SLOVENSKI STANDARD
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01-april-2023

Vgrajeni gasilni sistemi - Sistemi s pršečo vodo - 4. del: Protokol preskušanja za neskladiščne prostore za sistem z avtomatskimi šobami

Fixed firefighting systems - Water mist systems - Part 4: Test protocol for non-storage occupancies for automatic nozzle systems

Ortsfeste Brandbekämpfungsanlagen - Wassernebelsysteme - Teil 4: Prüfprotokoll für Nicht-Lager-Belegungen für automatische Düsensysteme

Installations fixes de lutte contre l'incendie - Systèmes à brouillard d'eau - Partie 4 : Protocole d'essai des systèmes à buses automatiques pour locaux non destinés au stockage

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ICS:

13.220.10	Gašenje požara	Fire-fighting

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Fixed firefighting systems - Water mist systems - Part 4: Test protocol for non-storage occupancies for automatic nozzle systems

Ortsfeste Brandbekämpfungsanlagen - Wassernebelsysteme - Teil 4: Prüfprotokoll für Nicht-Lager-Belegungen für automatische Düsensysteme

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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

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European foreword

This document (prEN 14972-4:2023) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

The EN 14972 series, published under the general title *Fixed firefighting systems — Water mist systems*, consists of the following parts. This list includes standards that are in preparation, and other standards can be added. For the current status of published standards, refer to www.cencenelec.eu.

— *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 classrooms 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*.

1 Scope

This document specifies the evaluation of the fire performance of water mist systems for lightly loaded non-storage and non-manufacturing occupancies with ordinary combustibles, such as offices, schools, hospitals and hotels.

This document is applicable to ceiling mounted and sidewall automatic nozzles to be used in restricted and/or unlimited areas.

This document is applicable for horizontal, solid, flat ceilings with heights of 2 m and above, up to the maximum tested ceiling height.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 636:2012+A1:2015, *Plywood - Specifications*

EN 13501-1:2018, *Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests*

EN 14972-1, *Fixed firefighting systems - Water mist systems - Part 1: Design, installation, inspection and maintenance*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14972-1 apply.

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

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

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

4 General requirements

4.1 Up to a maximum of 5 nozzles used in the fire tests shall be kept for later verification.

4.2 The water mist system, operating without manual intervention, shall successfully complete all described performance fire tests for their specific applications.

4.3 The fire load shall be taken from the conditioning area and arranged into the test area just before conducting the test.

4.4 All fire tests shall be conducted for 10 min after the activation of the first nozzle. After this 10 min period, any remaining fire shall be extinguished manually.

4.5 System components, component locations, operating conditions and test enclosure details shall remain unaltered throughout all of the fire tests for a given application.

4.6 All fire tests shall be conducted using the manufacturer instructions in regard to automatic nozzle placement, spray flux, and operating pressure. Sprays shall not be intermittent.

4.7 The minimum operating nozzle pressure (as specified by the manufacturer) shall be used for all tests. System operating pressures shall be repeatable to within ± 5 %. If the system pressures cannot be controlled within the specified tolerance, fire tests shall be conducted at the minimum and maximum pressure by using external means to control the system pressure.

4.8 For all fire tests, the system shall be either:

a) Pressurized to the minimum operating pressure specified by the manufacturer. Following activation of the first nozzle, the flowing water pressure shall be maintained at the minimum system operating pressure; or

b) Pressurized to the minimum stand-by pressure specified by the manufacturer. Following activation of the first nozzle, the flowing water pressure shall be gradually increased to the minimum system operating pressure specified by the manufacturer. The delay time until the minimum system operating pressure is reached shall correspond to the delay time expected in an actual installation. The delay time recorded during the tests shall be documented and included in the system specifications.

4.9 The maximum nozzle ceiling height and spacing (as specified by the manufacturer) shall be used for all tests. This includes utilizing the maximum ceiling spacing of the nozzles from the walls.

4.10 The ceiling nozzle arrangement shall have uniform spacing. The ceiling nozzle spacing from the wall shall be uniform, preferably one half of the main spacing.

4.11 The individual nozzles shall include either a fusible or glass bulb assembly and meet quick response nozzle criteria. The heat responsive element and temperature rating of the nozzles used in all fire tests shall be identical for evaluating the specific rating. The nominal operating temperature of the nozzle shall not exceed 107 °C.

The fire test protocol may also be applied for evaluating multiple temperature ratings simultaneously by using nozzles having the highest nominal temperature rating for the open space tests, and a combination of nozzles having the lowest and highest nominal temperature ratings for the small and large compartment tests as described in the respective test procedures in Clause 9.

