
**Smoke and heat control systems —
Part 8:
Smoke control dampers**

*Systèmes pour le contrôle des fumées et de la chaleur —
Partie 8: Volets des 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 the 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 dampers that are to be used in conjunction with pressure differential systems and smoke and heat control systems. They can also be used to pressurize when gas extinguishing systems are used.

Particular reference is made to EN 1366-10, which defines the furnace 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 dampers 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 the following 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 system 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.

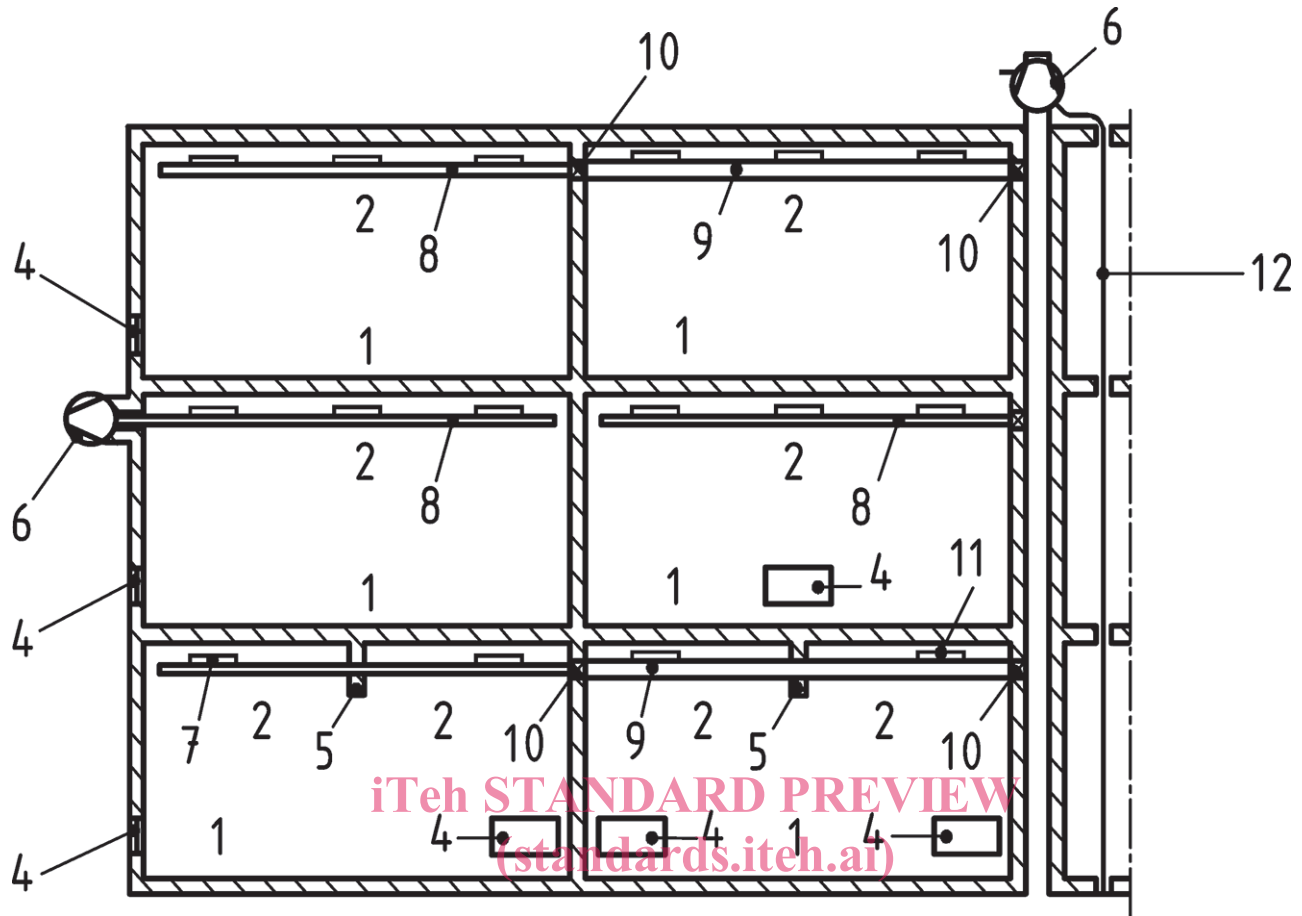
Smoke control dampers are commonly used in smoke and heat control systems as a means of limiting the number of ducts and high temperature fan units. The ducts into which such smoke control dampers are fitted generally serve a number of different fire compartments. The systems can be dedicated smoke extraction or possibly a combined environmental ventilation/smoke extraction.

