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Vgrajeni gasilni sistemi - Sistemi s pršečo vodo - Načrtovanje in vgradnja

Fixed firefighting systems - Watermist systems - Design and installation

Ortsfeste Brandbekämpfungsanlagen - Feinsprüh-Löschanlagen - Planung und Einbau

Installations fixes de lutte contre l'incendie - Systèmes à brouillard d'eau - Conception et installation

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Installations fixes de lutte contre l'incendie - Systèmes à brouillard d'eau - Conception et installation

Ortsfeste Brandbekämpfungsanlagen - Feinsprüh-Löschanlagen - Planung und Einbau

This Technical Specification (CEN/TS) was approved by CEN on 28 September 2010 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (CEN/TS 14972:2011) 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 document supersedes CEN/TS 14972:2008.

This Technical Specification (TS) was adopted by CEN for which there is the future possibility of agreement on a European Standard, but for which at present:

- the required support for approval as a European Standard cannot be obtained;
- there is doubt on whether consensus has been achieved;
- the subject matter is still under technical development.

This Technical Specification is established with a view to serving, for instance, the purpose of:

- publishing aspects of a subject which may support the development and progress of the European market;
- giving guidance to the market on or by specifications and related test methods;
- providing specifications in experimental circumstances and/or evolving technologies.

The CEN members are requested to submit their comments and experiences with the use of these requirements and recommendations to the Secretariat of the responsible Technical Committee CEN/TC 191.

CEN/TC 14972:2008 was reviewed and replaced with this new edition.

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

Introduction

The main purpose of this document is to provide information about the minimum requirements on watermist systems.

This document describes a series of specific test conditions to set out criteria capable of verifying performance claims of watermist systems, classify and determine the extent of their suitability for intended applications, whilst setting a minimum level of acceptable performance and/or safety.

As individual watermist applications have varied requirements and duty, this document is intended to apply to both skidded stand alone and pumped systems. It is the approving authority's responsibility to assess and implement the design manual of specific watermist systems against the tests set out in this document.

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1 Scope

This Technical Specification specifies minimum requirements and gives information on design, installation and testing and gives criteria for the acceptance of fixed landbased watermist systems for specific hazards and provides fire test protocols for a variety of hazard groups.

The requirements are not valid for watermist systems on ships, in aircraft, on vehicles and mobile fire appliances or for below ground systems in the mining industry.

Aspects of watermist associated with explosion protection are beyond the scope of this document.

The fire tests in this document apply to the applications as described in Annex A. Extrapolation is not covered.

The document is not a universal design manual for watermist systems, as different systems have different characteristics and hence follow different design criteria to satisfy their duty requirements.

In the absence of a generalized design method, it is the intent of this document that watermist systems are full-scale fire tested and its system component evaluations are conducted by qualified testing laboratories.

The full system acceptance requires the relevant fire test report, the component test report(s) as well as manufacturer's design, installation, operation and maintenance manual for the application.

If the gas in the system is a significant factor for extinguishment/suppression, the relevant parts of EN 12094 and EN 15004-1 are applicable.

Firefighting systems in accordance with EN 12845 and water spray systems are not covered.

2 Normative references

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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 54 (all parts), *Fire detection and fire alarm systems*

EN 12094 (all parts), *Fixed firefighting systems — Components for gas extinguishing systems*

EN 12259 (all parts), *Fixed firefighting systems — Components for sprinkler and water spray systems*

EN 12845:2004+A2:2009, *Fixed firefighting systems — Automatic sprinkler systems — Design, installation and maintenance*

EN 13501-1:2007, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests*

EN 15004-1, *Fixed firefighting systems — Gas extinguishing systems — Part 1: Design, installation and maintenance (ISO 14520-1:2006, modified)*

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

ISO 6182-11, *Fire protection — Automatic sprinkler systems — Part 11: Requirements and test methods for pipe hangers*

ISO 6182-12, *Fire protection — Automatic sprinkler systems — Part 12: Requirements and test methods for grooved-end components for steel pipe systems*

3 Terms and definitions

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

3.1

additive

chemical or mixture of chemicals, intentionally introduced into the water mist system

NOTE The additive can have one or more of the following purposes:

- enhancement of, or compliance with, fire protection requirements,
- corrosion protection,
- frost protection.

