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### Sistemi za nadzor dima in toplote - 3. del: Specifikacija za ventilatorje za odvod dima in toplote

Smoke and heat control systems - Part 3: Specification for powered smoke and heat control ventilators (Fans)

Rauch- und Wärmefreihaltung - Teil 3: Bestimmungen für maschinelle Rauch- und Wärmeabzugsgeräte

Systèmes pour le contrôle des fumées et de la chaleur - Partie 3: Specifications relatives aux ventilateurs pour le contrôle de fumées et de chaleur

Ta slovenski standard je istoveten z: **EN 12101-3:2015**

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## Smoke and heat control systems - Part 3: Specification for powered smoke and heat control ventilators (Fans)

Systèmes pour le contrôle des fumées et de la chaleur -  
Partie 3 : Spécifications relatives aux ventilateurs pour le  
contrôle de fumées et de chaleur

Rauch- und Wärmefreihaltung - Teil 3: Bestimmungen für  
maschinelle Rauch- und Wärmeabzugsgeräte

This European Standard was approved by CEN on 12 January 2015.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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## European foreword

This document (EN 12101-3:2015) 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of an identical text or by endorsement, at the latest by February 2016, and conflicting national standards shall be withdrawn at the latest by May 2017.

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 supersedes EN 12101-3:2002.

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) and/or EU Regulation(s).

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

This European Standard is part of the package of the European Standards EN 12101 covering smoke and heat control systems.

EN 12101, *Smoke and heat control systems*, consists of the following parts:

- *Part 1: Specification for smoke barriers — Requirements and test methods*
- *Part 2: Specification for natural smoke and heat control ventilators*
- *Part 3: Specification for powered smoke and heat control ventilators*
- *Part 4: Natural smoke and heat control ventilation systems — Installation and test methods* (published as CEN/TR 12101-4)
- *Part 5: Design and calculation for smoke and exhaust ventilation systems* (published as CEN/TR 12101-5)
- *Part 6: Specification for pressure differential systems- kits*
- *Part 7: Smoke duct sections*
- *Part 8: Smoke control dampers*
- *Part 10: Power supplies*
- *Part 11: Smoke control in car parks*
- *Part 12: SHEVS – Time dependent fires*
- *Part 13: Pressure differential systems (PDS) design and calculation methods, acceptance testing, maintenance and routine testing of installation*

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

**EN 12101-3:2015 (E)****Introduction**

Smoke and heat control 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.

In specific cases some fans are used to convey smoke (e.g. in tunnels or car parks). These fans, called jet fans or impulse fans are also within the scope of this standard.

The use of smoke and heat control 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 control ventilators operate fully and reliably whenever called upon to do so during their installed life. A heat and smoke control ventilation 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 control 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 control ventilators (fans) can be installed in the roof or upper part of walls of building or in a ducted system with the ventilator inside or outside the smoke reservoir or in a plant room.

Powered smoke and heat control ventilation systems should operate based on powered ventilators (fans). The performance of the powered smoke and heat control 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 control 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.

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**EN 12101-3:2015 (E)****1 Scope**

This European Standard specifies the products characteristics of powered smoke and heat control ventilators (fans) intended to be used as part of a powered smoke and heat control ventilation system in construction works.

It provides test and assessment methods of the characteristics and the compliance criteria of the test assessment results.

This European Standard applies to the following:

- a) fans for smoke and heat control ventilation;
- b) impulse/jet fans for smoke and heat control ventilation;

**2 Normative references**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1363 (all parts), *Fire resistance tests*

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

EN 60034-2-1, *Rotating electrical machines - Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles) (IEC 60034-2-1)*

EN 60034-18-41, *Rotating electrical machines - Part 18-41: Partial discharge free electrical insulation systems (Type I) used in rotating electrical machines fed from voltage converters - Qualification and quality control tests (IEC 60034-18-41)*

EN 60085, *Electrical insulation - Thermal evaluation and designation (IEC 60085)*

CLC/TS 60034-17, *Rotating electrical machines - Part 17: Cage induction motors when fed from converters - Application guide (IEC 60034-17)*

EN ISO 204, *Metallic materials - Uniaxial creep testing in tension - Method of test (ISO 204)*

EN ISO 5167 (all parts), *Measurement of fluid flow by means of pressure differential devices*

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

EN ISO 6892-1, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1)*

EN ISO 6892-2, *Metallic materials - Tensile testing - Part 2: Method of test at elevated temperature (ISO 6892-2)*

ISO 281, *Rolling bearings — Dynamic load ratings and rating life*

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

ISO 1099, *Metallic materials — Fatigue testing — Axial force-controlled method*

### 3 Terms, definitions, symbols and abbreviations

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### **ventilator**

term covering both natural or powered ventilators (fans)

#### 3.2

##### **powered smoke and heat control ventilator**

##### **PSHC ventilator**

smoke-ventilating fan that is suitable for handling smoke and hot gases for a specified time/temperature profile

#### 3.3

##### **dual purpose PSHC ventilator**

smoke-ventilating fan that has provision to allow its use for comfort (i.e. day to day) ventilation

