



**SLOVENSKI STANDARD**  
**oSIST prEN 14972-9:2019**  
**01-januar-2019**

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**Vgrajeni gasilni sistemi - Sistemi s pršečo vodo - 9. del: Protokol preskušanja sistemov z odprtimi šobami za požarno zaščito strojev v ohišjih do 260 m<sup>3</sup>**

Fixed firefighting systems - Water mist systems - Part 9: Test protocol for machinery in enclosures not exceeding 260 m<sup>3</sup> for open nozzle systems

Ortsfeste Brandbekämpfungsanlagen - Feinsprüh-Löschanlagen - Teil 9: Prüfprotokoll für Maschinen in Gehäusen bis 260 m<sup>3</sup> für offene Düsensysteme

Installations fixes de lutte contre l'incendie - Systèmes à brouillard d'eau - Partie 9 : Protocole d'essai des systèmes à buses ouvertes pour machines situées dans des enceintes ne dépassant pas 260 m<sup>3</sup>

**Ta slovenski standard je istoveten z: prEN 14972-9**

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**ICS:**

13.220.10      Gašenje požara      Fire-fighting

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 14972-9**

November 2018

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ICS 13.220.20

English Version

## Fixed firefighting systems - Water mist systems - Part 9: Test protocol for machinery in enclosures not exceeding 260 m<sup>3</sup> for open nozzle systems

Installations fixes de lutte contre l'incendie - Systèmes  
à brouillard d'eau - Partie 9 : Protocole d'essai des  
systèmes à buses ouvertes pour machines situées dans  
des enceintes ne dépassant pas 260 m<sup>3</sup>

Ortsfeste Brandbekämpfungsanlagen - Feinsprüh-  
Löschanlagen - Teil 9: Prüfprotokoll für Maschinen in  
Gehäusen bis 260 m<sup>3</sup> für offene Düsensysteme

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 191.

If this draft becomes a European Standard, 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.

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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 14972-9:2018) 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.

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<sup>3</sup> for open nozzle systems;*
- Part 9: *Test protocol for machinery in enclosures not exceeding 260 m<sup>3</sup> 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<sup>3</sup> for open nozzle systems;*
- Part 15: *Test protocol for combustion turbines in enclosures not exceeding 260 m<sup>3</sup> for open nozzle systems;*
- Part 16: *Test protocol for industrial oil cookers for open nozzle systems.*

**prEN 14972-9:2018 (E)****1 Scope**

This document specifies fire testing requirements for water mist systems used for fire protection of machinery in enclosures with volumes not exceeding 260 m<sup>3</sup>.

**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.

prEN 14972-1, *Fixed firefighting systems - Water mist systems - Part 1: Design, installation, inspection and maintenance*<sup>1)</sup>

**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in CEN/TS 14972 and the following apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

**3.1 machinery enclosure**

<water mist systems>

any enclosure containing equipment that uses fuel and/or lubrication fluids with volatilities less than or equal to heptane

<https://standards.iteh.ai/catalog/standards/sist/51f49bdf-7073-4d2b-9746->

EXAMPLE Internal combustion engines (excluding engine test cells), oil pumps, oil tanks, fuel filters, generators, transformer vaults, gear boxes, drive shafts, lubrication skids, diesel engine driven generators, and other similar equipment using liquid hydrocarbon fuel and/or hydraulic, heat transfer, and lubrication fluids with volatility less than or equal to heptane; enclosures with incidental use or storage of hydrocarbon ignitable liquids (also known as flammable liquids) of not more than two 208 litre drums.

**4 General requirements**

- 4.1** The tests should be conducted until the fire is extinguished, as required by the applicable fire test.
- 4.2** System components, component locations, operating conditions and test enclosure details shall remain unaltered throughout all of the fire tests for a given application.
- 4.3** All fire tests should be conducted following the manufacturer's instructions in regard to nozzle placement, spray flux, and spray duration. Sprays can be continuous or intermittent in time. In the case of intermittent, or cycled, sprays, the time period during which the system is not discharging shall not be greater than 50 % of one complete on/off cycle. The system off period shall not exceed one minute.