3.2

authority having jurisdiction

organization, office, or individual responsible for approving equipment, and installation, or a procedure

3.3

automatic nozzle

watermist nozzle held closed by an integral thermal release element

NOTE see 3.39.

3.4

cooking grease

vegetable shortening incorporating an antifoaming agent

NOTE Only new greases are used for the tests.

3.5

cooking oil

cooking oil available in market with flash point value of 230 °C to 280 °C and auto ignition point between 330 °C and 445 °C

3.6

deep fat fryer

commercially available cooking appliance in which cooking greases in depth are used

NOTE Requirements are specified in EN 60335-2-37:2002.

3.7

design pressure

maximum working pressure expected to be applied to a system component

NOTE 1 The design pressure is an important parameter for the determination of the strength of components.

NOTE 2 The systems are defined by the following values:

- for low pressure systems: up to 12,5 bar;
- for medium pressure systems: higher than 12,5 bar, but below 35 bar;
- for high pressure systems: 35 bar and higher.

3.8

discharge duration

accumulated time during which fire fighting medium is applied

NOTE The time is given in minutes.

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CEN/TS 14972:2011 (E)**3.9****discharge time**

time interval between the first appearance of extinguishing agent at the nozzle and the time at which the discharge becomes predominantly gaseous or ceases

NOTE The discharge time is expressed in seconds.

3.10**domestic occupancy**

individual dwelling for occupation as a single family unit or constructed or adapted to be used wholly or principally for human habitation

3.11**dry pipe system**

watermist system using automatic nozzles attached to a piping system containing air, nitrogen, or inert gas under pressure, the release of which (as from an opening of an automatic nozzle) allows the water to flow

NOTE The water flows into the piping system and out through any activated nozzles.

3.12**fire control**

limitation of fire growth and prevention of structural damages (by cooling of the objects, adjacent gases and/or by pre-wetting adjacent combustibles)

NOTE The heat release rate does not grow.

3.13**fire extinguishment**

complete elimination of any flaming or smouldering fire

3.14**firefighting medium**

substance which causes fire extinguishment, suppression or control

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NOTE Media for use in watermist systems: demi water, potable and sweet industrial water, and water with additives are relevant.

The terminology includes the following:

- a) water only, i.e. potable water, natural sea water, deionized water;
- b) water with antifreeze;
- c) water with fire extinguishing enhancing additive;
- d) combination of a),b) and c) with an inert gas or a blend of inert gases used primarily to atomize the water and/or to reduce oxygen concentration at the fire (see 3.25).

3.15**fire suppression**

sharp reduction in the heat release rate and prevention of re-growth of the fire

NOTE The heat release rate decreases.

3.16**flash-over prevention**

reducing the average temperature inside the protected volume to a temperature where the smoke layer with combustion products do not ignite

3.17**inspection**

most frequent scheduled maintenance procedure

3.18**installation (watermist)**

part of a watermist system comprising a control valve set, the associated downstream pipes and nozzles

3.19**local application system**

watermist system designed to protect a particular object or hazard in an enclosed, unenclosed or outdoor condition

3.20**maintenance**

combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or restore it to, a state in which it can perform a required function

[EN 50126-1:1999]

3.21**manufacturer's design and installation manual**

document containing design rules for all details of a water mist system based on successful fire tests

3.22**maximum discharge rate**

ratio of the quantity of extinguishing agent discharged from a nozzle to the discharge time measured within ± 1 s

NOTE

The ratio is expressed in litres per minute for the maximum pressure.

3.23**mean discharge rate**

discharge rate calculated dividing the total water amount by the total discharge time

3.24**multiple vat deep fat fryer**

multiple fryers which are mechanically joined together

NOTE

Each vat incorporates a separately controlled heating source. The at least two fryers are separated by at least 5 cm from each other.