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

It may be necessary for a number of reasons (fire growth, smoke release, etc.) that the open smoke control damper(s) is (are) required to close and that the damper(s) previously closed is (are) required to open.

The tests defined in this document are based on the assumption that when smoke is detected within a building, all smoke control dampers other than those serving the fire compartment/smoke reservoir (where the fire has initiated) remain closed or move to the closed position. All smoke control dampers serving the smoke-affected fire compartment/smoke reservoir remain open or move to the open position, and the fan(s) started/natural vents opened.

NOTE [Figure 1](#) gives examples of installation positions, but these are not the only positions where dampers can be fitted.



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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 ducts for single-compartments
- 8 smoke control ducts 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

Figure 1 — Example of powered smoke and heat exhaust ventilation

Further guidance on the application of smoke control dampers can 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 including, for example:

- a) commercial premises;
- b) shopping and retail centres;
- c) hospitals;

d) multi-residential buildings.

Smoke control dampers are intended for use in the following types of systems, including:

- 1) pressurization;
- 2) pressure relief;
- 3) extraction systems;
- 4) ductwork systems;
- 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 dampers to limit leakage in a fire and smoke control situation.

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Smoke and heat control systems —

Part 8: Smoke control dampers

1 Scope

This document applies to smoke control dampers, placed on the market and intended to operate as part of a pressure differential system or smoke and heat control system. This document specifies requirements and gives reference to the test methods defined for smoke control dampers and their associated components, such as actuators which are intended to be installed in such systems in buildings. Furthermore, provision on marking and information on installation and maintenance of these products are also given.

This document distinguishes between two categories of smoke control dampers, i.e. single-compartment smoke control dampers and multi-compartment fire-resisting smoke control dampers.

Smoke control dampers covered by this document can be installed into smoke control system ducts or onto the ducts' surface. They can be installed also into a wall, floor or ceiling/roof elements or onto the surface of these elements.

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 13501-4, EN 1366-10 and ISO 10294-1 for details of the furnace testing.

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

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 5135, *Acoustics — Determination of sound power levels of noise from air-terminal devices, air-terminal units, dampers and valves by measurement in a reverberation room*

ISO 7244, *Air distribution and air diffusion — Aerodynamic testing of dampers and valves*

ISO 10294-1, *Fire resistance tests — Fire dampers for air distribution systems — Part 1: Test method*

ISO 13943, *Fire safety — Vocabulary*

ISO 21927-9, *Smoke and heat control systems — Part 9: Specification for control equipment*

ISO 21927-10, *Smoke and heat control systems — Part 10: Specification for power output devices*

EN 1366-10, *Fire resistance tests for service installations — Part 10: Smoke control dampers*

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*

IEC 60068-2-52:1996, *Environmental testing — Part 2: Tests — Test Kb: Salt mist, cyclic (sodium chloride solution)*

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 inlet of air from outside the building

3.2

attended control room

room with people, who have the duty to control the smoke exhaust system permanently (24 hours per day, seven days per week), monitor the incoming signals from the smoke control systems and put the smoke control system into operation in case of smoke alarm

Note 1 to entry: This ensures that the smoke control system is running and items such as dampers are in position within the system response time.

3.3

elevated temperature

temperature in excess of normal ambient air, below those necessary for fire resistance testing, to which smoke and heat exhaust ducts for single-compartment are tested, to gain classification

3.4

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

3.5

interface control unit

device which controls the operation of the actuator located at the damper or within the same fire zone as the damper

3.6

multi-compartment smoke control damper

smoke control dampers, which are fire-resisting, for use in multi-compartment areas, which may be associated with multi- or single-compartment smoke control ductwork and/or may be installed in a fire compartment structure

3.7

multi-compartment fire-resisting smoke control duct

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.

Note 2 to entry: For more details, see ISO 21927-7.

3.8

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.

3.9**penetration seal**

product tested for use between the smoke control duct/damper and the fire compartment structure to maintain the fire resistance, at the position where a smoke control system duct passes through the element, or a damper is mounted in the element

3.10**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

3.11**pressure differential system**

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

3.12**remote signalling**

device located away from the damper which will indicate the damper position, open or closed

3.13**safety position**

position (open or closed) into which specific projects may require certain dampers to move, depending upon the fire location within the building

3.14**single-compartment smoke control damper**

smoke control damper for use in single-compartment areas, which may be associated with single-compartment smoke control ductwork and/or may be installed in an external wall or roof

3.15**single-compartment smoke control duct**

smoke control duct, 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.

Note 2 to entry: For more details, see ISO 21927-7.

3.16**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.

3.17**smoke and heat exhaust ventilator****SHEV**

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

3.18**smoke barrier**

barrier 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