
Smoke and heat control systems —

**Part 7:
Smoke ducts sections**

*Systèmes pour le contrôle des fumées et de la chaleur —
Partie 7: Sections des conduits de désenfumage*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html. (standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 11, *Smoke and heat control systems and components*.

A list of all parts in the ISO 21927 series can be found on the ISO website.

Introduction

This document contains the basic performance and requirements for smoke control duct sections, which are to be used in conjunction with pressure differential systems and smoke and heat control systems. They may also be used to pressurize when gas extinguishing systems are used.

Particular reference is made to EN 1366-8 and EN 1366-9, which define the fire resistance testing associated with these products and EN 13501-4, which provides details on their fire resistance classification.

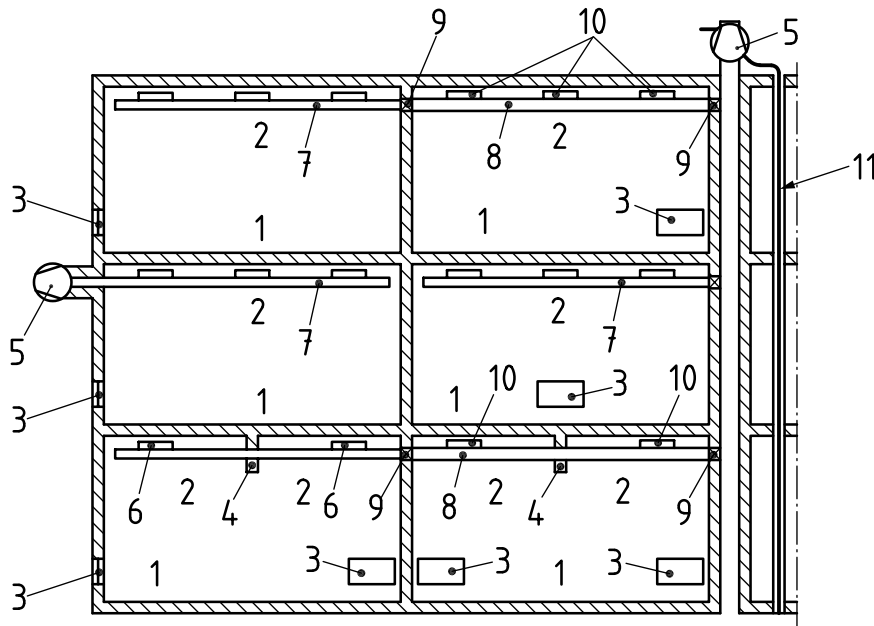
In addition to the prevention of transmission of smoke and combustion products from a fire zone, smoke control duct sections are utilized to contain the spillage of otherwise harmful and toxic extinguishing gases from the affected area, and for the control of pressurizing and excess air relief within pressurization systems.

Smoke control systems are designed to fulfil three basic functions.

- a) The extraction of smoke from a single fire compartment to the outside of the building.
- b) The extraction of smoke from fire compartments of a building, using a SHEVS connected to one or more fire compartments. The smoke control duct may or may not pass through other compartments of the building to reach the outside of the building.
- c) The use of pressurization to maintain smoke free clear areas.

Smoke control ducts are commonly used in smoke and heat control systems. They may serve single compartments or a number of different fire compartments. The systems may be dedicated smoke extraction or possibly a combined environmental ventilation/smoke extraction.

The smoke and heat control system may remove smoke using either high temperature fans (in accordance with ISO 21927-3) or natural ventilators (in accordance with ISO 21927-2).



Key

- 1 fire compartment
- 2 smoke reservoir
- 3 air inlet
- 4 smoke barrier
- 5 powered smoke and heat exhaust ventilator (fan)
- 6 smoke control dampers for single compartments
- 7 smoke control duct sections for single compartments
- 8 smoke control duct sections for multi compartments
- 9 smoke control dampers for multi compartments mounted inside or outside of wall or floor
- 10 smoke control dampers for multi compartments mounted on the surface of the duct
- 11 electrical equipment

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Figure 1 — Example of powered smoke and heat exhaust ventilation

Further guidance on the application of smoke control ducts may be found within the rest of the EN 12101 series and technical reports.

The areas for which products supplied to this document are considered applicable include, for example,

- a) commercial premises,
- b) shopping and retail centres,
- c) hospitals, and
- d) multi-residential buildings.

Smoke control duct sections are intended for use in the following types of systems, including

- 1) pressurization,
- 2) pressure relief,
- 3) extraction systems,
- 4) ductwork systems, and

5) inerting fire suppression systems.

It is realized that all the above systems do not address smoke directly, but similar properties are required of such smoke control ducts to limit leakage in a fire and smoke control situation.

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Smoke and heat control systems —

Part 7: Smoke ducts sections

1 Scope

This document applies to smoke control duct sections placed on the market and intended to operate as part of a pressure differential system or smoke and heat exhaust system. This document specifies requirements and gives reference to the test methods defined for smoke control duct sections and their associated components (for example, hangers and other items proven at the time of testing), which are intended to be installed in such systems in buildings. Furthermore, marking and information on installation and maintenance of these products are also given in this document.