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1) This document is currently in preparation.

**4.4** In conjunction with the performance fire tests, all twin fluid water mist systems should be subjected to a straight discharge test with no fire to evaluate the resulting discharge and oxygen concentration. This evaluation should be conducted using the maximum extinguishing agent flow and pressure. The discharge duration for the test shall be the maximum required for the system and occupancy to be protected. Oxygen measurements should be recorded at a location(s) within the test enclosure. This information shall be used to evaluate personnel safety, and should be accounted for in the manufacturer's design, installation, operation, and maintenance manual.

## **5 Enclosure requirements**

The test enclosure area shall have main dimensions of 7,3 m by 7,3 m by 4,9 m high. The enclosure should be constructed of wood or metal frame with an inner lining of minimum 13 mm gypsum or 0,7 mm galvanized steel (see Figure 1). To minimize leakages, all joints and gaps shall be sealed. At 2,7 m from one of the enclosure corners, in one of the walls parallel to the machinery equipment mock-up, a 0,8 m by 2,0 m high personnel door should be installed with a locking mechanism.

A 1,2 m by 2,4 m high removable panel should also be installed in one of the walls to allow for test enclosure access (The personnel door can be constructed within this panel). A minimum of two hinged ceiling hatches measuring approximately 0,9 m by 1,8 m should be installed in opposite diagonal corners for heat and smoke release at the conclusion of the fire test.

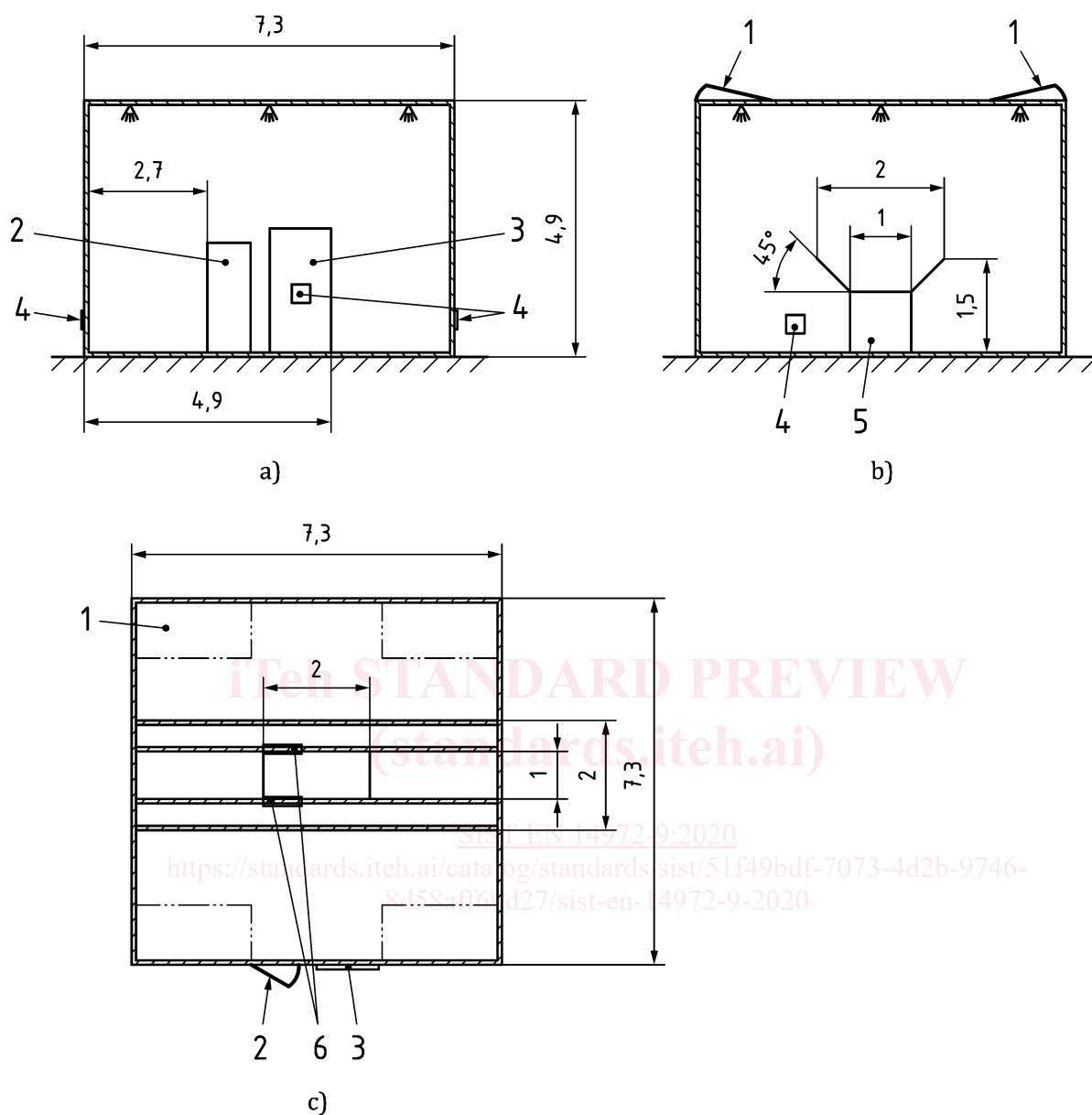
The floor should be non-combustible and any floor drainage or vent openings should be sealed during testing. A small louvered vent can be provided to allow the intake of air, to prevent excessive suctioning of the walls and ceiling and maintain structural integrity of the fire test enclosure.

