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Smoke and heat exhaust control systems - Part 7: Smoke ducts

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ICS

English version

Smoke and heat control systems - Part 7: Smoke control ducts

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Foreword

This document (prEN 12101-7:2004) 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.

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: Fire and smoke control installations – Kits,
- Part 6: Pressure differential – Kits,
- Part 7: Smoke control ducts,
- Part 8: Smoke control dampers,
- Part 9: Control panels and emergency control panels,
- Part 10: Power supplies.

EN 12101 is included in a series of European Standards planned to also cover:

- a) Gas extinguishing systems (EN 12094 and EN ISO 14520),
- b) Sprinkler systems (EN 12259),
- c) Powder systems (EN 12416),
- d) Explosion protection systems (EN 26184),
- e) Foam systems (EN 13565),
- f) Hose reel systems (EN 671),
- g) Water spray systems (EN BKWX).

Introduction

Smoke and heat exhaust ventilation systems (SHEVS) create a smoke free layer above the floor by removing smoke and thus improve the conditions for the safe escape and/or rescue of people and animals and the protection of property and permit the fire to be fought while still in its early stages. They also exhaust hot gases released by a fire in the developing stage.

The use of smoke and heat exhaust ventilation systems (SHEVS) to create smoke free areas beneath a buoyant smoke layer has become widespread. Their value in assisting in the evacuation of people from construction works, reducing fire damage and financial loss by preventing smoke logging, facilitating fire fighting, reducing roof temperatures and retarding the lateral spread of fire is firmly established.

Pressure differential systems are also available to assist in the evacuation of people, fire fighting and the reduction of smoke migration.

For these benefits to be obtained it is essential that smoke and heat control systems operate fully and reliably whenever called upon to do so during their installed life. A heat and smoke control system is a scheme of safety equipment intended to perform a positive role in a fire emergency.

Components for smoke and heat control systems should be installed as part of a properly designed smoke and heat control system.

Smoke and heat exhaust ventilation systems help to:

- keep the escape and access routes free from smoke,
- facilitate fire fighting operations by creating a smoke free layer,
- delay and/or prevent flashover and thus full development of the fire,
- protect equipment and furnishings,
- reduce thermal effects on structural components during a fire,
- reduce damage caused by thermal decomposition products and hot gases.

Powered SHEVS should operate based on powered ventilators. The performance of the powered smoke and heat exhaust system depends on:

- the temperature of the smoke,
- the size, number and location of the exhaust openings,
- the wind influence,
- the size, geometry and location of the inlet air openings,
- the time of actuation,
- the location and conditions of the system (for example arrangements and dimensions of the building).

SHEVS are used in buildings or construction works where the particular (large) dimensions, shape or configuration make smoke control necessary. Typical examples are:

- single and multi-storey shopping malls,

- single and multi-storey industrial buildings and warehouses; atria and complex buildings,
- enclosed car parks,
- stairways,
- tunnels,
- theatres.

Depending on differing circumstances and the situation of the building or construction works that can affect their performance, powered or natural smoke and heat control systems or pressure differential systems may be used.

It is specified in Parts 4 and 6 of this European Standard that powered and natural exhaust ventilators shall not be used to extract smoke and hot gases from the same smoke reservoir.

Special conditions apply where gas extinguishing systems (e.g. according to EN 12094 or EN ISO 14520) are used (see prEN 12101-4 and 6). It is the purpose of this standard to provide the additional requirements for smoke control system ducts to operate in these hostile conditions.

A number of different system designs are commonly in use to fulfil this function and separate into three distinct groups. These are:

- i) natural dedicated smoke and/or heat control systems,
- ii) powered dedicated smoke and/or heat control systems,
- iii) powered smoke and/or heat control systems that are used during the day to day running of the building or construction works and otherwise provide an environmental air provision function.

Each can then be separated further into smoke and/or heat control systems that serve a single fire compartment and those that, by the provision of smoke ducts, serve or pass through a number of fire compartments.

When a system is to be provided, it is necessary to ensure that any components do not fail and cause failure of the smoke and/or heat control system whilst working to control heat and/or smoke. Thus all components are tested to meet the performance requirements of the smoke control system duct into which they are to be installed following the principles described in this standard.

The components installed within a system are generally to:

- allow access to the duct for cleaning and inspection of ancillaries (e.g. access doors/panels),
- limit noise (silencers, attenuators),
- control air distribution within parts of the smoke control system duct (turning vanes at bends, volume control system ducts, etc.),
- give air flow/volume indication, and
- provide structural support to the system and control the direction of air/smoke movement at the terminals of the system (grilles).

1 Scope

This European Standard applies to smoke control system ducts operating as part of smoke and heat control systems, placed on the market. This standard specifies requirements and refers to test methods for smoke control system ducts which are intended to be installed in smoke and heat control systems in buildings.

This European Standard also governs components used within such duct systems, such as turning vanes and silencers, with the exception of natural and powered smoke ventilators and smoke control system dampers, which are covered by separate standards.

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

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1363-1, *Fire resistance tests — Part 1: General requirements*

EN 1363-2, *Fire resistance tests — Part 2: Alternative and additional procedures*

EN 1366-1, *Fire resistance tests for service installations — Part 1: Fire resistant ducts*

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

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

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

EN 12101-2, *Smoke and heat control systems — Part 2: Specification for natural smoke and heat exhaust ventilators*

EN 12101-3, *Smoke and heat control systems — Part 3: Specification for powered smoke and heat exhaust ventilators*

prEN 12101-4, *Smoke and heat control systems — Part 4: Fire and smoke installations — Kits*

prEN 12101-6, *Smoke and heat control systems — Part 6: Pressure differential systems — Kits*

prEN 12101-8, *Smoke and heat control systems — Part 8: Smoke control dampers*

prEN 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 ISO 5167-1, *Measurement of fluid flow by means of orifice plates, nozzles and venturi tubes inserted in circular cross section conduits running full*

EN ISO 9001:2000, *Quality management systems — Requirements*

EN ISO 13943, *Fire safety — Vocabulary*

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