
Vgrajeni gasilni sistemi - Sistemi s pršečo vodo - 14. del: Protokol preskušanja sistemov z odprtimi šobami za požarno zaščito turbin v ohišjih nad 260 m³

Fixed firefighting systems - Water mist systems - Part 14: Test protocol for combustion turbines in enclosures exceeding 260 m³ for open nozzle systems

Ortsfeste Brandbekämpfungsanlagen - Wassernebelsysteme - Teil 14:
Brandversuchsprotokoll für Verbrennungsturbinen in Gehäusen über 260 m³ für offene
Düsenysteme

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Installations fixes de lutte contre l'incendie - Systèmes à brouillard d'eau - Partie 14 :
Protocole d'essai des systèmes à buses ouvertes pour turbines à combustion situées
dans des enceintes de plus de 260 m³

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Fixed firefighting systems - Water mist systems - Part 14: Test protocol for combustion turbines in enclosures exceeding 260 m³ for open nozzle systems

Installations fixes de lutte contre l'incendie - Systèmes à brouillard d'eau - Partie 14 : Protocole d'essai des systèmes à buses ouvertes pour turbines à combustion situées dans des enceintes de plus de 260 m³

Ortsfeste Brandbekämpfungsanlagen - Wassernebelsysteme - Teil 14: Prüfprotokoll für Verbrennungsturbinen in Gehäusen über 260 m³ für offene Düsensysteme

This European Standard was approved by CEN on 2 August 2021.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 14972-14:2021) 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of an identical text or by endorsement, at the latest by March 2022, and conflicting national standards shall be withdrawn at the latest by March 2022.

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;*
- 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 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.*

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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.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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 the evaluation of the fire performance for water mist systems used for fire protection of combustion turbines in enclosures with volumes exceeding 260 m³.

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*

EN 10025-2, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14972-1:2020 apply.

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

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

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

4 General requirements

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

4.2 The fire tests shall be conducted until the fire is extinguished or suppressed, as required by the applicable fire test for their specific applications.

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

4.4 All fire tests shall be conducted using the specifications from the manufacturer's DIOM manual (design, installation, operation and maintenance manual) 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.

4.5 In conjunction with the performance fire tests, all twin fluid water mist systems (except for those applying compressed air) shall be subjected to a straight discharge test with no fire to evaluate the resulting discharge and oxygen concentration. This evaluation shall 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 shall be recorded at a location(s) within the test enclosure. This information shall be used to evaluate personnel safety, and shall be accounted for in the manufacturer's DIOM manual.

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4.6 In addition to the fire tests, an optional spray cooling test may be conducted, and the results shall be analysed by heat transfer calculations to confirm that excessive turbine shell distortion is avoided. No direct spray impingement onto the turbine casing is allowed in real installations unless otherwise proven by the heat transfer calculations using the spray cooling test results.

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

5 Test enclosure requirements

The maximum enclosure volume (as specified by the manufacturer) shall be tested (see Figure 1).

The enclosure area should be preferably squared. If this is not possible length of the sides shall not exceed 2,5:1 ratio. In any case the length of any of the sides shall be at least 8,00 m.

The maximum enclosure height (as specified by the manufacturer) shall be tested. The enclosure shall be constructed of wood or metal frame with an inner lining of minimum 13 mm gypsum or 0,7 mm galvanized steel.

To minimize leakages, all joints and gaps shall be sealed. An opening measuring 2 m by 2 m and 0,5 m above the floor level shall be installed in the centre of one wall, as shown in Figure 1.

A minimum of two hinged ceiling hatches measuring approximately 1 m by 2 m shall be installed in opposite diagonal corners for heat and smoke release at the conclusion of the fire test. The floor shall be non-combustible and any floor drainage or vent openings shall be sealed during testing.