3.25**operating pressure**

constant or time-dependent pressure at a component during discharge

3.26**preaction system**

dry pipe system, in which an independent fire detection system in the protected area allows the firefighting medium to flow into the pipework prior to the independent operation and subsequent operation of any automatic nozzle

3.27**pump**

device consisting of one or more pressurizing units directly connected to a suitable driver

3.28**preburn time**

time from ignition of the fire source till the operating pressure or design flow is available at the hydraulically most remote nozzle

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3.29**qualified company**

company registered by a national body or accepted by the authorities having jurisdiction for design, installation and maintenance of fixed watermist systems and fully trained and authorized by the manufacturer

3.30**responsible person**

person(s) responsible for or having effective control over fire safety provisions adopted in or appropriate to the premises or the building

3.31**single fluid system**

system which generates watermist by passage of water or water with additive through the nozzle

3.32**split vat deep fat fryer**

fryer that incorporates a dividing partition which splits the fryer in sections

NOTE Each split vat fryer incorporates a separately controlled heating source. The at least two fryers are separated by at least 5 cm from each other.

3.33**supplier**

qualified company that is responsible for the product, process or service and is able to ensure that quality assurance is exercised

3.34**system duration**

total time for which the supply of fire fighting medium is designed to last

NOTE 1 The time is given in minutes.

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NOTE 2 For systems with intermittent discharge it is the sum of the times of discharge and the times without discharge.

3.35**twin fluid system**

system which generates watermist at the nozzle by mixing water with an atomizing gas fed from a separate pipe(s) from the water supply

3.36**user**

person or persons responsible for use and maintenance of the watermist system

3.37**volume protection system**

watermist system designed to protect all hazards in an enclosed volumetric space

3.38**watermist**

water spray for which the diameter $D_{v0,90}$ measured in a plane 1 m from the nozzle at its minimum operating pressure is less than 1 mm

3.39**watermist nozzle**

component with one or more orifices which is designed to produce and discharge watermist

3.40**watermist system**

entire means of a firefighting system connected to a water supply equipped with one or more nozzles capable of delivering watermist to meet the requirements of this document

NOTE Watermist systems may discharge plain watermist or a mixture of watermist and some other agent or agents like gases or additives.

3.41**wet pipe system**

watermist system using automatic nozzles attached to a piping system containing water and connected to a water supply so that water discharges immediately from nozzles operated by the heat from a fire

4 Requirements**4.1 General**

Watermist systems shall only be designed, installed and maintained by qualified companies and shall comply with the following requirements.

The safe use of a water mist system is limited to applications it has been tested for. Parameters used during such tests define the limits of its application, unless methods being acceptable to the authorities having jurisdiction to interpolate test results can be applied. Parameters include room geometry, ventilation conditions, fire load, etc.

Watermist systems shall be tested in accordance with Annex A. For scenarios where Annex A is not applicable, it is recommended to test watermist systems in accordance with Annex B by a recognized third party laboratory. In this case, the results of the test protocol should be acceptable to the authority having jurisdiction, responsible for the acceptance of the system.

Annex A describes fire test protocols for a variety of hazard groups. Watermist systems shall be successfully tested in accordance with these test protocols.

Annex B provides guidelines for defining representative fire test protocols based on a proper fire protection engineering evaluation of the fire hazard, the compartment conditions, and the performance objectives for the system.

The full system evaluation also includes component testing. Annex D describes the testing of watermist nozzles. For other components, a customized evaluation or review should be carried out based on existing component standards. If no suitable component standard is available, case-by-case evaluations should be conducted by qualified testing laboratories.

Water mist systems shall be certified in conformity to all requirements of this document by a recognized authority.

Where a watermist system or an extension or alteration to a watermist system is being considered within new or existing buildings, the relevant parties shall be consulted and, where necessary, their approval sought at an early stage, e.g. the water supply authority, the fire authority; the insurer(s) of the building and building contents.

