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Smoke and heat control systems —

Part 10: Specification for power output devices

Systèmes pour le contrôle des fumées et de la chaleur —

Partie 10: Spécifications pour les sources d'alimentation

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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 21927-10 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*

— *Part 9: Specification for control equipment*[1)]

— *Part 10: Specification for power output devices*

1) To be published.

Introduction

Smoke and heat control systems (SHCS) create and maintain smoke-free areas in a construction works by controlling smoke flow and thus improve the conditions for the safe escape and/or rescue of people and animals and the protection of property. They also permit fighting a fire while it is still in its early stages. 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. To obtain these benefits, 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 composite of safety equipment intended to perform a positive role in a fire emergency.

It is expected that components for any smoke and heat control system will be installed as part of a properly designed system.

Smoke and heat control systems help to

— keep the escape and access routes free from smoke,

— facilitate fire fighting operations,

— 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, natural or powered smoke and heat ventilators can be used in a smoke and heat control system.

Control equipment is required to control all components in an SHCS, such as

— natural ventilators,

— powered ventilators,

— smoke barriers,

— smoke dampers,

— air inlets.

Control equipment is dealt with in ISO 21927-9.

Pressure differential systems are used to either positively pressurize spaces separated from the fire or to depressurize the space containing the fire in order to limit or prevent the flow of smoke and heat into adjacent spaces. A typical use is to pressurize an escape stairwell in order to protect vertical means of escape.

Depending on the design of the system, natural or powered smoke and heat ventilation can be used in a smoke and heat control system.

Power output devices for a smoke and heat control system can be for pneumatic systems, low-voltage or extra-low-voltage electrical systems, or a combination of any of these.

Smoke and heat control system power output devices can also provide power for day-to-day ventilation and for other fire safety equipment under fire conditions.

Smoke and heat control systems —

Part 10:
Specification for power output devices

1 Scope

This part of ISO 21927 specifies requirements and gives test methods for primary and secondary electrical and pneumatic power output devices, designed for use in smoke and heat control systems in buildings.

NOTE A summary of functions is given in Annex A.

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 6988, *Metallic and other non organic coatings — Sulfur dioxide test with general condensation of moisture*

ISO 8528-1, *Reciprocating internal combustion engine driven alternating current generating sets — Part 1: Application, ratings and performance*

ISO 8528-2, *Reciprocating internal combustion engine driven alternating current generating sets — Part 2: Engines*

ISO 8528-3, *Reciprocating internal combustion engine driven alternating current generating sets — Part 3: Alternating current generators for generating sets*

ISO 8528-4, *Reciprocating internal combustion engine driven alternating current generating sets — Part 4: Controlgear and switchgear*

ISO 8528-5:2005, *Reciprocating internal combustion engine driven alternating current generating sets — Part 5: Generating sets*

ISO 8528-6, *Reciprocating internal combustion engine driven alternating current generating sets — Part 6: Test methods*

ISO 8528-7, *Reciprocating internal combustion engine driven alternating current generating sets — Part 7: Technical declarations for specification and design*

ISO 8528-10, *Reciprocating internal combustion engine driven alternating current generating sets — Part 10: Measurement of airborne noise by the enveloping surface method*

ISO 8528-12:1997, *Reciprocating internal combustion engine driven alternating current generating sets — Part 12: Emergency power supply to safety devices*

ISO 8573-1, *Compressed air — Part 1: Contaminants and purity classes*

ISO 9809-1:2010, *Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 1: Quenched and tempered steel cylinders with tensile strength less than 1 100 MPa*

ISO 9809-2:2010, *Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa*

ISO 9809-3:2010, *Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Part 3: Normalized steel cylinders*

ISO 12100-1, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

ISO 12100-2, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

ISO 21927-9[2)], *Smoke and heat control systems — Part 9: Specification for control equipment*

EN 286-1, *Simple unfired pressure vessels designed to contain air or nitrogen — Part 1: Pressure vessels for general purposes*

EN 1964-1, *Transportable gas cylinders — Specification for the design and construction of refillable transportable seamless steel gas cylinders of water capacities from 0,5 litre up to and including 150 litres — Part 1: Cylinders made of seamless steel with an R_m value of less than 1 100 MPa*