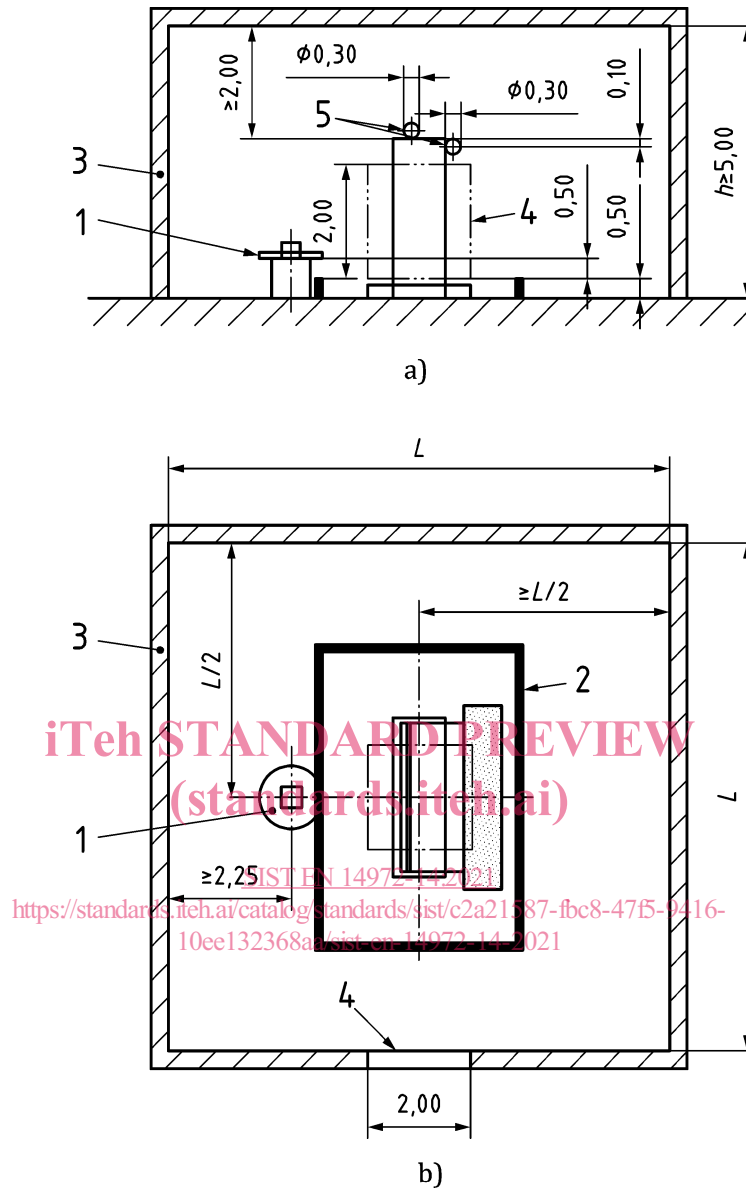
A small vent can be provided to allow the intake of air, to prevent excessive suctioning of the walls and ceiling and maintain structural integrity of the fire test enclosure.

The combustion turbine and engine mock-up unit shall be centred in the test enclosure.

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Dimensions in metres

**Key**

- | | | | |
|----|----------------------------|-----|------------|
| a) | front view | 4 | opening |
| b) | top view | 5 | steel pipe |
| 1 | tray for Class A fire test | h | height |
| 2 | bilge enclosure | L | length |
| 3 | test enclosure | | |

Figure 1 — Combustion turbine test enclosure

EN 14972-14:2021 (E)**6 Combustion turbine mock-up requirements****6.1 Combustion turbine mock-up unit**

The mock-up unit measures 3 m long by 1 m wide by 3 m high (see Figure 2 and Figure 3). It is fabricated from sheet steel with a nominal thickness of 5 mm. A tray with a depth of 100 mm is formed at the top of the mock-up unit. Two 30 cm nominal diameter pipes, 3 m in length, are attached to the unit to simulate obstructions. A 0,7 m wide solid shelf is also connected to the unit, which provides a barrier to allow shielded fire tests to be conducted. Placement of additional baffles or obstructions can be needed to prevent the direct impact of mist on the pool or spray test fires.

A 200 mm × 50 mm notch is cut into the side of the top tray opposite the solid shelf for the purposes of the flowing fire test (see Figure 2 and Figure 3).

