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Smoke and heat control systems - Part 8: Smoke control dampers

Rauch- und Wärmefreihaltung - Teil 8: Entrauchungsklappen

Systèmes pour le contrôle des fumées et de la chaleur - Partie 8: Volets des désenfumage

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Smoke and heat control systems - Part 8: Smoke control dampers

Systèmes pour le contrôle des fumées et de la chaleur - Partie 8: Volets de désenfumage

Rauch- und Wärmefreihaltung - Teil 8: Entrauchungsklappen

This European Standard was approved by CEN on 17 March 2011.

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Foreword

This document (EN 12101-8:2011) 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of an identical text or by endorsement, at the latest by November 2011, and conflicting national standards shall be withdrawn at the latest by November 2011.

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.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This European Standard has the general title "*Smoke and heat control systems*" and consists of the following separate parts:

— Part 1: Specification for smoke barriers,

— Part 2: Specification for natural smoke and heat exhaust ventilators,

— Part 3: Specification for powered smoke and heat exhaust ventilators,

— Part 4: Installed SHEVS systems for smoke and heat ventilation (Technical Report (TR)),

— Part 5: Guidelines on functional recommendations and calculation methods for smoke and heat exhaust ventilation systems (TR),

— Part 6: Specification for pressure differential systems – Kits,

— Part 7: Smoke duct sections,

— Part 8: Smoke control dampers (this standard),

— Part 9: Control panels,

— Part 10: Power supplies.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard 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 pressurise when gas extinguishing systems are used.

Particular reference is required 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 utilised to contain the spillage of otherwise harmful and toxic extinguishing gases from the affected area, and for the control of pressurising and excess air relief within pressurisation systems.

Smoke control systems are designed to fulfil the following basic functions. These are:

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 pressurisation to maintain smoke free clear areas.

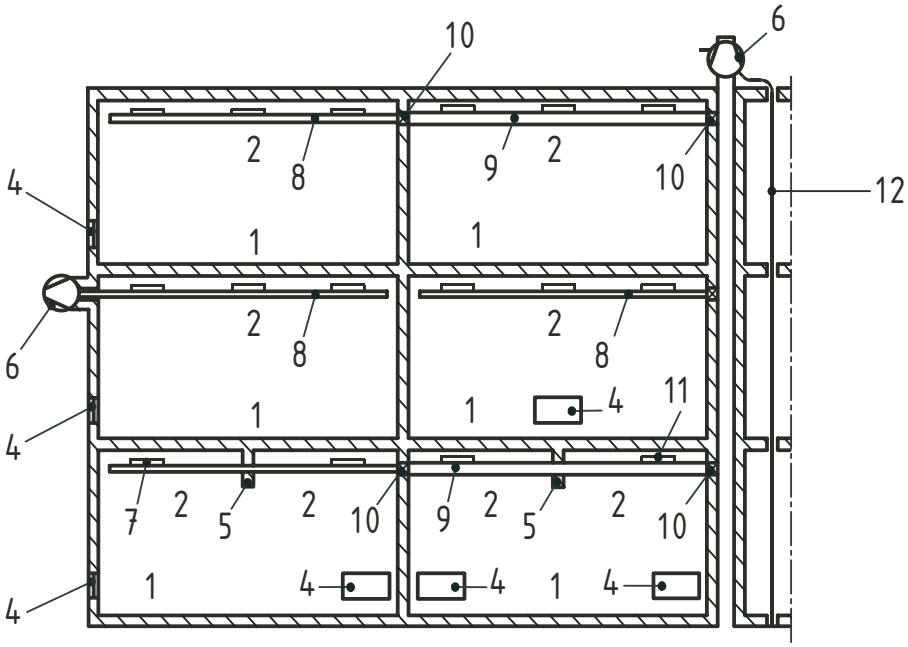
Smoke control dampers are commonly used in smoke and heat control systems as a means of limiting the number of ducts and high temperature fan units. The ducts into which such smoke control dampers are fitted generally serve a number of different fire compartments. The systems may be dedicated smoke extraction 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 EN 12101-3) or natural ventilators (in accordance with EN 12101-2).

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 standard 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 may be fitted.



