



**SLOVENSKI STANDARD**  
**SIST EN 14972-16:2019**

**01-oktober-2019**

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**Vgrajeni gasilni sistemi - Sistemi s pršečo vodo - 16. del: Protokol preskušanja sistemov z odprtimi šobami za požarno zaščito industrijskih cvrtnikov**

Fixed firefighting systems - Water mist systems - Part 16: Test protocol for industrial oil cookers for open nozzle systems

Ortsfeste Brandbekämpfungsanlagen - Feinsprüh-Löschanlagen - Teil 16:  
Brandversuchsprotokoll für industrielle Großfrittieranlagen für Feinsprüh-Löschanlagen mit offenen Düsen

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Installations fixes de lutte contre l'incendie - Systèmes à brouillard d'eau - Partie 16:  
Protocole d'essai des systèmes à buses ouvertes pour cuiseurs industriels

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**Ta slovenski standard je istoveten z: EN 14972-16:2019**

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**ICS:**

13.220.10      Gašenje požara      Fire-fighting

**SIST EN 14972-16:2019**      **en,fr,de**

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EUROPEAN STANDARD

EN 14972-16

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2019

ICS 13.220.20

English Version

## Fixed firefighting systems - Water mist systems - Part 16: Test protocol for industrial oil cookers for open nozzle systems

Installations fixes de lutte contre l'incendie - Systèmes  
à brouillard d'eau - Partie 16 : Protocole d'essai des  
systèmes à buses ouvertes pour friteuses industrielles

Ortsfeste Brandbekämpfungsanlagen - Feinsprüh-  
Löschanlagen - Teil 16: Brandversuchsprotokoll für  
industrielle Großfrittieranlagen für Feinsprüh-  
Löschanlagen mit offenen Düsen

This European Standard was approved by CEN on 7 July 2019.

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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.

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

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## European foreword

This document (EN 14972-16:2019) 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 February 2020, and conflicting national standards shall be withdrawn at the latest by February 2020.

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.

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*<sup>1</sup>;
- *Part 3: Test protocol for office, school class rooms and hotel for automatic nozzle systems*<sup>1</sup>;
- *Part 4: Test protocol for non-storage occupancies for automatic nozzle systems*<sup>1</sup>;
- *Part 5: Test protocol for car garages for automatic nozzle systems*<sup>1</sup>;
- *Part 6: Test protocol for false floors and false ceilings for automatic nozzle systems*<sup>1</sup>;
- *Part 7: Test protocol for commercial low hazard occupancies for automatic nozzle systems*<sup>1</sup>;
- *Part 8: Test protocol for machinery in enclosures exceeding 260 m<sup>3</sup> for open nozzle systems*<sup>1</sup>;
- *Part 9: Test protocol for machinery in enclosures not exceeding 260 m<sup>3</sup> for open nozzle systems*<sup>1</sup>;
- *Part 10: Test protocol for atrium protection with sidewall nozzles for open nozzle systems*<sup>1</sup>;
- *Part 11: Test protocol for cable tunnels for open nozzle systems*<sup>1</sup>;
- *Part 12: Test protocol for commercial deep fat cooking fryers for open nozzle systems*<sup>1</sup>;
- *Part 13: Test protocol for wet benches and other similar processing equipment for open nozzle systems*<sup>1</sup>;
- *Part 14: Test protocol for combustion turbines in enclosures exceeding 260 m<sup>3</sup> for open nozzle systems*<sup>1</sup>;
- *Part 15: Test protocol for combustion turbines in enclosures not exceeding 260 m<sup>3</sup> for open nozzle systems*<sup>1</sup>;

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<sup>1</sup> Under development.

**EN 14972-16:2019 (E)**

- *Part 16: Test protocol for industrial oil cookers for open nozzle systems.*
- *Part 17: Test protocol for residential occupancies for automatic nozzle systems*

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.

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## 1 Scope

This document specifies fire testing requirements for water mist systems used for fire protection of industrial oil cookers. This does not include requirements for systems used for protection of other equipment such as exhaust air ducts, heaters, heat exchangers, and food processing and food preparation areas.

## 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 14972-1:-<sup>2</sup>, *Fixed firefighting systems — Water mist systems — Design, installation, inspection and maintenance (in preparation)*

EN 60584-1:2013, *Thermocouples — Part 1: EMF specifications and tolerances (IEC 60584-1:2013)*

## 3 Terms, definitions and abbreviations

### 3.1 Terms and definition

For the purposes of this document, the terms and definitions given in EN 14972-1:-<sup>2</sup> 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 <https://www.iso.org/obp>

#### 3.1.1

##### **industrial oil cooker**

non-insulated conveyerized fryers, or batch kettles, used in food processing plants

Note 1 to entry: These cookers are extremely different in size, configuration, and construction from standard kitchen or restaurant oil cookers or fryers and require a different type of extinguishment system. Industrial oil cookers normally have large cooking surfaces, from four and a half square meter to several hundred square meters. They contain from several hundred litres up to approximately 20 000 l of cooking oil. Industrial oil cookers (except for some batch kettles) typically have moveable covers, or hoods, that can be hydraulically operated.

