INTERNATIONAL STANDARD

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Smoke and heat control systems —

Part 3: Specification for powered smoke and heat exhaust ventilators

Systèmes de contrôle de fumée et de chaleur —

Partie 3: Spécifications pour les ventilateurs mécaniques d'évacuation des fumées et de la chaleur

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 21927-3 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*.

ISO 21927 consists of the following parts, under the general title *Smoke and heat control systems*:

— *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*

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 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 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.

It is important that components for smoke- and heat-exhaust systems be installed as part of a properly designed smoke and heat 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.

Depending on the design of the system and the ventilator, powered or natural smoke and heat ventilators can be used in a smoke- and heat-control system. Powered smoke- and heat-exhaust ventilators can be installed in the roof or upper part of walls of buildings or in a ducted system with the ventilator inside or outside the smoke reservoir or in a plant room.

It is important that powered smoke- and heat-exhaust ventilation systems operate based on powered ventilators. The performance of a powered smoke- and heat-exhaust system depends on

— the temperature of the smoke,

— size, number and location of the exhaust openings,

— the wind influence,

— 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).

Smoke- and heat-exhaust ventilation systems 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-exhaust ventilation systems can be used.

It is important that powered and natural exhaust ventilators not be used to extract smoke and hot gases from the same smoke reservoir.

Special conditions apply where gas extinguishing systems (e.g. in accordance with ISO 14520-1) are used.

Smoke and heat control systems —

Part 3:
Specification for powered smoke and heat exhaust ventilators

1 Scope

This part of ISO 21927 specifies requirements and gives methods for testing powered smoke- and heat-exhaust ventilators that are intended to be installed as part of a powered smoke- and heat-exhaust ventilation system. It also provides a procedure for approving a range of powered smoke- and heat-exhaust ventilators and their motors, from a limited number of tests.

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.

ISO 834-1, *Fire resistance tests — Elements of building construction — Part 1: General requirements*

ISO 5167 (all parts), *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full*

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

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

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

ISO 13943, *Fire safety — Vocabulary*

ISO 21927-2:2004, *Smoke and heat control systems — Part 2: Specification for natural smoke and heat exhaust ventilators*

IEC 60034-1, *Rotating electrical machines — Part 1: Rating and performance*

IEC 60034-2, *Rotating electrical machines — Part 2: Methods for determining losses and efficiency of rotating electrical machinery from tests (excluding machines for traction vehicles)*

3 Terms and definitions

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

3.1
smoke- and heat-control system
arrangement of components installed in a construction work to limit the effects of smoke and heat from a fire