Key

1 Fire compartment

2 Smoke reservoir

4 Air inlet

5 Smoke barrier

6 Powered smoke and heat exhaust ventilator (fan)

7 Smoke control dampers for single compartments (FprEN 12101-8 and EN 1366-10)

8 Smoke control ducts for single compartments (FprEN 12101-7 and EN 1366-9)

9 Smoke control ducts for multi compartments (FprEN 12101-7 and EN 1366-8)

10 Smoke control dampers for multi compartments (FprEN 12101-8 and EN 1366-10) mounted inside or outside of wall or floor

11 Smoke control dampers for multi compartments (FprEN 12101-8 and EN 1366-10) mounted on the surface of the duct

12 Electrical equipment

Figure 1 – Example of powered smoke and heat exhaust ventilation

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

The areas for which products supplied to this standard are considered applicable include 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) pressurisation,

2) pressure relief,

3) extraction systems,

4) ductwork systems,

5) inerting fire suppression systems.

It is realised 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.

1 Scope

This European Standard 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 standard 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. It also provides for the evaluation of conformity of these products to the requirements of this standard. Furthermore, provision on marking and information on installation and maintenance of these products are also given.

This European Standard distinguish 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 European Standard 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.

To avoid duplication, reference is made to a variety of other standards. To this end, this standard is to be read in conjunction with EN 13501-4, EN 1366-10 and EN 1366-2, for details of the furnace testing.

This standard does not consider 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.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 1366-2, *Fire resistance tests for service installations – Part 2: Fire dampers*

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

EN 1751, *Ventilation for buildings – Air terminal devices – Aerodynamic testing of dampers and valves*

prEN 12101-9, *Smoke and heat control systems - Part 9: Control panels*

EN 12101-10, *Smoke and heat control systems - Part 10: Power supplies*

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*

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

EN 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 5135:1997)*

EN ISO 13943, *Fire safety – Vocabulary (ISO 13943:2008)*

3 Terms and definitions

For the purposes of this document, the definitions given in EN ISO 13943, together with the following, apply.

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 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
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, 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 dampers
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 ducts
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 [EN 12101-7]

NOTE May also have a dual function as a normal air conditioning duct.

3.8
natural smoke and heat control system
smoke and heat ventilation system which uses natural ventilation

NOTE 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 utilises 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 dampers
smoke control dampers 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 ducts
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 [EN 12101-7]

NOTE May also have a dual function as a normal air conditioning duct.

3.16
smoke and heat exhaust ventilation system (SHEVS)
system consisting of products and/or components jointly selected to exhaust smoke and heat

NOTE 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

3.19
smoke control damper for systems with automatic activation
smoke control damper that is applicable to the systems defined in 3.26

3.20
smoke control damper for systems with manual intervention
smoke control damper that is applicable to the systems defined in 3.27 and 3.28

3.21
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

3.22
smoke control damper – horizontal installation
smoke control damper fitted in-line across a vertical duct, or on the top and bottom surface of a horizontal duct

3.23
smoke control damper – vertical installation
smoke control damper fitted in-line across a horizontal duct, or on the sides of a horizontal duct, or on any surface of a vertical duct

3.24
smoke control duct - section
element of smoke control duct constructed to form part of a smoke control system [EN 12101-7]

3.25
smoke control system with automatic activation
smoke control system (smoke and heat exhaust ventilation type or pressure differential type), that operates automatically on receipt of a smoke or fire alarm without any manual action/intervention

NOTE A system with an attended control room can also be accepted as an automatic system. Once initiated, the system will not cause the damper position to be changed.

3.26
smoke control system with automatic activation and with manual override
smoke control system (smoke and heat exhaust ventilation type or pressure differential type), that can be put into operation as 3.26 on receipt of a smoke or fire alarm, but once initiated the system will allow the damper position to be changed by external input or fireman's override

3.27
smoke control system with manual initiation
smoke control system (smoke and heat exhaust ventilation type or pressurization type), that has to be put into operation, on detection of smoke or fire, by human intervention (e.g. by pressing a button, or pulling a handle), leading to a sequence of automatic actions in the operation of the smoke control system

NOTE Once initiated, the system may allow the damper position to be changed by external input or fireman's override.

3.28
smoke free clear area
volume of air which is unpolluted by smoke

3.29
smoke layer
layer of smoke that stabilises underneath the roof due to the affect of temperature gradient

3.30
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