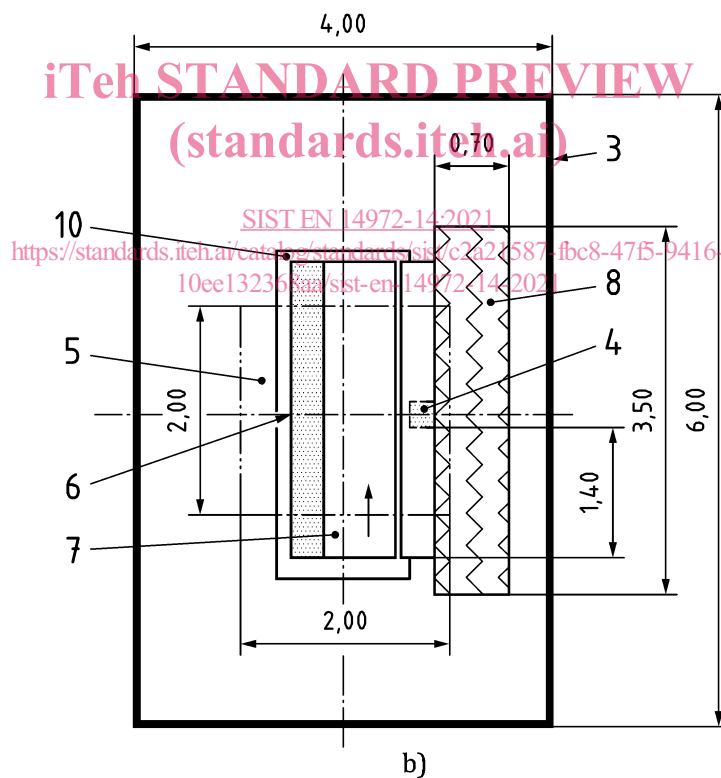
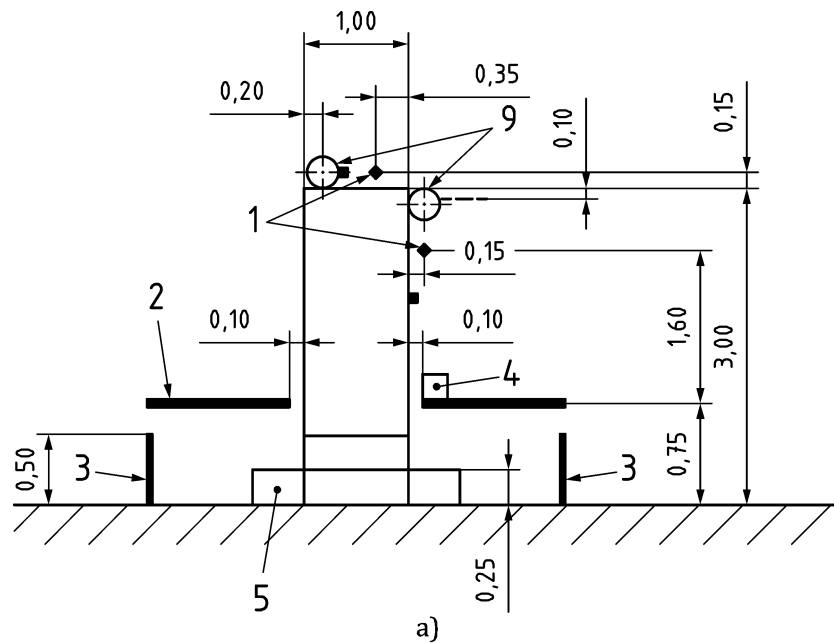
The mock-up unit shall be surrounded by a steel floor plate system, 6 m long × 4 m wide × 0,75 m high. A 4 m² × 0,254 m high square pan shall be located underneath the floor plate system.

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Dimensions in metres

**Key**

- | | | | |
|----|------------------------------------|----|--|
| a) | front view | 6 | location for notch for flowing fuel |
| b) | top view | 7 | top tray (3,00 m ²) |
| 1 | exposed and concealed spray nozzle | 8 | solid steel plate (5,00 mm) |
| 2 | bilge steel plate | 9 | steel pipes |
| 3 | bilge enclosure | 10 | gap between engine and inside perimeter of bilge plate |
| 4 | tray (0,1 m ²) | ■ | thermocouple |