NOTE To avoid duplication, reference is made to a variety of other standards. To this end, this document can be read in conjunction with EN 1366-8, EN 1366-9 and ISO 6944-1, for details of the fire resistance testing and EN 13501-4 for corresponding classification.

This document has not considered in detail the detrimental and/or corrosive effects that may be caused by process chemicals present in the atmosphere, which are drawn through the system intentionally or inadvertently.

This document also governs associated components used together with smoke control duct sections such as turning vanes and silencers, with the exception of natural and powered smoke ventilators and smoke control dampers, which are covered by separate standards.

Ducts for use other than in smoke and heat exhaust/control systems are not covered by this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 13943, *Fire safety — Vocabulary*

EN 1366-8, *Fire resistance tests for service installations — Part 8: Smoke extraction ducts*

EN 1366-9, *Fire resistance tests for service installations — Part 9: Single compartment smoke extraction ducts*

EN 13501-4, *Fire classification of construction products and building elements — Part 4: Classification using data from fire resistance tests on components of smoke control systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13943 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at <http://www.electropedia.org/>

— ISO Online browsing platform: available at <http://www.iso.org/obp>

**3.1
air inlet**

device connected to outside air to allow the entry of air from outside the construction works

**3.2
elevated temperature**

temperatures in excess of normal ambient air, below those necessary for fire resistance testing, to which smoke and heat exhaust ducts for single compartments are tested

**3.3
fire compartment**

enclosed space comprising one or more separate spaces, bounded by elements of construction having a specified fire resistance and intended to prevent the spread of fire (in either direction) for a given period of time

**3.4
natural smoke and heat control system**

smoke and heat ventilation system which uses natural ventilation

Note 1 to entry: Natural ventilation is caused by buoyancy forces due to differences in density of the gases because of temperature differences.

**3.5
penetration seal**

product used between the smoke control duct and the fire compartment boundary structure to maintain the fire resistance, when tested and having met the requirements of EN 1366-8, at the position where a smoke control duct passes through the element

**3.6
powered smoke and heat exhaust system**

smoke and heat ventilation system which utilizes a number of hot gas fans that are suitable for handling hot gases for a limited period of time which causes the positive displacement of gases

**3.7
pressure differential systems**

system of fans, ducts, vents and other features provided for the purposes of creating a lower pressure in the fire zone than in the protected space

**3.8
smoke and heat exhaust ventilation system
SHEVS**

system consisting of products and/or components jointly selected to exhaust smoke and heat

Note 1 to entry: The products and/or components form a system in order to establish a buoyant layer of warm gases above cooler cleaner air.

**3.9
smoke and heat exhaust ventilator
SHEV**

device specially designed to move smoke and hot gases out of a construction works under conditions of fire

**3.10
smoke barrier**

obstruction to restrict the spread of smoke and hot gases from a fire, forming part of the boundary of a smoke reservoir or used as a channelling screen, or used as a void edge boundary

**3.11
smoke control damper**

device automatically or manually activated, which may be open or closed in its operational position, to control the flow of smoke and hot gases into, from or within a duct

3.12**smoke control duct**

<horizontal> smoke control duct which passes horizontally through vertical walls

3.13**smoke control duct**

<multi-compartment fire resisting> fire resisting smoke control ducts built from more than one smoke control duct section for use in multi-compartment applications designed to transport smoke and/or hot gases away from the source of a fire

Note 1 to entry: May also have a dual function as a normal air conditioning duct.

3.14**smoke control duct**

<single compartment> smoke control ducts built from more than one smoke control duct section for use within single fire compartment application designed to transport smoke and/or hot gases away from the source of a fire

Note 1 to entry: May also have a dual function as a normal air conditioning duct.

3.15**smoke control duct**

<section> element of smoke control duct constructed to form part of a smoke control system

3.16**smoke control duct**

<vertical> smoke control duct which passes vertically through horizontal floors

3.17**smoke layer**

covering of smoke that stabilizes underneath the roof due to the effect of temperature gradient

3.18**smoke reservoir**

region within a building limited or bordered by smoke barriers or structural elements and which will, in the event of a fire, retain a thermally buoyant smoke layer

3.19**smoke zone****structural supports**

means of retaining the smoke control duct to the building structure

4 Smoke control duct section requirements**4.1 General****4.1.1 Fire resistance — multi-compartment smoke control duct section**

The multi-compartment smoke control duct section shall demonstrate the following and shall be classified in accordance with EN 13501-4:

- a) integrity: this shall be tested in accordance with the test method in 5.2 and the integrity classification (E) declared;
- b) insulation: this shall be tested in accordance with the test method in 5.2 and the insulation classification (I) declared;
- c) leakage: this shall be tested in accordance with the test method in 5.2 and the leakage classification (S) declared;