place to prevent any malfunction as far as possible, which may be powered electrically or otherwise. Detection and alarm systems cover facilities for the input, transmission (through wires or wirelessly), processing and issuing of alarms, including the necessary power supply. This standard applies to detection and alarm systems which detect and report the scale of the risk at an early stage.

3.8
measuring zones
<oxygen reduction system> virtual separation of the protected volume for oxygen measuring

3.9
normal operation
situation in which the equipment, protection systems and components are able to carry out their designated functions within their design parameters

3.10
oxygen reduced air
ambient air with an oxygen concentration lower than natural air

3.11
oxygen reduced air supply
nitrogen enriched air stream with an oxygen concentration of less than natural air ready to be introduced into a protected volume

3.12
oxygen reduction
reduction of oxygen which increases the nitrogen concentration to prevent the ignition or spread of fire

3.13
protected volume
effective volume of the space to be protected

3.14
system
combination of components whose function and compatibility guarantees the safety of the installation

3.15
technical areas
areas where either or the control panel, nitrogen production unit and other relevant system components are placed

3.16
control panel
electrical device for monitoring, controlling and alarm of the oxygen reduction system

4 System requirements

4.1 General

An oxygen reduction system shall consist basically of:

a) a supply of oxygen reduced air;

b) a fixed pipework system with fittings, valves, nozzles, outlets;

c) oxygen sensors and control panel;

d) alarms.

Oxygen reduced air is produced by air separation or by injecting inert gas or gas mixture into the protected area.

The oxygen concentration in the protected area shall be monitored by means of measuring equipment. During operation, the supply of nitrogen shall be controlled automatically according to demand. Where necessary as a result of a risk analysis additional means shall be provided to operate the supply manually or an additional supply operated manually or automatically.

The oxygen reduction system can be equipped with automatic equipment designed to shut down machinery and to close fire doors and other equipment, with the aim of creating and maintaining the required oxygen concentration.

4.2 Personnel safety

Oxygen reduced air can be dangerous for personnel.

Adherence to this European Standard does not remove the user's statutory responsibility to comply with the relevant national bodies and laws. In case no national laws exist, further information can be found in Annex B.

Code requirements for unventilated confined spaces do not apply to space protected by oxygen reduction system that control and continuously monitor indoor climate for extended occupation.

Personnel safety measures shall be made for the fact that neighbouring volumes can have a reduced oxygen concentration. These areas may also need to be monitored and/or personnel safety measures may need to be taken.

Technical or organizational measures shall be taken to prevent unauthorized people from entering protected areas with permanently reduced oxygen levels.

The measurement system shall be designed in such a way that a loss of function or a measurement error can in no event lead to the minimum oxygen threshold not being detected.

The spreading of the oxygen-reduced atmosphere to other areas not intended for this (e.g. through wall openings, cable ducts, floor drainages, leaking doors, conveyor belts, etc.) shall be prevented.

4.3 Effectiveness and application

A fire risk assessment detailing the key fire protection factors shall be done. The important aspects are:

— the type and quantity of material/materials requiring protection;

— the area(s) requiring protection;

— the right dimension of the oxygen reduced air supply to maintain the reduced oxygen concentration on its design value;

— a back-up oxygen reduced air supply, if provided;

— alarm equipment.

Oxygen reduction systems provide preventive fire protection. The introduction of nitrogen reduces the oxygen concentration of the air, thereby preventing the ignition or spread of fire except for the following:

— chemicals containing their own supply of oxygen, such as cellulose nitrate;

— mixtures containing oxidizing materials, such as sodium chlorate or sodium nitrate;

— chemicals cable of undergoing auto-thermal decomposition, such as some organic peroxides;

— reactive metals (such as sodium, potassium, magnesium, titanium and zirconium), reactive hydrides or metal amides, some of which may react violently.

4.4 Alarm organization and emergency plan

An alarm organization is required for the following purposes:

— to alert affected and responsible persons;

— to alert the permanently attended location;

— to initiate other necessary protective measures.

The responsibilities for the alarm organization shall be defined.

The emergency plan should cover keywords to designate the basic measures that need to be taken in case of emergency, too low oxygen level or fire signal.

5 Design

5.1 Qualification of the designer

The designer shall be sufficiently technically qualified to ensure effective protection.

5.2 Fire protection concept

The system design shall be part of the fire safety concept of the building.

As part of the system design a fire risk assessment might lead to further fire protection measures.

EXAMPLE Since the oxygen reduction system cannot prevent or detect smouldering or pyrolizing processes (e.g. overheated cables) suitable smoke detection systems for the protected volume e.g. high sensitive smoke detection systems according to EN 54–20 class A, are recommended and should be part of the main fire alarm system of the facility.

Where special circumstances deviate from what is covered in this standard, for example spatial configuration, structure, installations, combustible materials, altitude different from sea level, temperature different from normal, fumes or gases, require special measures, the designer shall take these into account. In these cases the appropriate authorities shall be consulted.

5.3 Structural specifications for the protected area

Structural partitions shall comply with the criteria governing the protection target, as shown in Table 1. Building regulation specifications are unaffected by these measures.