EN 13293, *Transportable gas cylinders — Specification for the design and construction of refillable transportable seamless normalized carbon manganese steel gas cylinders of water capacity up to 0,5 litre for compressed, liquefied and dissolved gases and up to 1 litre for carbon dioxide*

EN 50130-4, *Alarm systems — Part 4: Electromagnetic compatibility — Product family standard: Immunity requirements for components of fire, intruder and social alarm systems*

IEC 60068-1, *Environmental testing — Part 1: General and guidance*

IEC 60068-2-1, *Environmental testing — Part 2-1: Tests — Test A: Cold*

IEC 60068-2-6, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal)*

IEC 60068-2-47, *Environmental testing — Part 2-47: Tests — Mounting of specimens for vibration, impact and similar dynamic tests*

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

IEC 60068-2-75, *Environmental testing — Part 2-75: Tests — Test Eh: Hammer tests*

IEC 60068-2-78, *Environmental testing — Part 2-78: Tests — Test Cab: Damp heat, steady state*

IEC 60204-1, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 60529, *Degrees of protection provided by enclosures (IP code)*

Guideline 84/525/EWG *of the advice from 17 September 1984 for the adjustment of the legislation of the member states over smooth gas bottles from unalloyed aluminium and aluminium alloys*

2) To be published.

3 Terms and definitions and abbreviated terms

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

3.1 Terms and definitions

3.1.1
final voltage
lowest recommended voltage to which a battery should be discharged

NOTE The final voltage is specified by the battery manufacturer.

3.1.2
$I_{max\ a}$
maximum standby current

3.1.3
$I_{max\ b}$
maximum short duration current

3.1.4
multiple-use gas bottle
gas bottle that is held open to the system and can operate the system a number of times before it is necessary that it be replaced or refilled

3.1.5
power output device
source or store of power or a means of automatically switching between separate power sources

3.1.6
primary power source
power supply that is used whenever it is available

3.1.7
secondary power source
power supply that automatically replaces the primary power source in the event of its failure

3.1.8
single-use gas bottle
gas bottle that remains sealed until pierced for once-only emergency use

3.1.9
smoke and heat control system
arrangement of components installed in a building to limit the effects of smoke and heat from a fire

3.1.10
smoke and heat exhaust ventilation system
SHEVS
system comprised of components that together exhaust smoke and heat to establish a buoyant layer of warm gases above cooler, cleaner air

3.1.11
smoke and heat exhaust ventilator
SHEV
device specially designed to move smoke and hot gases out of the building under conditions of fire

3.2 Abbreviated terms

p.o.d.: power output device

c.p.: control panel

FPC: factory production control

4 General requirements — Electrical

4.1 General

If a smoke and heat control system fails to the “fire operational” position on loss of power, only one power source shall be required. For non-fail safe smoke and heat control systems, there shall be at least two power sources: the primary power source and the secondary power source. The primary power source shall be designed to operate from the public electricity supply or an equivalent system. The secondary power source, for example batteries or a generator, shall be permanently available, tested and maintained.

Each power source, on its own, shall be capable of operating those parts of the smoke and heat control system for which it is intended.

If the primary power source fails, then the p.o.d. shall be automatically switched over to a secondary power source. When the primary power source is restored, the p.o.d. shall be automatically switched back.

If the switching from one power source to the other causes an interruption in supply of power, the duration of the interruption shall be specified in the manufacturer's data (see Clause 9).

Where there are two or more power sources, failure of one of the power sources shall not cause the failure of any other power source or the failure of the supply of power to the system.

The p.o.d. shall be classified as either

— class A: suitable for use with all systems, or

— class B: suitable for use with fail safe systems only.

Monitoring of transmission paths, if required, shall be by the c.p., not the p.o.d.; see ISO 21927-9.

When subjected to the functional test in 12.1, the p.o.d. shall satisfy the requirements of 12.1.3.

The secondary power source may also be used for other functions, e.g. day-to-day comfort ventilation. When used in this way, the p.o.d. shall ensure that sufficient power is retained for emergency use as specified in Clause 6, e.g. by preventing further use for the other functions.

The compatibility of a separate p.o.d. with other equipment, for example the c.p., should be taken into account by the system designer.

NOTE The use of frequency converters for day-to-day ventilation within smoke control systems is dealt with in ISO 21927-9.