4.2 Exclusions**4.2.1 General**

Watermist systems shall be designed and installed in a way that in any case contact between water and the following materials or substances is avoided.

CEN/TS 14972:2011 (E)**4.2.2 Materials which react with water**

Watermist systems shall not be used for direct application to materials that react with water to produce violent reactions or significant amounts of hazardous products. These materials include:

- a) reactive metals, such as lithium, sodium, potassium, magnesium, titanium, zirconium, uranium and plutonium;
- b) metal alkoxides, such as sodium methoxide;
- c) metal amides, such as sodium amide;
- d) carbides, such as calcium carbide;
- e) halides, such as benzoyl chloride and aluminum chloride;
- f) hydrides, such as lithium aluminum hydride;
- g) oxyhalides, such as phosphorus oxybromide;
- h) silanes, such as trichloromethylsilane;
- i) sulfides, such as phosphorus pentasulfide;
- j) cyanates, such as methylisocyanate.

NOTE These materials are allowed if stored in non-combustible containers.

4.2.3 Liquefied gases

Watermist systems shall not be used for direct application to liquefied gases at cryogenic temperatures (such as liquefied natural gas), which boil violently when heated by water.

4.3 Local applications

Systems designed to be installed in local applications shall be tested for the associated hazard class selected and for the main protection objective/objectives of the applications concerned.

Systems designed to be installed in multiple hazard local application areas, where protection for individual objects is foreseen, shall be approved for all associated hazards present in the area.

If necessary additional systems/nozzles shall be installed to cover all hazards present in that area.

4.4 Volume protection

Volume protection systems shall be designed and installed for the hazards to be protected within the volume, in accordance with the design parameters established through representative fire tests (see 6.1).

Systems designed to be installed in a multiple hazard application shall be tested and approved for all present hazards in the volume. Where the spread of fire is likely to involve two or more enclosed volumetric spaces, adjacent fire hazards shall be taken into account, and the watermist system shall be designed for the combined hazard.

NOTE The installation of an automatic door closing mechanism is expected to improve the effectiveness of the system by ensuring that any doors to the volume being protected are kept shut.

4.5 Other considerations

4.5.1 Discharge delay

For dry and preaction systems with automatic nozzles the firefighting medium shall exit from the nozzle within 60 s after activation, i.e. opening of the first nozzle. In application with open nozzles the firefighting medium shall exit from all nozzles within 30 s after activation.

4.5.2 Selection of detection system

If a detection system is used for activation it shall be as specified in the manufacturer's design and installation manual. The detection system shall be specified based on the results of the fire tests.

The detection system shall comply with the requirements of 6.8.3.

4.5.3 Oxygen depletion

Systems discharging into the protected volume a gas, different from air, shall comply with the safety requirements of EN 15004-1.

The safety requirements effected by the gas concentration produced by the watermist system shall comply with national regulations.

5 Activation and control

5.1 General

The detection and activation system can either be mechanical, hydraulic, pneumatic, or electrical. The activation system should fulfil the following requirements, if applicable:

- the detection system shall be installed in all zones protected by the watermist system and shall comply with the data sheet given by the manufacturer of the activation device;
- the temperature rating of detector shall be as close as possible to, but not less than 30 °C above, the highest anticipated ambient temperature;
- when air or inert gas is used, the working pressure in the system shall not exceed 3,5 bar, except if otherwise specified by the deluge valve manufacturer;
- detection lines shall be monitored.

Details of specific intermittent misting operations of systems and the associated modes of controls re-setting are not specified in this European Standard, but such systems can be applied in design, as long as the above agreed principles of system rationale are observed and followed.

Detection, actuation, alarm and control systems shall be installed, tested and maintained in accordance with appropriate national standards.

Failure of the control panel shall not be able to stop the ongoing watermist discharge or the ongoing discharge sequence.

Watermist systems relying on a control system for the entire discharge duration shall be fire performance tested together with the control system.

Watermist systems shall be automatically activated, except where the authorities having jurisdiction allow only manual activation.