



SLOVENSKI STANDARD
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Vgrajeni gasilni sistemi - Sistemi s pršečo vodo - 12. del: Protokol preskušanja za komercialne cvrtnike za cvrtje v globoki maščobi za sistem z odprtimi šobami

Fixed firefighting systems - Water mist systems - Part 12: Test protocol for commercial deep fat cooking fryers for open nozzle systems

Ortsfeste Brandbekämpfungsanlagen - Wassernebelsysteme - Teil 12: Prüfprotokoll für kommerzielle Frittier- und Fettbackgeräte für offene Düsensysteme

Installations fixes de lutte contre l'incendie - Systèmes à brouillard d'eau - Partie 12 : Protocole d'essai des systèmes à buses ouvertes pour friteuses à usage collectif

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ICS:

13.220.20	Požarna zaščita	Fire protection
97.040.20	Štedilniki, delovni pulti, pečice in podobni aparati	Cooking ranges, working tables, ovens and similar appliances

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Fixed firefighting systems - Water mist systems - Part 12: Test protocol for commercial deep fat cooking fryers for open nozzle systems

Ortsfeste Brandbekämpfungsanlagen -
Wassernebelsysteme - Teil 12: Prüfprotokoll für
kommerzielle Frittier- und Fettbackgeräte für offene
Düsenysteme

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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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 14972-12:2023) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This document is a working document.

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 m³ for open nozzle systems;*
- *Part 9: Test protocol for machinery in enclosures not exceeding 260 m³ 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 m³ for open nozzle systems;*
- *Part 15: Test protocol for combustion turbines in enclosures not exceeding 260 m³ 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 fire and splash testing requirements for manually operated water mist systems used for the protection of commercial deep fat fryers, hoods and ducts. This does not include requirements for systems used for protection of surrounding areas beyond that which the water mist system is intended to cover.

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 14972-1:2020, *Fixed firefighting systems - Water mist systems - Part 1: Design, installation, inspection and maintenance*

3 Terms and definitions

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

ISO and IEC maintain terminological 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>

3.1 cooking grease

vegetable shortening incorporating an antifoaming agent

3.2 deep fat fryer

cooking appliance where the food is fried submerged in a fixed vat filled with oil exposed to an intense radiant or convective heat source

[SOURCE: EN 17446:2021, 3.4]

3.3 discharge rate

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

Note 1 to entry: Expressed in litres/minute.

3.4 grease filter

component of a grease vapour removal system that deflects the air and vapours passing through it in such a manner as to result in the grease vapours concentrating, condensing, or both, for the purpose of grease collection

3.5

hood

device part of an exhaust system that directs and captures grease and oil vapours and also the combustion gases from a cooking appliance

[SOURCE: EN 17446:2021, 3.3]

3.6

hood plenum chamber

volume of enclosed space between the grease filters and the portion of the hood above the grease filters in a hood and duct system

3.7

multiple-vat fryer

fryer that incorporates vats that are mechanically joined together, where each vat incorporates a separately controlled heating source

[SOURCE: EN 17446:2021, 3.4.1]

3.8

split-vat deep fat fryer

fryer that incorporates a divided partition which splits the fryer in sections, where each split-vat fryer incorporates a separately controlled heating source

Note 1 to entry: It may have one or several vats arranged adjoining each other.

[SOURCE: EN 17446:2021, 3.4.2]

4 General requirements

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4.1 The water mist system, operating without manual intervention, shall successfully complete all described performance tests for their specific applications. Each application shall be tested individually.

4.2 System components, component locations, operating conditions and test hall details shall remain unaltered throughout all of the performance 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.

5 Deep fat fryer, hood and duct mock-up requirements

5.1 Deep fat fryer

The deep fat fryer used for the deep fat fryer tests shall be a commercially available natural gas, propane, or electric deep fat fryer, at least 230 mm deep, having a cooking surface area as specified in the manufacturer's installation instructions. For a deep fat fryer with an integral drip board, or the like, the calculated cooking area, along with the drip area, shall be as indicated in the manufacturer's installation instructions.