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SIST EN 14972-9:2020

<https://standards.iteh.ai/catalog/standards/sist/51f49bdf-7073-4d2b-9746-8d58aff69d27/sist-en-14972-9-2020>

Dimensions in metres



**Key**

- 1 ceiling hatch (typical)
- 2 door (0,8 m x 2,0 m)
- 3 removable panel (12 m x 2,4 m)
- 4 window
- 5 pan
- 6 sheet metal

**Figure 1 — Test enclosure and machinery mock-up steel plate**



## 6 Machinery mock-up requirement

The machinery mock-up is simulated with a horizontal flat steel table and steel baffles to provide shielded spaces for fires (see Figure 1). The specific details and thermal mass of the obstructions are not simulated. The mock-up unit should be centred along the longer wall dimension in the test enclosure.

Horizontal 0,85 mm thick galvanized steel sheet metal shall be placed at an elevation of 1 m on steel legs, on both sides of the steel table, so that the mock-up extends longitudinally the entire length of the enclosure (see Figure 1). This is located in the centre of the room or at a location within the test cell to be selected after the nozzles are installed (as per manufacturer's design criteria). This allows the fire to be placed in an area considered the most challenging to the specific system being tested.

The bottom of a cylindrical piece of equipment is simulated with 0,85 mm thick galvanized steel sheet metal directed upward at an angle of 45° on either side of the horizontal steel sheet metal table surface. These side pieces also extend longitudinally the entire length of the enclosure, rising to a height of 1,5 m above the horizontal steel sheet metal surface. The total width of the mock-up is 2,0 m. If multiple sections of steel sheet metal are used, there should be a minimal gap between the various sections to permit water run-off. It is recommended to either butt up or simply attach the table and sheet metal extension surfaces with screw fasteners.

The space below the table is partially shielded from water mist using 1 m high by 0,5 m wide sheet metal baffles. The side baffles should be of 0,85 mm thick galvanized sheet metal construction and removable. They can be installed on support legs and kept in place by being pinched between the underside of the steel table and the 45 degree angle extensions and the floor for ease of removal.