#### 3.4

##### **emergency PSHC ventilator**

smoke-ventilating fan that is not used for comfort (i.e. day to day) ventilation

#### 3.5

##### **smoke reservoir**

region within a building limited or bordered by smoke curtains or structural elements and which will in the event of a fire retain a thermally buoyant smoke layer

#### 3.6

##### **powered roof ventilator**

fan designed for mounting on a roof and having exterior weather protection

#### 3.7

##### **thermal insulated ventilator**

ventilator insulated to limit the external surface temperature to reduce the danger of injury to persons or damage to materials (see 5.3.1)

#### 3.8

##### **smoke reservoir ventilator**

ventilator suitable for operation fully immersed in a smoke reservoir

#### 3.9

##### **non smoke reservoir ventilator**

ventilator not suitable for operation fully immersed in a smoke reservoir

#### 3.10

##### **series-produced powered ventilator product family**

physically similar fans using the same form of construction and materials throughout, with the same methods of impeller construction, motor mounting and construction, and electrical connection in which the following may vary across the range:

- overall dimensions of the fans; and/or
- the impeller diameter and width, hub size, blade length and number of blades of the impeller; and/or;
- the motor details, as per 3.12, 3.13, 3.14 and 3.15

**EN 12101-3:2015 (E)****3.11****impulse/jet fans for smoke and heat control ventilation**

fan used for producing a jet of air in a space and unconnected to any ducting

Note 1 to entry The air jet may be used, for example, for adding momentum to the air within a duct, a tunnel or other space, or for intensifying the heat transfer in a determined zone.

**3.12****non-series produced fans for smoke and heat control ventilation**

fans that are:

- individually designed and manufactured, upon request and for specific purposes, needing to readjust the production machines for their manufacture in order to be used in the work concerned; or
- custom-made for a specific order to obtain one or several end use performances different from products manufactured in series, even if produced according to the same manufacturing process/system design.

Note 1 to entry These are products of individual design that are ordered for and installed in one and the same known work. They should neither be part of a range of equal products, which is manufactured in series of the same kind combining usual components in the same way, nor should they and their field of application (e.g. dimensions, weight) be offered on the general initiative of the manufacturer (e.g. by means of published catalogues or other ways of advertising).

**3.13****three phase motor family**

motors which are physically similar, using the same form of construction i.e. same materials and manufacturing method for carcass, cooling impeller, when fitted, and end covers; same insulation materials which includes sheet insulation used for coil separation and slot insulation, winding impregnation material (varnish or resin etc., lead insulation, terminal blocks and any other materials that could affect the integrity of the insulation); same bearing type, class of fit, lubricant and arrangement, with motor windings based on the same maximum winding temperature and class of insulation.; in which the following may vary across the range:

- frame size; <https://standards.iteh.ai/catalog/standards/sist/429e1f04-d544-49c2-8925-1d1c3a9cbe3f/sist-en-12101-3-2015>
- the rotational speed;
- the electrical windings, including multi-speed;
- the form of mounting, e.g. foot, flange, pad, clamp, etc.

**3.14****single phase motor family**

motors which are physically similar, using the same form of construction i.e. same materials and manufacturing method for carcass, cooling impeller, when fitted, and end covers; same insulation materials which includes sheet insulation used on for coil separation and slot insulation, winding impregnation material (varnish or resin etc., lead insulation, terminal blocks and any other materials that could affect the integrity of the insulation); same bearing type, class of fit, lubricant and arrangement, with motor windings based on the same maximum winding temperature and class of insulation, same capacitor type and same location of the capacitor; in which the following may vary across the range:

- the frame size;
- the rotational speed;
- the electrical windings, including multi-speed;
- the form of mounting, e.g. foot, flange, pad, clamp, etc.

**3.15****motor rating**

motor rating (rated power) is the maximum power that the motor will deliver continuously without exceeding the allowable temperature rise

**3.16****fire open position**

position of a component to be reached and maintained while venting smoke and heat

**4 Requirements****4.1 Response delay (response time)****4.1.1 Opening under wind load within a given time**

If the fan is designed to be installed at the atmospheric termination of a smoke control system (e.g. powered roof ventilator) and is fitted with a fan shutter flaps or louvers which project above the wind deflectors (cowl or wind shield), the shutter, flaps or louvers shall open in less than 30 s when tested in accordance with 5.2.1.

**4.1.2 Opening under snow load within a given time**

If the fan is designed to be installed at the atmospheric termination of a smoke control system (e.g. powered roof ventilator) and is fitted with a fan shutter flaps or louvers which project above the wind deflectors (cowl or wind shield), the shutter, flaps or louvers shall open in less than 30 s when tested in accordance with 5.2.2.

**4.2 Operational reliability****4.2.1 General**

Operational reliability of a PSHC ventilator (fan) shall be demonstrated by verification against application categories and by verification of motor ratings.

**4.2.2 Application categories**

To demonstrate its operational reliability, a PSHC ventilator (fan) has to be verified against categories:

The following Table 1 shows the relevant method to allocate the results in the corresponding category:

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SIST EN 12101-3:2015  
<https://standards.iteh.ai/catalog/standards/sist/429e1f04-d544-49c2-8925-1d1c3a9cbe3f/sist-en-12101-3-2015>