Multiple-vat and split-vat deep fat fryers shall be separately tested.

NOTE On certain electric fryers, the heating elements can be damaged due to the high temperatures during the fire testing; therefore, natural gas or propane fuelled units are commonly used for the fire tests.

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The deep fat fryer shall be such that, at an ambient temperature of (21 ± 5) °C:

- a) adjusting the deep fat fryer to its maximum power setting, the average value of rise in temperature per minute when the temperature of the oil goes from (260 ± 5) °C to (315 ± 5) °C, shall not be less than 7 °C/min;
- b) adjusting the deep fat fryer to its maximum power setting and shutting it off on reaching (325 ± 5) °C, the average value of descent of temperature per minute when the temperature of the oil goes from (315 ± 5) °C to (260 ± 5) °C, shall not exceed 3 °C/min.

For the verification of the deep fat fryer requirements, temperatures shall be continuously recorded with a thermocouple located at the same position as during the tests as indicated in Clause 7.

The length and width of the cooking area of the fryer being tested shall correspond to the maximum area coverage and dimension limitations specified in the manufacturer's installation instructions.

5.2 Deep fat fryer mock-up

Each hood and duct extinguishing test shall be conducted with a deep fat fryer mock-up as an ignition source located under the hood directly below the duct entrance. The distance between the ignition source and the hood entrance shall be convenient for the test installation.

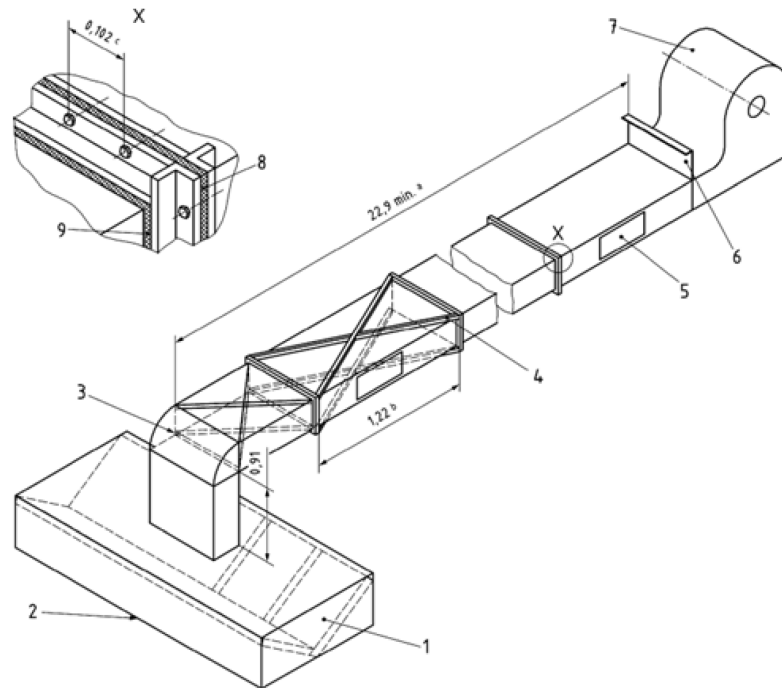
The deep fat fryer mock-up shall be a pool fabricated of sheet metal at least 2 mm thick, having a surface area of at least 0,35 m² and depth of at least 230 mm. Alternatively, a deep fat fryer as specified in 5.1 may be used.

5.3 Duct mock-up

The shape of the duct shall be rectangular. The extinguishing system may be used in a round duct having a cross sectional area equal to or less than that of the tested rectangular duct. See Figure 1. The duct cross sectional area shall be the maximum specified in the installation instructions.