EXAMPLE Used for chicken, fish, potato products, fries, chips and doughnuts.

### 3.2 Abbreviations

AIT auto-ignition temperature

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<sup>2</sup> Under preparation. Stage at the time of publication prEN 14972-1:2019.

## EN 14972-16:2019 (E)

## 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 tests shall be conducted until the fire is extinguished, as required by the applicable fire test.
- 4.4 System components, component locations, operating conditions and test enclosure details shall remain unaltered throughout all of the fire tests for a given application.
- 4.5 All fire tests shall be conducted using the manufacturer specifications 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 1 min.
- 4.6 The nozzles can be placed inside or outside the industrial oil cooker and shall be located in accordance with the manufacturer's specifications.
- 4.7 In case a nozzle is provided with protective caps, these shall also be used during the fire tests. If nozzle caps are not provided, an alternative method is needed to prevent grease vapours, moisture or other foreign matter from entering the piping and plugging the nozzle orifice.
- 4.8 The fire scenarios shall be conducted using cooking oil specified by the manufacturer. Commonly used cooking oils, their flash points and AITs are listed in Table 1 for information. The test results are only valid for water mist system with cooking oils with flash points and AITs less than or equal to the tested oil  $\pm 5\%$ . If oils with lower AIT or flash point shall be used in the field, then the test has to be repeated with the respective new cooking oil.

**Table 1 — Typically Flash points and AIT's for different cooking oils**

Cooking oil	Flash point °C	AIT °C
Canola	338	363
Corn	342	362
Cotton seed	334	366
Peanut	348	370
Soybean (Soya)	333	377
Sunflower	340	359
Palm	328	377

## 5 Test equipment requirements

- 5.1 The test laboratory shall 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.
- 5.2 The size of the test laboratory shall not impact extinguishment of any test fires (i.e. depletion of oxygen due to an inadequately sized test laboratory).



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

**5.4** 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.

**5.5** 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 shall be conducted at the minimum and maximum pressure by using external means to control the system pressure.

**5.6** The fire tests shall be conducted in a large open test hall of sufficient area, and with a minimum ceiling height of 5,0 m, to avoid impacting the results of the tests. Tests involving larger oil cooker mock-ups can require a higher ceiling height. Ventilation for between tests and cooling of the enclosure shall be provided.

## 6 Industrial oil cooker mock-ups requirement

There shall be three industrial oil cooker mock-ups denoted as mock-up A, mock-up B and mock-up C (see Figures 1, 2 and 3).

Each mock-up shall be fabricated from nominal 10 mm thick steel and shall consist of a pan and a hood.

- Mock-up A: The insides dimensions of the pan shall be X meter wide, Y meter long and minimum 34 cm deep. Y shall be greater than or equal to X. The inside dimensions of the hood shall be X plus 5 cm wide, Y plus 5 cm long and 76 cm deep. Both ends of the hood along the X dimension shall be open. In addition, there shall be a 50 cm diameter hole on top of the hood simulating the exhaust duct. The distance from the centreline of the hole to either end of the hood shall be half of Y plus 2,5 cm.
- Mock-up B: The insides dimensions of the pan shall be X meter wide, two-times Y meter long and minimum 34 cm deep. Y shall be greater than or equal to X. The inside dimensions of the hood shall be X plus 5 cm wide, two-times Y plus 5 cm long and 76 cm deep. Both ends of the hood along the X dimension shall be open. In addition, there shall be two 50 cm diameter holes on top of the hood simulating the exhaust ducts. The distance from the centreline of the holes to the closest respective end of the hood shall be 0,7-times Y plus 2 cm.
- Mock-up C: The insides dimensions of the pan shall be X meter wide, three-times Y meter long and minimum 34 cm deep. Y shall be greater than or equal to X. The inside dimensions of the hood shall be X plus 5 cm wide, three-times Y plus 5 cm long and 75 cm deep. Both ends of the hood along the X dimension shall be open. In addition, there shall be three 50 cm diameter holes on top of the hood simulating the exhaust ducts. The distance between the centreline of the holes shall be 0,75-times Y plus 1,3 cm. The distance from the centreline of the two holes closest to the ends of the hood and the closest respective end of the hood shall be 0,75-times Y plus 1,3 cm.

Alternative pan and hood dimensions, and configurations, may be used at the request of the manufacturer, resulting in an expanded range of tested mock-up configurations. This includes mock-up configurations to allow for lesser minimum nozzle distance to oil surface and greater maximum nozzle distance to oil surface than those achieved using the standard mock-up dimensions.

Any variations from the standard mock-up have to be documented in the DIOM manual and in the test report.