SLOVENSKI STANDARD
SIST EN 14972-1:2021

01-februar-2021

Nadomešča:
SIST-TS CEN/TS 14972:2011

Vgrajeni gasilni sistemi - Sistemi s pršečo vodo - 1. del: Načrtovanje, vgradnja, pregled in vzdrževanje

Fixed firefighting systems - Water mist systems - Part 1: Design, installation, inspection and maintenance

Ortsfeste Brandbekämpfungsanlagen - Feinsprüh-Löschanlagen - Teil 1: Planung, Einbau, Inspektion und Wartung

Installations fixes de lutte contre l'incendie - Systèmes à brouillard d'eau - Partie 1 : Conception, installation, inspection et maintenance

Ta slovenski standard je istoveten z: **EN 14972-1:2020**

ICS:

13.220.10	Gašenje požara	Fire-fighting

SIST EN 14972-1:2021 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14972-1

December 2020

ICS 13.220.20

Supersedes CEN/TS 14972:2011

English Version

Fixed firefighting systems - Water mist systems - Part 1: Design, installation, inspection and maintenance

Installations fixes de lutte contre l'incendie - Systèmes à brouillard d'eau - Partie 1 : Conception, installation, inspection et maintenance

Ortsfeste Brandbekämpfungsanlagen - Feinsprüh-Löschanlagen - Teil 1: Planung, Einbau, Inspektion und Wartung

This European Standard was approved by CEN on 11 October 2020.

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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 14972-1:2020 E

Contents

Page

European foreword ... 7
Introduction ... 9
1 Scope ... 10
2 Normative references ... 10
3 Terms, definitions and abbreviations ... 11
3.1 Terms and definitions ... 11
3.2 Abbreviations ... 18
4 Design ... 18
4.1 Design principal ... 18
4.1.1 General ... 18
4.1.2 General requirement ... 18
4.1.3 Full scale fire testing procedures ... 18
4.2 Design, installation, operation and maintenance manual ... 19
4.2.1 General ... 19
4.2.2 Content of the DIOM manual ... 19
4.3 Water mist systems using gas for their operation ... 21
4.4 Use of additives ... 21
4.5 Design parameters ... 21
4.6 Water and gas supply ... 21
4.6.1 Pumped systems requirements ... 21
4.6.2 Self-contained systems requirements ... 21
4.7 Compartment protection ... 21
4.7.1 General ... 21
4.7.2 Compartment ... 21
4.7.3 Fire hazard ... 22
4.7.4 Design requirements ... 22
4.8 Requirements for different types of water mist deluge systems ... 22
4.8.1 Local application systems ... 22
4.8.2 Local application systems with multiple hazards ... 22
4.8.3 Volume protection water mist systems ... 22
4.8.4 Zoned protection systems ... 22
4.8.5 Activation and control ... 22
4.9 Design of water mist automatic nozzle systems ... 23
4.9.1 Extent of protection ... 23
4.9.2 Permitted exceptions within a building ... 23
4.9.3 Material reaction ... 23
4.9.4 System design ... 23
4.9.5 Nozzle selection and positioning ... 28
4.9.6 Alarm device ... 28
4.9.7 Test connection ... 28
4.9.8 Air velocity and openings ... 28
4.10 Design of water mist deluge system ... 29
4.10.1 Nozzle selection and positioning ... 29
4.10.2 Air velocity and openings ... 29
4.10.3 Automatic shut-down ... 29
4.11 Fire detection and fire alarm systems activating the water mist system ... 29

4.11.1 General requirements ... 29
4.11.2 Fire detection and fire alarm systems continuity ... 29
4.11.3 Avoiding false alarms by water mist discharge ... 30
4.11.4 Manual activation ... 30
4.11.5 Electrical detection and activation ... 30
4.11.6 Non-electrical detection ... 31
4.12 Hydraulic and pneumatic calculations ... 31
4.13 Water, propellant and atomizing gas supply design ... 31
4.13.1 General ... 31
4.13.2 Connection to public or town mains ... 31
4.13.3 Flow requirement ... 32
4.13.4 Maximum and minimum water pressure ... 32
4.13.5 Discharge operating time ... 32
4.13.6 Type of water supply ... 34
4.13.7 Availability ... 35
4.13.8 Housing of equipment for water supplies ... 39

5 Installation ... 39
5.1 General ... 39
5.1.1 DIOM manual ... 39
5.1.2 Electrical safety ... 39
5.1.3 High Voltage live electrical equipment ... 40
5.1.4 Electrical clearances ... 40
5.2 Nozzle ... 40
5.2.1 General ... 40
5.2.2 Automatic nozzle ... 41
5.2.3 Open nozzle ... 41
5.3 Pipe ... 42
5.3.1 General ... 42
5.3.2 Protection against mechanical damages ... 42
5.3.3 Protection against corrosion ... 42
5.3.4 Protection in seismic areas ... 42
5.3.5 Protection against freezing for wet pipes ... 42
5.3.6 Accessibility of the pipe work ... 42
5.3.7 Pipe bending ... 42
5.3.8 Water supply pipes ... 43
5.3.9 Pipe support ... 43
5.3.10 Drainage ... 44
5.4 Gas and water containers (where provided) ... 44
5.4.1 General ... 44
5.4.2 Location ... 44
5.4.3 Accessibility ... 44
5.4.4 Fixing ... 44
5.4.5 Manifolds ... 44
5.4.6 Temperature ... 45
5.5 Strainers and filters ... 45
5.5.1 Strainers ... 45
5.5.2 Nozzle filter ... 45
5.5.3 System filters ... 45
5.6 Valves ... 45
5.6.1 General ... 45
5.6.2 Identifications ... 45
5.6.3 Accessibility ... 45

5.6.4 Securing and monitoring valves 45
5.6.5 Shut-off valves 45
5.6.6 Control valves 46
5.6.7 Check and non-return valves 46
5.7 Pressure gauges 46
5.8 Test connection 46
5.8.1 Test connection for automatic water mist systems 46
5.8.2 Test connection for water mist deluge system 46
5.9 Electrical installation 46
5.9.1 Electrical power supply 46
5.9.2 Fire detection and fire alarm system 46
5.10 System monitoring and alarms 46
5.10.1 General 46
5.10.2 Alarms 47
5.10.3 Remote signalling 47
5.11 Water mist system supply, including additives 48
5.11.1 General 48
5.11.2 Water quality 48
5.11.3 Additives 48
5.11.4 Water supply 48
5.11.5 Test devices 51

6 Water mist system components 51
6.1 General 51
6.1.1 Requirements for components 51
6.1.2 Pressure rating 51
6.2 Nozzle 51
6.3 Piping and fittings 52
6.3.1 Pipework 52
6.3.2 Fittings 52
6.4 Flexible hoses 53
6.4.1 Hose length 53
6.4.2 Hoses to be used in areas exposed to fire class B fires 53
6.4.3 Hose rating 53
6.5 Pipe supports 53
6.6 Valves 53
6.6.1 Shut-off valves 53
6.6.2 Pressure regulating valves 54
6.6.3 Check and non-return valves 54
6.6.4 Drain/fill valves 54
6.6.5 Safety valves 54
6.7 Control valves 54
6.7.1 General 54
6.7.2 Strainers and filters 54
6.8 Flow switches and flow transmitters 55
6.9 Pressure switches and pressure transmitters 55
6.10 Supply components for self-contained systems 55
6.10.1 General 55
6.10.2 Excess pressure 55
6.10.3 Pressure container marking 55
6.10.4 Design temperature 55
6.10.5 Gas cylinders and actuation valve 55
6.10.6 Cylinders and storage containers for water 55

7 Main pumps for water mist systems 56
7.1 General 56
7.2 Pump set 56
7.2.1 Operation 56
7.2.2 Overpressure 56
7.2.3 Centrifugal pumps 56
7.2.4 Positive displacement pumps 56
7.2.5 Pump driver 56
7.2.6 Pump Cooling 56
7.2.7 Pump set anchoring 56
7.2.8 Positive displacement pump filters 57
7.2.9 Pump set coupling 57
7.2.10 Valves and accessories 57
7.2.11 Suction pipe 57
7.2.12 Discharge pipe 58
7.2.13 Pump set rating 58
7.2.14 Pump set operation 58
7.2.15 Electrically driven pump sets 59
7.2.16 Diesel engine driven pump sets 61