5 Test hall requirements

5.1 The fire test hall shall be of adequate size with natural or minimal ventilation so as not to interfere with the fire testing within the enclosure or about the mock-up or test fuel package in the hall.

5.2 For the open space tests the test area shall include a ceiling of at least 80 m^2 in order to simulate an uninterrupted open space. There shall be a minimum gap of 1 m from the ceiling rim to the wall of the fire test hall, sufficient ventilation or space, to guarantee sufficient O_2 concentration over the entire test period.

5.3 For all fire tests, the ceiling, floor, and walls shall be as dry as possible, with only the permissibly moisture content of the environment. The relative humidity in the test enclosure shall not significantly differ from that of the ambient relative humidity of the environment. Maximum room relative humidity shall not be more than 70 % prior to the test.

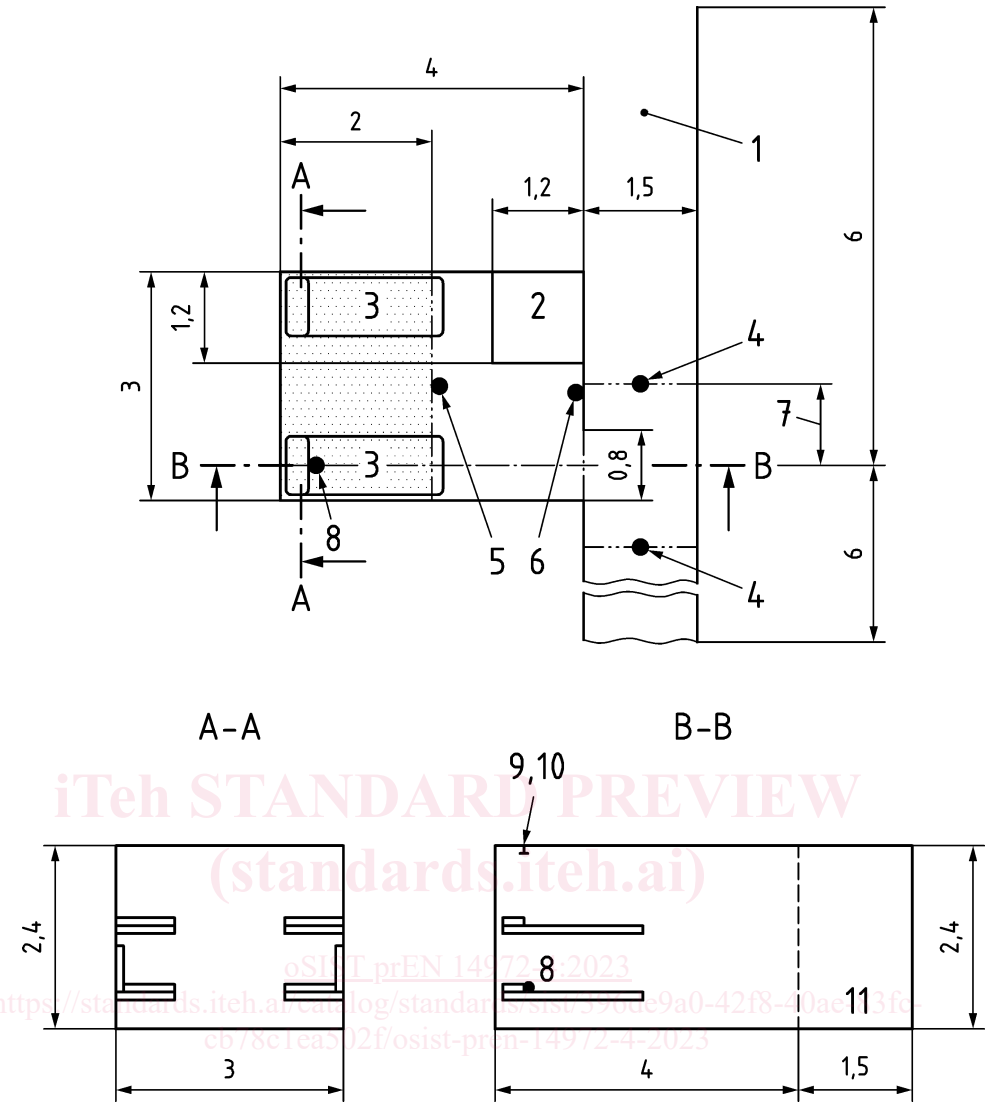
5.4 The test enclosures or the fire test hall shall be at an ambient temperature of (20 ± 10) °C prior to the start of the test. The enclosure or hall shall be at as uniform an ambient temperature as reasonably possible. All non-fire induced drafts shall be eliminated.

