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English Version

## Smoke and heat control systems - Part 4: Installed SHEVS systems for smoke and heat ventilation

Systèmes pour le contrôle des fumées et de la chaleur -  
Partie 4: Systèmes SEFCV installés pour l'évacuation de  
fumées et de chaleur par ventilation

Rauch- und Wärmefreihaltung - Teil 4: Anlagen zur Rauch-  
und Wärmefreihaltung im eingebauten Zustand

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## Foreword

This document (CEN/TR 12101-4:2006) has been prepared by Technical Committee CEN/TC 191 "Fixed firefighting systems", the secretariat of which is held by BSI.

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 European document (Technical Report) has the general title "*Smoke and heat control systems*" and consists of the following separate parts:

- *Part 1: Specifications 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.*
- *Part 5: Guidelines on functional recommendations and calculation methods for smoke and heat exhaust ventilation systems (published as CEN/TR 12101-5)*
- *Part 6: Specification for pressure differential systems - Kits*
- *Part 7: Smoke control ducts*
- *Part 8: Smoke control dampers*
- *Part 9: Control panels*
- *Part 10: Power supplies*

## Introduction

Smoke and heat exhaust ventilation systems 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. It contributes to the protection of property and permits 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 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. For these benefits to be obtained it is essential that smoke and heat exhaust ventilators operate fully and reliably whenever called upon to do so during their installed life. A heat and smoke exhaust ventilation system is a scheme of safety equipment intended to perform a positive role in a fire emergency.

Components for smoke and heat exhaust ventilation systems should be installed as part of a properly designed smoke and heat exhaust ventilation 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 damages caused by thermal decomposition products and hot gases.

A powered smoke exhaust system can also be used for the realisation of the following purposes:

- creation of a negative pressure differential facing the direction of escape for the prevention of the spread of smoke;
- local dilution of smoke within occupied zones.

Natural smoke and heat exhaust ventilators are devices fitted into the roof and /or upper walls of a construction works to allow smoke and fire gases to be exhausted from the construction works when driven by thermal buoyancy inherent in those gases. It is essential that they are able to open, and/or to remain open in the event of a fire and to fulfil their function even when climatic and weather conditions are unfavourable.

Depending on the building geometry and siting of the building with regard to neighbouring buildings, and design criteria, natural smoke and heat exhaust ventilators can be used instead of powered smoke and heat ventilators.

This Technical Report sets down the testing requirements for the system when installed to ensure that it operates in a safe and reliable manner. Commissioning, periodic maintenance and servicing requirements are stated as well as the users' responsibilities for ensuring that the system is always for use in case of fire.

Components of the SHEVS should be designed or chosen to meet the specific performance requirement of the system.

Without proper installation of all of its components, the SHEVS could not operate correctly nor meet the performance targets for which it has been designed.

Commissioning is necessary to check the SHEVS operates in accordance with its design. The system has to be permanently available for operation. This can only be achieved when checked and maintained.

## 1 Scope

This Technical Report applies to SHEVS when installed in a building. This Technical Report specifies the ability of the system to meet the required performances of the SHEVS as specified by the design of the system. This Technical Report requires that a detailed engineering design of the system exists but this standard does not state how the design is made. This Technical Report also covers requirements on components and compatibility between components to ensure that the requirements on the installed system will be met. This Technical report includes requirements for the assembly, installation, commissioning, function testing, maintenance, periodic servicing and routine testing of SHEVS.

## 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 12101-1, *Smoke and heat control systems — Part 1: Specification for smoke barriers*

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*

EN 12101-6, *Smoke and heat control systems — Part 6: Specification for pressure differential systems\_ - kits*

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 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 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests*

EN 13501-2, *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*

EN 13501-3, *Fire classification of construction products and building elements — Part 3: Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire 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 60529, *Specification for degrees of protection provided by enclosures (IP code) — Safety signs directive (92/58/EEC)*

EN ISO 5167-1, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 1: General principles and requirements (ISO 5167-1:2003)*

ISO 2408, *Steel wire ropes for general purposes – Minimum requirements*

ISO 5801, *Industrial fans -- Performance testing using standardized airways*

ISO 5221, *Air distribution and air diffusion - Rules to methods of measuring air flow rate in an air handling duct*

ISO 5168, *Measurement of fluid flow -- Procedures for the evaluation of uncertainties*

### 3 Definitions

For the purposes of this Technical Report, the following definitions apply (see also Annex C with drawings).

#### 3.1

##### **access level**

level of restriction for qualified persons of the access to specific equipment of a component

#### 3.2

##### **air inlet**

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

#### 3.3

##### **automatic activation**

initiation of operation of the smoke and heat venting installation without manual action

#### 3.4

##### **automatic and manual activation**

initiation of operation of the smoke and heat venting installation, which can be both automatic and manual

#### 3.5

##### **commissioning**

the act of ensuring that all components and the system are installed and operating in accordance with this standard

#### 3.6

##### **component**

component of a SHEVS is a complete product which is part of the SHEVS : ventilator, air inlet, electric cable, silencer, etc.

#### 3.7

##### **control panel**

device containing control and/or release devices, manual and/or automatic, used to operate the system

#### 3.8

##### **detailed engineering plan (DEP)**

document produced by the SHEVS designer giving technical specifications of the system, from which, by means of a detailed engineering plan, the specifications for the system may be derived. It includes details of controls, mode tables of how the system is to operate with particular design fires and the siting of components (see Annex D)

#### 3.9

##### **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

NOTE "Fire compartment" often has regulatory connotations. The term should not be confused with "room of origin" or "fire cell".