<https://standards.iteh.ai/catalog/standards/sist/c71eaf12-0c5d-4104-9d47-3473128bc4dd/osist-pren-14972-12-2023>

Dimensions in metres

**Key**

- | | | | |
|---|--|---|--|
| 1 | filters (thickness 50,8 mm) | 7 | blower capable of providing 2,54 m/s to 5,08 m/s air velocity through the duct |
| 2 | hood | 8 | sealant |
| 3 | dam (height 12,7 mm) | 9 | welded seam all around |
| 4 | angle iron supports to minimize wrapping | a | |
| 5 | access ports provided every 2,43 m | b | |
| 6 | damper | c | |

Figure 1 — Typical example of hood and duct mock-up

The duct shall be installed with the longest side horizontal and the ratio between vertical and horizontal sides shall be 1 : 2 with $\pm 10\%$ tolerance.

The duct length shall be specified by the manufacturer of the extinguishing system. If a length of 22,9 m or more is used, the extinguishing system may be installed without limitation to the maximum duct length. Access ports shall be provided at least every 2,4 m along the duct to permit the inspection and greasing of the duct. Duct sections shall be provided with gaskets to prevent the leakage of grease at the point of connection. The gasket material shall be made of a material that withstands the heat exposure generated during the test. The duct shall be supported at least every 2,4 m to help maintain the duct integrity.

The duct shall have a downward slope toward the hood of 25,4 mm to 76,2 mm for every 3 m of duct length so that a stream of liquid grease, for test purposes, flows from the duct onto the filters. The duct shall have a ≤ 900 mm high riser to connect the hood and the horizontal run of the duct. At the point at which the horizontal run of the duct connects to the riser, a 12,5 mm high dam shall be used on the bottom of the duct to allow an amount of grease to remain in the duct throughout the test period.

At the outlet of the duct, an exhaust blower and a damper shall be provided to permit adjustment of air velocity through the filters and the duct.

5.4 Hood mock-up

The hood dimensions shall be the maximum as specified in the installation instructions.

The hood shall be at least 1,2 m wide, 1,2 m long and 0,6 m high. It shall be constructed of sheet metal having a minimum thickness of 2 mm. See Figure 1.

The filter frame shall be a " V " type extending the full length of the hood. The bottom portion of the filter frame shall be constructed of 50 mm × 50 mm angle iron having a minimum thickness of 3 mm. Steel mesh type filters shall be installed at a $(45 \pm 10)^\circ$ inclined position on both sides of the " V ". During the extinguishing tests, the deep fat fryer mock-up described in 5.2 shall be located below the hood and filters. The hood and filters shall extend beyond each end of the ignition source. See Figure 1.

6 Test equipment requirements

6.1 The test hall shall be of adequate size with natural or minimal ventilation so as not to interfere with the testing within the hall or about the mock-up or to impact the extinguishment of any test fires (i.e. depletion of oxygen due to an inadequately sized test hall).

6.2 The test hall shall be at an ambient temperature of $(20 \pm 10)^\circ\text{C}$ prior to the start of each test. All non-fire induced drafts shall be eliminated.

6.3 The minimum discharge conditions (as specified by the manufacturer) shall be used for all tests, unless otherwise stated. The nozzle(s) shall be placed at the most difficult location and orientation allowed by the installation instructions with respect to achieving the required performance.

6.4 System operating pressures shall be repeatable 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.

6.5 The nozzles shall be located in accordance with the manufacturer's instructions.

6.6 The cooking grease used in the tests shall be new vegetable shortening incorporating an antifoaming agent. The liquid grease shall have an auto-ignition temperature not less than 363°C .

6.7 Prior to the conduct of each test, the fryer or the relevant mock-ups shall be cleaned and provided with new cooking grease.

7 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).

All thermocouples shall be of Type K, diameter 1 mm. For the duct tests shielded thermocouples are recommended.

- a) The grease temperature during deep fat fryer testing shall be measured with a thermocouple located 25 mm below the grease surface. The thermocouple shall be located not closer than 75 mm to any side of the fryer.
- b) The interior of the duct shall be provided with temperature sensors located at the centre of the duct cross section, at a distance of 3,6 m and 6,1 m from the duct entrance.
- c) Air velocity within the duct, downstream of the hood with ungreased filters installed, shall be measured by suitable equipment (a pitot tube or a vane / hot wire anemometer). The measurements