5.5 Oxygen concentration shall not decrease below 20 % as an average value inside the test hall. If these conditions are not met, the water mist system shall only be installed in rooms with a maximum size equal to the limits of the facility they are tested in.

6 Test enclosure requirements

6.1 Small compartment

The small compartment shown in Figure 1 shall measure 3 m × 4 m and shall be 2,4 m in height. A 1,2 m × 1,2 m compartment shall be built within this space to simulate a lavatory. The compartment shall be fitted with a doorway with dimensions of 0,8 m wide and 2,2 m high. This doorway shall not include a door. The doorway leads to a 12 m long and 1,5 m wide corridor.



Key

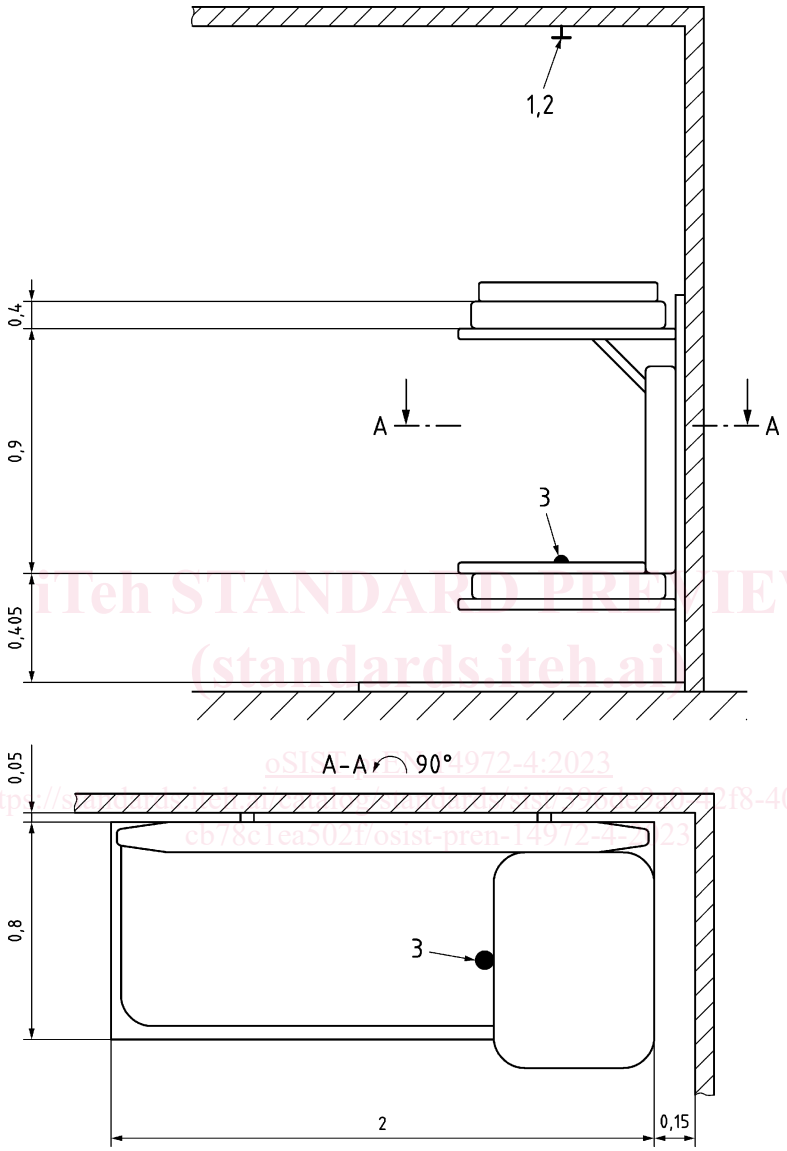
1 corridor minimum length 12 m
2 lavatory
3 bunk bed
4 corridor nozzle
5 centre nozzle
6 sidewall nozzle
7 half x spacing between nozzles
8 ignition point
9 embedded surface thermocouple
10 gas temperature thermocouple 75 mm below ceiling surface
11 corridor

Figure 1 — Small compartment test room with bunk beds.

The walls of the compartment and the corridor shall be fabricated from a 13 mm nominal thickness non-combustible wall board. The compartment walls are to be backed with 45 mm nominal thickness of mineral wool insulation and covered with 3 mm to 4 mm thick uncoated plywood panelling (EN 636:2012+A1:2015) with no fire retardant treatment.