8 Testing, acceptance and commissioning 65
8.1 Acceptance test for water mist systems 65
8.2 Test criteria 65
8.3 Site commissioning test 66
8.4 Completion certificate and documents 66

9 Inspection and maintenance 67
9.1 Inspection 67
9.1.1 Inspection schedule 67
9.1.2 User's program of inspection 67
9.2 Inspection and maintenance routines 67
9.2.1 Weekly routine 67
9.2.2 Monthly routine 68
9.2.3 Quarterly routine 68
9.2.4 Half-yearly routine 69
9.2.5 Annual inspection 69
9.2.6 Three-yearly routine 70
9.2.7 Five-yearly routine 70
9.2.8 Ten-yearly routine 71
9.2.9 Maintenance schedule 71
9.2.10 User's program of monitoring 71
9.2.11 Training 71

10 Documentation 71
10.1 Installation documentation 71
10.2 Documentation for acceptance of design, installation and commissioning 72

Annex A (informative) Guideline for developing representative fire test protocols for water mist systems 74

A.1 General 74
A.2 Evaluation of the fire hazard 74
A.3 Evaluation of the compartment conditions 75
A.4 Determining the performance objective 76
A.5 Setting up the fire test procedure 76
A.6 Carrying out the test 78

A.7 Documentation and interpretation of test results 78
A.8 Example for fire test report 78
Annex B (informative) Area of operation for typical automatic nozzle water mist systems 80
B.1 General 80
B.2 Typical system component layouts 80
B.2.1 System components gridded layout 80
B.2.2 System components terminal layout 81
B.2.3 System components looped layout 81
B.3 AOs to be determined by full hydraulic calculation 82
B.4 Most unfavourable and most favourable AO demands and the pump supply curve 84
B.5 Calculating the number of nozzles and actual area of AO 85
B.6 Method of calculating the area per nozzle 87
B.6.1 Regular spacing 87
B.6.2 Irregular spacing 88
B.7 Shape of the AO 90
B.7.1 General 90
B.7.2 Shape of the hydraulically most unfavourable location 91
B.7.3 Shape of the hydraulically most favourable location 94
B.8 Length of the AO 96
B.9 Relocation of section valves 97
B.10 Calculating the nozzles operating in the most unfavourable AO 97
Bibliography 99

European foreword

This document (EN 14972-1:2020) 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 June 2021, and conflicting national standards shall be withdrawn at the latest by June 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 14972:2011.

The former CEN/TS 14972:2011 was reviewed and replaced with this new European standard.

EN 14972, *Fixed firefighting systems — Water mist systems*, consists of the following parts:

— Part 1: Design, installation, inspection and maintenance;

— Part 2: Test protocol for shopping areas for automatic nozzle systems;

— Part 3: Test protocol for office, school class rooms and hotel for automatic nozzle systems;

— Part 4: Test protocol for non-storage occupancies for automatic nozzle systems;

— Part 5: Test protocol for car garages for automatic nozzle systems;

— Part 6: Test protocol for false floors and false ceilings for automatic nozzle systems;

— Part 7: Test protocol for commercial low hazard occupancies for automatic nozzle systems;

— Part 8: Test protocol for machinery in enclosures exceeding 260 m^3 for open nozzle systems;

— Part 9: Test protocol for machinery in enclosures not exceeding 260 m^3 for open nozzle systems;

— Part 10: Test protocol for atrium protection with sidewall nozzles for open nozzle systems;

— Part 11: Test protocol for cable tunnels for open nozzle systems;

— Part 12: Test protocol for commercial deep fat cooking fryers for open nozzle systems;

— Part 13: Test protocol for wet benches and other similar processing equipment for open nozzle systems;

— Part 14: Test protocol for combustion turbines in enclosures exceeding 260 m^3 for open nozzle systems;

— Part 15: Test protocol for combustion turbines in enclosures not exceeding 260 m^3 for open nozzle systems;

— Part 16: Test protocol for industrial oil cookers for open nozzle systems;

— Part 17: Test protocol for residential occupancies for automatic nozzle systems.

NOTE This list includes standards that are in preparation and other standards may be added. For current status of published standards refer to www.cen.eu.

This document converts CEN/TS 14972:2011 into a full EN standard. It is a full revision of the Technical Specification, and incorporates the following principal changes:

— guidance on areas of operation;

— guidance on effective capacity of tanks;

— extension of scope of application to cover more areas in buildings when supported by test standards produced by other organizations.

Any user claiming compliance with this document is expected to be able to justify any course of action that deviates from its recommendations.

This document is intended for use by manufacturers, designers and installers of water mist systems, and for authorities having jurisdiction.

It has been assumed in the preparation of this document that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Water mist systems

Fixed water mist systems for the fire protection of industrial, commercial and residential hazards comprise specially designed nozzles mounted in pipework, and connected via control valves to a dedicated water supply.

Specific areas within buildings can be protected by water mist where relevant fire test protocols exist.

Water mist systems deliver a mist of small droplets which control, suppress or extinguish fire by:

— absorbing heat from the fire and its surroundings;

— smothering the flames by localized oxygen depletion through evaporation to steam;

— blocking some of the radiant heat transfer to adjacent combustible materials;

— wetting and cooling of the fuel surface.

Fires such as those involving flammable liquids (class B fires) can be extinguished using water mist. Fires such as those involving ordinary combustible materials (class A fires) can be controlled and suppressed using water mist and may also extinguished. Water mist can also prevent flash-over.

With the high surface area of the droplets produced, water mist is able to absorb relatively large amounts of heat and thus provide efficient cooling.

Currently, the majority of applications for water mist relate to property and asset protection. However, under certain circumstances, water mist can improve conditions within the protected space and thus increase the chances of survival for personnel inside the protected areas. It can also enhance personnel protection in more general applications by protecting facilities thereby enhancing the safety of individuals.

Water mist is a specific application solution which needs to be proven for each individual application and/or occupancy.

1 Scope

This document specifies requirements and gives recommendations for the design, installation, inspection and maintenance of all types of fixed land based water mist systems.

This document is intended to apply to water mist automatic nozzle systems and water mist deluge systems supplied by stand alone or pumped systems.

The document covers only applications and occupancies which are covered by the fire test protocols of the EN 14972 series.

Aspects of water mist associated with explosion protection and/or use within vehicles are not covered by this document.

This document does not cover all legislative requirements. In certain countries specific national regulations apply and take precedence over this document. Users of this document are advised to inform themselves of the applicability or non-applicability for this document by their national responsible authorities.

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 3-7:2004+A1:2007, *Portable fire extinguishers — Part 7: Characteristics, performance requirements and test methods*

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

CEN/TS 54-14, *Fire detection and fire alarm systems — Part 14: Guidelines for planning, design, installation, commissioning, use and maintenance*

EN 12094-1, *Fixed firefighting systems — Components for gas extinguishing systems — Part 1: Requirements and test methods for electrical automatic control and delay devices*

EN 12094-2, *Fixed firefighting systems — Components for gas extinguishing systems — Part 2: Requirements and test methods for non-electrical automatic control and delay devices*

EN 12094-4, *Fixed firefighting systems — Components for gas extinguishing systems — Part 4: Requirements and test methods for container valve assemblies and their actuators*

EN 12094-8, *Fixed firefighting systems — Components for gas extinguishing systems — Part 8: Requirements and test methods for connectors*

EN 12094-10, *Fixed firefighting systems — Components for gas extinguishing systems — Part 10: Requirements and test methods for pressure gauges and pressure switches*

EN 12259-1, *Fixed firefighting systems — Components for sprinkler and water spray systems — Part 1: Sprinklers*

EN 12259-2, *Fixed firefighting systems — Components for sprinkler and water spray systems — Part 2: Wet alarm valve assemblies*

EN 12259-3, *Fixed firefighting systems — Components for automatic sprinkler and water spray systems — Part 3: Dry alarm valve assemblies*

prEN 12259-12, *Fixed firefighting systems — Components for sprinkler and water spray systems — Part 12: Pumps*

EN 12845:2015+A1:2019, *Fixed firefighting systems — Automatic sprinkler systems — Design, installation and maintenance*

prEN 14972 (all parts),[1] *Fixed firefighting systems — Water mist systems*

EN 15004-1:2019, *Fixed firefighting systems — Gas extinguishing systems — Part 1: Design, installation and maintenance (ISO 14520-1:2015, modified)*

EN 17450-1,[2] *Fixed firefighting systems — Water mist components — Part 1: Product characteristics and test methods for strainer and filter components*

prEN 17451, *Fixed firefighting systems — Automatic sprinkler systems — Design, assembly, installation and commissioning of pump sets*

EN 50342 (all parts), *Lead-acid starter batteries*

EN 60529, *Degrees of protection provided by enclosures (IP Code)*

EN 60623, *Secondary cells and batteries containing alkaline or other non-acid electrolytes - Vented nickel-cadmium prismatic rechargeable single cells (IEC 60623)*

ISO 3046-1, *Reciprocating internal combustion engines — Performance — Part 1: Declarations of power, fuel and lubricating oil consumptions, and test methods — Additional requirements for engines for general use*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1.1
additive
chemical or mixture of chemicals, intentionally injected to the water mist system or pre-mixed with the water in the water supply and/or system piping

Note 1 to entry: The additive can have one or more of the following purposes:

— compliance with fire protection requirements;

— corrosion protection;

[1] In preparation.

2 Status at time of publication: prEN 17450-1:2019.

— frost protection;

— preventing micro-biological growth.

3.1.2
area of operation
<automatic nozzles> maximum area over which it is assumed, for design purposes, that automatic water mist nozzles will operate in a fire

<open nozzles> all nozzles included in one section

Note 1 to entry: The total area of operation can consist of more than one section.

3.1.3
atomizing gas
compressed air or other gas used to produce water mist by mixing with the water

3.1.4
authorities
organizations responsible for approving water mist systems, equipment and procedures, e.g. the fire and building control authorities, the fire insurers, the local water authority or other appropriate public authorities

3.1.5
automatic nozzle water mist system

water mist system with activation based on an individual automatic water mist nozzle that operates when its thermal release element is heated to its thermal rating or above, allowing water mist to discharge over specified area or volume

Note 1 to entry: Automatic nozzle water mist systems are referred to as water mist sprinkler systems in other publications.

Note 2 to entry: According to the type of the pipework the automatic nozzle water mist systems are differentiated in:

— wet pipe systems;

— dry pipe systems; and

— pre-action systems.

3.1.6
automatic water mist nozzle
pneumatic water mist nozzle
component, with one or more orifices, which is designed to produce and discharge water mist, held closed by an integral thermal release element and a pneumatic element, the nozzle can be opened either via the thermal release element or an increase of pressure to a pre-set value

3.1.7
competent person
organization
individual or organization that has the requisite training and experience, access to the requisite tools, equipment and information, and is capable of carrying out a defined task

3.1.8
control valve
valve intended to open automatically to control the flow of the extinguishing medium of a water mist system or sections of it and trigger an alarm

Note 1 to entry: A control valve may be:

— a deluge valve for a deluge system;

— a wet valve for an automatic wet pipe system;

— a dry valve for an automatic dry pipe system;

— a pre-action valve for an automatic pre-action system.

3.1.9
deluge water mist system
water mist system with activation based on the simultaneous discharge from all the predetermined nozzles included in one system section that operates when a fire detection and fire alarm system actuates the control valve controlling the flow to that system section or by manual means

Note 1 to entry: According to the application characteristics the deluge water mist systems are differentiated in:

— local application systems;

— volume protection systems; and

— zoned protection systems (sectioned systems).

3.1.10
discharge operating time
time interval from the start until the end of the discharge of water mist from the system nozzle(s)

Note 1 to entry: The discharge time is expressed in minutes.

3.1.11
dry pipe system
water mist system using automatic nozzles in which the pipework is always charged with air or inert gas under pressure

Note 1 to entry: The water flows into the piping system and out through any activated nozzles.

3.1.12
enhanced availability water mist system
water mist system with additional measures for enhanced availability of the system

Note 1 to entry: For example, for life safety or insurance purposes.

3.1.13
fire control
to limit the size of the fire by distribution of water to reduce the heat release rate and pre-wet adjacent combustibles, while controlling the gas temperatures at the ceiling and limiting the radiation to prevent damage to structures during the discharge operating time