



# SLOVENSKI STANDARD

## oSIST prEN 16750:2014

01-september-2014

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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

**Ta slovenski standard je istoveten z: prEN 16750**

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**ICS:**

13.220.10	Gašenje požara	Fire-fighting
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English Version

**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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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## Contents

	Page
Foreword.....	4
Introduction .....	5
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	7
4 System requirements .....	8
4.1 General.....	8
4.2 Personnel safety .....	9
4.3 Effectiveness and application .....	9
4.4 Alarm organization and alarm plan.....	9
5 Design .....	10
5.1 Qualification of the designer .....	10
5.2 Fire protection concept.....	10
5.3 Structural specifications for the protected area.....	10
5.4 Oxygen concentration.....	11
5.5 Oxygen reduction for preventative fire protection.....	11
5.6 Safety margins .....	11
5.7 Oxygen reduced air quantity .....	14
5.8 Technical areas .....	16
6 Distribution pipework.....	17
6.1 Pipework .....	17
6.2 Pipe supports .....	17
6.3 Components in the pipework .....	17
6.4 Injection points .....	18
7 Monitoring the oxygen concentration .....	18
8 Alarms and notifications .....	19
9 Control equipment .....	20
9.1 Function.....	20
9.2 Requirements .....	20
9.3 Electrical power supply.....	20
9.4 Electrical installations .....	20
9.5 Data recording.....	21
10 System operation.....	21
10.1 Instruction and training of personnel.....	21
10.2 Inspections .....	21
10.3 Operations log.....	21
10.4 Further obligations .....	22
11 Maintenance .....	22
12 Documentation.....	22
13 Installation .....	23
13.1 Qualification of the installer .....	23
13.2 General specifications, installation .....	23
Annex A (normative) Ignition thresholds for oxygen reduction using nitrogen in fire protection .....	24
A.1 Ignition thresholds.....	24

<b>A.2</b>	<b>Tests to ascertain ignition thresholds of unfamiliar materials .....</b>	<b>25</b>
<b>Annex B (informative)</b>	<b>Information for health and safety – Working in oxygen-reduction atmospheres for reasons of fire prevention .....</b>	<b>28</b>
<b>B.1</b>	<b>General .....</b>	<b>28</b>
<b>B.2</b>	<b>Principles of occupational health .....</b>	<b>28</b>
<b>B.3</b>	<b>Risk classes .....</b>	<b>28</b>
<b>B.4</b>	<b>Basic requirements .....</b>	<b>29</b>
<b>B.5</b>	<b>Protective measures for all areas with oxygen-reduced atmospheres .....</b>	<b>30</b>
<b>B.6</b>	<b>Risk classes and safety measures .....</b>	<b>31</b>
<b>Annex C (informative)</b>	<b>Existing national regulations for access and working in areas with lower oxygen concentration. ....</b>	<b>33</b>
<b>Bibliography .....</b>		<b>34</b>

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## Foreword

This document (prEN 16750:2014) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

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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.

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## 1 Scope

This European Standard covers 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.

## 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

##### 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 shall not be exceeded in any time.

#### 3.3

##### **emergency situation**

deviation from normal operation, i.e. 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**

combustible material present in the protected area in a significant quantity

Note 1 to entry: The significant quantity is 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 Annex A.1).

**prEN 16750:2014 (E)****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****normal operation**

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

**3.9****oxygen reduced air**

ambient air with an oxygen concentration lower than natural air at sea level

**3.10****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

**3.11****oxygen reduction**

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

**3.12****protected volume**

effective volume of the space to be protected [SIST EN 16750:2017](https://standards.iteh.ai/catalog/standards/sist/31199a44-e99e-4988-aaa6-310b5f99ba97/sist-en-16750-2017)

**3.13****system**

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

**3.14****technical areas**

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

**3.15****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 concentration 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 shall be controlled automatically according to demand. Where necessary 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 / law. In case no national laws exist, further information can be found in Annex B.

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/areas 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 preventative fire protection. The introduction of nitrogen reduces the oxygen concentration of the air, thereby preventing the ignition or spread of fire.

## 4.4 Alarm organization and alarm plan

An alarm organization is required for the following purposes:

- to alert affected and responsible persons;
- to alert the fire brigade;
- to initiate other necessary protective measures.

## prEN 16750:2014 (E)

The responsibilities for the alarm organization shall be defined.

The alarm plan should cover key words to designate the basic measures that need to be taken in case of emergency.

## 5 Design

### 5.1 Qualification of the designer

The designer shall be sufficiently technically qualified to ensure effective protection. Where special circumstances, such as spatial configuration, structure, installations, combustible materials, fumes or gases, require special measures, the designer shall take these into account. In these cases the appropriate authorities shall be consulted.

### 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.

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

### 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.

**Table 1 — Structural partitions**

Level	Protection target	Protected volume	Specification	Achieved by
1	The contents of a room shall be protected from internal fires.	Room	Enclosing elements (walls, floor and roof) shall be sufficiently air tight <sup>a</sup> over the life time to protect from internal fires.	—
2	The contents of a room shall be protected from internal fires and from fires spreading from an external source.	Room	Enclosing elements (walls, floor and roof) shall be sufficiently air tight <sup>a</sup> over the life time and provide protection against the spread of fire from the surrounding area.	The construction of fire compartments according to the relevant guidelines.
<sup>a</sup> Openings shall be constantly sealed or sealable; otherwise allowances shall be made based on their dimensions.				

**NOTE** The user should be aware of the relationship between leakage, reduced oxygen air supply and the system duty cycle.

In the case of oxygen reduction systems all operational openings that are not included in the calculation of the required levels of oxygen shall be provided with closing mechanisms or monitored via limit switches. These operational openings include emergency exit doors and other doors, gates etc.