The ceiling of the compartment shall be constructed of acoustical panels. The panels shall be 12 mm to 16 mm thick and of A2 class (EN 13501-1:2018). For each fire test, new acoustical panels shall be installed in the 2,4 m × 2,4 m area directly over the fire source.

Two thermocouples shall be centred directly over the ignition source as shown in Figure 1 and Figure 2. One thermocouple shall be embedded within the ceiling panels, such that the thermocouple bead is located 6,5 mm above the bottom surface of the ceiling. A second thermocouple shall be located 75 mm below the ceiling surface. The nozzle locations are shown in Figure 1. Only the compartment nozzle is an active nozzle, the corridor nozzles are target nozzles to determine their potential operation.



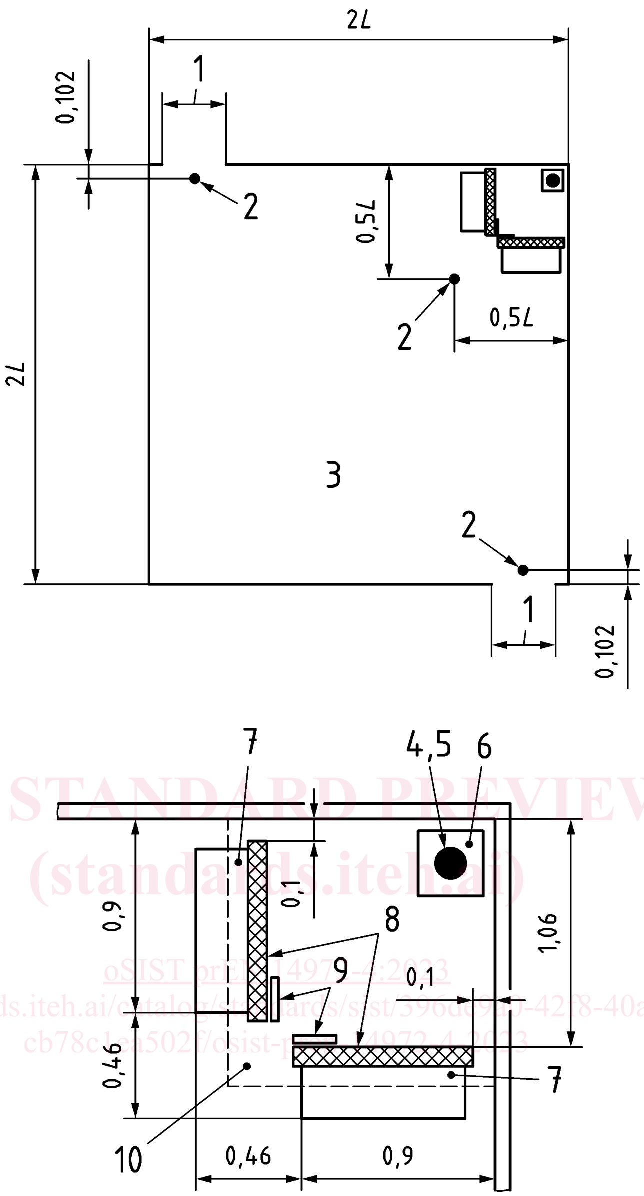
Key

1 embedded ceiling surface thermocouple
2 gas temperature thermocouple (75 mm below ceiling surface)
3 ignition point

Figure 2 — Bunk beds

6.2 Large compartment

For water mist systems using pendent or upright nozzles, including flush, recessed, and concealed pendent nozzles, the large compartment shall be the minimum required room size for four nozzles at the maximum nozzle spacing, with one half the maximum nozzle spacing to the walls, and 2,4 m in height. The compartment shown in Figure 3 shall have equal length sides, as specified by the manufacturer, and shall include a minimum area of 37 m^2.



Key

1 doorway 0,8 m wide × 2,2 m high

2 nozzle

3 height of enclosure 2,4 m

4 embedded ceiling surface thermocouple

5 gas temperature thermocouple (75 mm below ceiling surface) (centred over ignition point)

6 wood crib placed on top of 0,3 m x 0,3 m pan for heptane, 50 mm from walls

7 simulated furniture

8 foam 0,86 m x 0,75 m, 75 mm thick

9 wicks

10 floor sheathing 1,2 m x 1,2 m x 0,6 m

L maximum nozzle spacing

Figure 3 — Large compartment, corner crib and simulated furniture and locations of pendent and upright nozzles

For water mist systems using sidewall nozzles, including flush, recessed, and concealed sidewall nozzles, the large compartment shall be the minimum required room size for one nozzle to be installed in the centre of each wall at the maximum nozzle spacing (four total nozzles). The room height shall be 2,4 m.