## 7 Test equipment requirements

**7.1** The test laboratory should be of adequate size with natural or minimal ventilation so as to not interfere with the fire testing within the enclosure or about the mock-up or test fuel package.

**7.2** The size of the test laboratory should not impact extinguishment of any test fires (i.e. depletion of oxygen due to an inadequately sized test laboratory).

**7.3** For all fire tests, the ceiling, floor, and walls should be as dry as possible, with only ambient moisture content allowed. The relative humidity in the test enclosure should not significantly differ from that of the ambient relative humidity.

**7.4** The test enclosures or laboratory shall be at an ambient temperature of  $(20 \pm 10)$  °C prior to the start of the test. The enclosure or hall shall be at as uniform an ambient temperature as reasonably possible. Localized hot or cold spots are not permitted. All non-fire induced drafts shall be eliminated.

**7.5** The minimum operating nozzle pressure (as specified by the manufacturer) shall be used for all tests, unless otherwise noted. System operating pressures shall be repeatable to within  $\pm 5$  %. If the system pressures cannot be controlled within the specified tolerance, fire tests should be conducted at the minimum and maximum pressure by using external means to control the system pressure.

**7.6** 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.

**7.7** 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.

**7.8** The discharge from water mist doorway nozzles, if used, are not permitted to discharge directly into the enclosure. The arrangement and discharge from the doorway water mist nozzles must not enhance the heat release rate or increase the fire intensity of any fire test arrangement.

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**7.9** These nozzles, if used, shall be specified in the design and installation manual. Doorway screening nozzles are not permitted to be used in lieu of automatic door closing devices. All doorways have to be closed upon system actuation.

**7.10** Intermediate pendent or upright nozzles that are not at ceiling level, or wall mounted nozzles, are not permitted.

**8 Instrumentation requirements**

The following measurements shall be recorded to within a  $\pm 5\%$  tolerance level at intervals not exceeding one second using a computerized data acquisition system. Measurements should begin and end at least one minute prior to ignition and after extinguishment of the test fire(s).

- a) Fuel pressure and flow at the outlet of fuel pump (fuel flow and pressure should be measured prior to each test series).
- b) Fuel temperature within the fuel storage container. All fuels shall be at an ambient temperature of  $(20 \pm 10)$  °C.
- c) Temperature of fuel in pools with thermocouple located in the approximate centre of the initial fuel layer. All fuels shall initially be at an ambient temperature of  $(20 \pm 10)$  °C.
- d) Test enclosure temperatures measured in the centre portion of the room at the 1/3, 2/3 and ceiling heights. The enclosure and mock-up shall initially be at an ambient temperature  $(20 \pm 10)$  °C for all tests.
- e) Temperature of air into the spray fires, measured approximately 50 cm horizontally behind fuel spray nozzle with bare bead thermocouples welded from chromel-alumel wire, with a diameter of 0,32mm.
- f) Pool fire temperatures with a thermocouple located approximately 2,5 cm above the initial pool surface and 25 cm within the pool rim.
- g) Spray fire temperatures with a thermocouple located approximately 25 cm ahead of flame stabilizer at the cone radius.
- h) Extinguishment should be registered by thermocouples located above the pools and in front of the spray fires as previously described. The fire can be considered to be extinguished when temperature registration drops below 100 °C and does not increase. Registration by means of thermal imaging equipment, in addition to the thermocouples, is strongly encouraged.
- i) Oxygen, carbon monoxide and carbon dioxide concentrations, measured approximately 50 cm horizontally behind fuel spray nozzle or away from the pool, at the same level above the floor, and away from any open door or ventilation source. Due to the size of the test fires relative to the volume of the enclosure, consideration to the oxygen concentration is critical to verify that the test fires have not been self-extinguished. Oxygen should generally be no less than 16 percent during the entire period of each test.
- j) For the spray fires, conventional oil burner nozzles are used, meeting the requirements in Tables 1 and 2: