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Fixed firefighting systems - Condensed aerosol extinguishing systems - Part 1: Requirements and test methods for components

Ortsfeste Brandbekämpfungsanlagen - Löschanlagen für kondensierte Aerosole - Teil 1: Anforderungen und Prüfverfahren für Bauteile

Installations fixes de lutte contre l'incendie - Systèmes d'extinction a aérosol - Partie 1 : Exigences et méthodes d'essais pour les éléments constitutifs

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (CEN/TR 15276-1:2009) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This document has the general title *Fixed fire-fighting systems – Condensed aerosol extinguishing systems* and will consist of the following parts:

— Part 1: *Requirements and test methods for components;*

— Part 2: *Design, installation and maintenance*.

Introduction

It has been assumed in the preparation of this document that the execution of its provisions is entrusted to appropriately qualified and experienced people in the specification, design, installation, testing, approval, inspection, operation and maintenance of systems and equipment, for whose guidance it has been prepared, and who can be expected to exercise a duty of care to avoid unnecessary release of extinguishant.

Product certification: Users of this document are advised to consider the desirability of independent certification of product conformity with this document based on testing and continuing surveillance, which may be coupled with assessment of manufacturer quality systems against EN ISO 9001.

Fire-fighting systems covered in this document are designed to provide a supply of fixed condensed aerosol extinguishing medium to extinguish fire.

The requirements of this document are made in the light of the best technical data known to the working group at the time of writing but, since a wide field is covered, it has been impracticable to consider every possible factor or circumstance that might affect implementation of the requirements.

It is important that the fire protection of a building or plant be considered as a whole. Aerosol extinguishant systems form only a part, though an important part, of the available facilities, but it should not be assumed that their adoption necessarily removes the need to consider supplementary measures, such as the provision of portable fire extinguishers or other mobile appliances for first aid or emergency use, or to deal with special hazards.

Aerosol extinguishants have been recognized as effective media for the extinction of Class A fires (solid surface burning fires) and Class B and Class C fires according to EN 2, but it should not be forgotten, in the planning of comprehensive schemes, that there may be hazards for which these mediums are not suitable, or that in certain circumstances or situations there may be dangers in their use requiring special precautions.

Advice on these matters can be obtained from the appropriate manufacturer of the aerosol generators or the extinguishing system. Information may also be sought from the appropriate fire authority, the health and safety authorities and insurers. In addition, reference should be made as necessary to other national standards and statutory regulations.

It is essential that fire-fighting equipment be carefully maintained to ensure instant readiness when required. Routine maintenance is liable to be overlooked or given insufficient attention by the owner of the system. It is, however, neglected at peril to the lives of occupants of the premises and at the risk of crippling financial loss. The importance of maintenance cannot be too highly emphasised.

Condensed aerosol may contain traces of toxic substances like those produced by a fire, and will obscure vision like smoke from fire.

1 Scope

This document specifies requirements, describes test methods for condensed aerosol extinguishing components and covers solely condensed aerosols.

This document is not intended to indicate approval of the extinguishants listed herein by the appropriate authorities, as other extinguishants may be equally acceptable.

This document is intended as a standard covering solely condensed aerosol.

The condensed aerosol generator typically consists of the following main components:

a) solid aerosol-forming compound;

b) cooling mechanism;

c) ignition device(s);

d) end plate discharge outlet(s);

e) housing;

f) mounting bracket.

This document does not cover dispersed aerosols.

This document requires, as a precaution, that the room is evacuated and sealed off whenever a generator is activated. Precautions include evacuation of the proximity area, criteria for re-entering and other safeguards as stated in Clause 5 of CEN/TR 15276-2:2009.

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 316, *Wood fibreboards – Definition, classification and symbols*

EN 622 (all parts)*), Fibreboards – Specifications*

EN 60068-2-6, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal) (IEC 60068-2-6:2007)*

EN 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp Heat, cyclic (12 h + 12 h cycle) (IEC 60068-2-30:2005)*

ISO 209, *Aluminium and aluminium alloys – Chemical composition*

ISO 5660-1, *Reaction-to-fire tests – Heat release, smoke production and mass loss rate – Part 1: Heat release rate (cone calorimeter method)*

3 Terms and definitions

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

3.1
authority
organisation, office or individual responsible for approving equipment, installations or procedures in determining acceptability

NOTE The authority may base acceptance on conformity to the appropriate standards.

3.2
clearance

3.2.1
electrical clearance
unobstructed air distance between extinguishing system equipment and unenclosed or uninsulated live electrical components not at ground potential

3.2.2
thermal clearance
air distance between a condensed aerosol generator and any structure or components sensitive to the temperature developed by the generator

3.3
condensed aerosol
extinguishing medium consisting of finely divided solid particles and gaseous matter, these being generated by a combustion process of a solid aerosol-forming compound

3.4
condensed aerosol generator
non-pressurised device which, when activated, generates an aerosol. It includes the mounting brackets

3.5
design factor
extinguishing factor multiplied by the safety factor, required for system design purposes

NOTE 1 The design factor is expressed in grams per cubic metre.

NOTE 2 Extinguishing factor and design factor have been introduced as an alternative to extinguishing concentration and design concentration respectively as concentration of the actual aerosol cannot be measured or even assessed in some cases (the discharged medium, apart from the condensed aerosol, may contain products of the thermal decomposition of a chemical coolant).

3.6
discharge time
time from the generator activation to the end of its discharge

3.7
extinguishing application density
minimum mass of a specific aerosol-forming compound per cubic metre of enclosure volume required to extinguish fire involving a specific fuel under defined experimental conditions, excluding any safety factors

NOTE The extinguishing factor is expressed in grams per cubic metre.

3.8
family
group of generators with same solid compound, same kind of cooling device, same kind of discharge outlet, same ignition device, same layout and same internal/external architecture

3.9
ignition device
any device which is able to ignite the solid aerosol-forming compound

3.10
listing authority
recognized fire protection testing and approval body (notified laboratory)

3.11
maintenance
thorough check to give maximum assurance that the extinguishing system will operate as intended

NOTE It includes a thorough examination and any necessary repair or replacement of system components.

3.12
manufacturer
legal person that is responsible for the design, manufacturing, packaging and quality assurance of a device before it is placed on the market

3.13
monitoring
supervision of the operating integrity of an electrical, mechanical, pneumatic or hydraulic control feature of a system

3.14
protected volume
volume enclosed by the building elements around the protected enclosure, minus the volume of any permanent impermeable building element within the enclosure

3.15
release
physical discharge or emission of an aerosol as a consequence of the generator actuation

3.16
safety factor
multiplier of the extinguishing factor to determine the design factor

3.17
solid aerosol-forming compound
mixture of oxidant, combustible component and technical admixtures producing fire extinguishing aerosol upon ignition

3.18
supplier
legal person that is responsible for the product and is able to ensure that its quality is ensured

3.19
thermal ignition device
device which automatically operates at a rated temperature and is arranged for the ignition of the solid aerosol-forming compound

3.20
test house
establishment having all relevant test equipment to carry out the required tests

4 Component requirements

4.1 Condensed aerosol generator

The condensed aerosol generator typically consists of the following main components:

a) solid aerosol-forming compound;

b) cooling mechanism;

c) ignition device(s);

d) end plate discharge outlet(s);

e) housing;

f) mounting bracket.

The generator is a non-pressurised canister, because aerosol is generated and distributed by the combustion process of the solid aerosol-forming compound.

4.2 Solid aerosol-forming compound

Upon actuation of the condensed aerosol generator, the solid aerosol-forming compound shall undergo the combustion reaction producing a fire extinguishing aerosol.

4.3 Cooling mechanism

The cooling mechanism shall provide an adequate cooling of the hot aerosol prior to its discharge into the enclosure.

4.4 Ignition device

4.4.1 General

The ignition device is arranged to initiate the aerosol-forming compound.

If the ignition device is a complex device incorporating several components, all such components shall be specified by the manufacturer.

4.4.2 Electrical ignition device

The electrical ignition device shall be capable of operating via an electrical input and arranged to initiate the aerosol-forming compound.

4.4.3 Thermal ignition device

The thermal ignition device shall be capable of operating at a rated temperature and arranged to initiate the aerosol-forming compound.

4.4.4 Other methods of ignition device

Methods capable to ignite the aerosol-forming compound, other than 4.4.2 and 4.4.3, shall be specified.

4.5 End plate and housing

The outer case and all parts inside the generator shall be made of corrosion-resistant material or shall be suitably treated to resist corrosion. The manufacturer shall ensure that the materials of construction are also compatible with the solid aerosol-forming compound and the cooling device so that corrosion or chemical action does not occur.

Materials for non-metallic components that are exposed to ultraviolet light shall be UV-stabilised.

4.6 Extinguishants

The extinguishants referred to in this document are electrically non-conductive media.

5 Condensed aerosol generators requirements

5.1 General

The test samples shall conform to the technical description (drawings, parts list, description of function, operating instructions) as stated by the manufacturer (see 5.16 and 7.3).

The manufacturer shall specify the minimum distance from the generator outlet to the first obstacle.

The manufacturer shall specify the minimum and maximum mass of aerosol compound discharged from the generator

5.2 Extinguishing factor

The extinguishing factor for specific fuels under different classes of fires shall be determined by test using the fire test protocol described in Annex A.

5.3 Agent distribution

The maximum area coverage and the related maximum and minimum height of the protected enclosure for each aerosol generator unit size shall be determined by test using the fire test protocol described in 7.5.

5.4 Discharge time

The discharge time required to achieve 95 % of the minimum design application density shall be specified by the manufacturer and shall not exceed 90 s when tested in accordance with 7.6.

5.5 Ambient temperature and humidity operation ranges

Condensed aerosol generators shall operate at ambient temperatures as specified by the manufacturer and as a minimum requirement from – 20 °C to + 50 °C.

Condensed aerosol generators shall operate at ambient humidity up to 95 %.

These operation ranges shall be verified by the temperature and humidity operation range tests as described in 7.7.

5.6 Service life

The service life of condensed aerosol generator under specific conditions, as described in 5.5, shall be specified by the manufacturer and as a minimum requirement shall not be less than 5 years.

The specified service life shall be verified by test using the accelerated ageing test as described in 7.8.

5.7 Shelf life and storage conditions

The shelf life and storage conditions shall be specified by the manufacturer.

5.8 Corrosion

The aerosol generator shall operate according to 7.16 and shall show no sign of damage which could alter the proper extinguishing action after being subjected to the corrosion test described in 7.9.

Any copper alloy part used in the component shall not crack, when tested in accordance with 7.10 (stress corrosion test).

5.9 Vibration

The aerosol generator shall operate according to 7.16 after being subjected to a vibration test described in 7.11.

5.10 Mechanical shock

The aerosol generator shall operate according to 7.16 after being subjected to an impact test as described in 7.12.

The aerosol generator shall operate according to 7.16 after being subjected to a drop test as described in 7.13.

5.11 Discharge temperature

5.11.1 General

The requirements of 5.11.2 and 5.11.3 shall be verified by test according to the procedure described in 7.14.

5.11.2 Casing temperature

The manufacturer shall specify the maximum developed temperature for aerosol casing that shall not exceed 400 °C.

5.11.3 Aerosol flow temperature

The manufacturer shall specify the distance from the aerosol generator discharge outlet to the point where the temperatures do not exceed 75 °C, 200 °C and 400 °C.

5.12 Ignition device

5.12.1 General

The characteristics of the ignition device shall be verified and the reliability of operation tested by using the test method as described in 7.15.

5.12.2 Electrical ignition device

The manufacturer shall specify at least the minimum activation current and its duration, form of the signal, maximum monitoring current, range of voltage and the type of connection for a multiple generators arrangement.