BS EN 14972-7:2023

BSI Standards Publication

Fixed firefighting systems — Water mist systems

Part 7: Test protocol for commercial low hazard occupancies for automatic nozzle systems

bsi.

National foreword

This British Standard is the UK implementation of EN 14972-7:2023.

The UK participation in its preparation was entrusted to Technical Committee FSH/18/5, Watermist systems.

A list of organizations represented on this committee can be obtained on request to its committee manager.

BSI, as a member of CEN, is obliged to publish EN 14972-7:2023 as a British Standard.

The UK committee has a concern to the degree of reliance on the design, installation, operation and maintenance (DIOM) manual to constrain critical parameters with regard to the whole EN 14972 series of standards.

The UK committee believes that EN 14972-7:2023 does not sufficiently cover certain technical and safety matters. These have been addressed to some extent in National Annexes NA and NB of this standard.

The limits of application of the fire test protocols and other constraints have not, at the time of writing, been published. The intended scope and clear limits of the fire test protocols to the application of this standard are fundamental to its safe implementation. National Annexes NA and NB contain the UK committee recommendations (i.e. mechanisms to declare and constrain limits of application).

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Published by BSI Standards Limited 2023

ISBN 978 0 539 18708 3

ICS 13.220.20

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2023.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14972-7

July 2023

ICS 13.220.20

English Version

Fixed firefighting systems - Water mist systems - Part 7: Test protocol for commercial low hazard occupancies for automatic nozzle systems

Installations fixes de lutte contre l'incendie - Systèmes à brouillard d'eau - Partie 7 : Protocole d'essai des systèmes à buses automatiques pour locaux commerciaux à risque faible

Ortsfeste Brandbekämpfungsanlagen - Wassernebelsysteme - Teil 7: Prüfprotokoll für kommerzielle Belegung geringer Gefährdung für automatische Düsensysteme

This European Standard was approved by CEN on 9 July 2023.

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Ref. No. EN 14972-7:2023 E

Contents

European foreword

This document (EN 14972-7:2023) 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 January 2024, and conflicting national standards shall be withdrawn at the latest by January 2024.

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.

The EN 14972 series, *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^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*

NOTE This list includes standards that are in preparation and other standards can be added. For current status of published standards refer to www.cencenelec.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.

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1 Scope

This document specifies fire testing requirements for water mist systems used for fire protection of commercial low hazard occupancies up to 5 m 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, *Plywood — Specifications*

EN 12259-1, *Fixed firefighting systems — Components for sprinkler and water spray systems — Part 1: Sprinklers*

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

EN 14972-4:—[1], *Fixed firefighting systems — Water mist systems — Part 4: Test protocol for non-storage occupancies for automatic nozzle systems*

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 terminology 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/

3.1
low hazard occupancy
lightly loaded non-storage and non-manufacturing areas with ordinary combustibles

Note 1 to entry: Areas in occupancies with relatively low rates of heat release, with maximum fuel loads and obstructions, as indicated in test fire arrangements.

Note 2 to entry: Fuel loads are specified in 5.1 to 5.4.

4 General requirements

4.1 General

The low hazard occupancy tests comprise small, large and open compartments, plus open plan office simulations. The water mist system shall pass all the tests for the categories for which it is to be used.

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

[1] Under preparation. Stage at the time of publication: prEN 14972-4:2023.

4.2 Categories

4.2.1 Category I system

This system covers rooms up to 37 m^2 containing low hazard fire loads ≤ 150 MJ/m^2 up to 2,4 m ceiling height.

4.2.2 Category II system

This system covers unlimited rooms containing low hazard fire loads ≤ 150 MJ/m^2 up to 5 m ceiling height.

4.2.3 Category III system

This system covers unlimited rooms containing low hazard fire loads, ≤ 500 MJ/m^2 up to 5 m ceiling height.

5 Fuel packages

5.1 Fuel package 1 (bunk beds)

This fuel package is specified in EN 14972-4:—[1], 7.1.

5.2 Fuel package 2 (corner crib and simulated furniture)

This fuel package is specified in EN 14972-4:—[1], 7.2.

5.3 Fuel package 3 (sofas)

This fuel package is specified in EN 14972-4:—[1], 7.3.

5.4 Fuel package 4 (simulated work station)

The simulated work station fuel load arrangement shall be as shown in Figure 1.

Two walls shall be constructed 2,4 m wide × 1,8 m high from two layers of plasterboard attached to a timber frame. The walls shall be positioned to form a corner arrangement. The front face of the walls shall be clad with 12 mm thick Elliotis pine plywood panels in accordance to EN 636.

The table arrangement shall be formed from two differently sized tables, each constructed from 22 mm thick chipboard with a metal angle support frame. The large table shall measure 2,4 m long × 1,2 m wide × 760 mm high, and the small Table 1,2 m long × 0,9 m wide × 760 mm high. The two tables shall be butted together, and aluminium foil tape shall be used to seal the joint. The chipboard tables shall be separated from the plywood walls by a gap of (10 ± 2) mm (see Figure 1).

Two separate wood and plastic cribs (a corner crib and a target crib) shall be located underneath the table arrangement. Each crib shall be formed from 40 sticks of pinus silvestris (European redwood) measuring 38 mm × 38 mm × 250 mm long, and 16 sticks of pinus silvestris measuring 38 mm × 38 mm × 1 000 mm, arranged in alternate layers. Four layers of ten of the short sticks shall be equally spaced over the length of the crib with the bottom layer forming the bottom of the crib. Four layers of four of the long sticks shall be equally spaced over the width of the crib, with the top layer forming the top of the wood crib. Additionally, 27 sticks of natural polypropylene shall be inserted in the gaps formed by the wood crib sticks on the top two layers of the crib and on top of the crib itself (that is three rows of nine sticks). The polypropylene sticks shall measure 35 mm × 200 mm × 10 mm thick.

The corner crib shall be positioned 400 mm away from the plywood wall, with the length of the crib positioned parallel to the wall. The end of the crib (closest to the corner) shall be 250 mm away from the other plywood wall.

The target crib shall be positioned 250 mm away from the plywood wall, with the length of the crib positioned parallel to the wall. The end of the crib (closest to the corner crib) shall be 500 mm away from the corner crib.

The target table fuel loading shall consist of cardboard box files, polyurethane foam and paper as follows:

— ten cardboard box files measuring 370 mm × 265 mm × 75 mm wide;

— six sheets of polyurethane foam having a density of 17 kg/m³ to 19 kg/m³ and measuring 370 mm × 265 mm × 75 mm wide;

— four batches of 500 sheets of white size A4 paper having a density of approximately 80 g/m².

Two sets of box files and foam sheets shall be used, each of three box files spaced with three foam sheets. For each arrangement, the two box files closest to the corner shall each be filled with 500 sheets of white size A4 paper. The box files and foam sheets shall be positioned 50 mm away from the adjacent plywood walls.

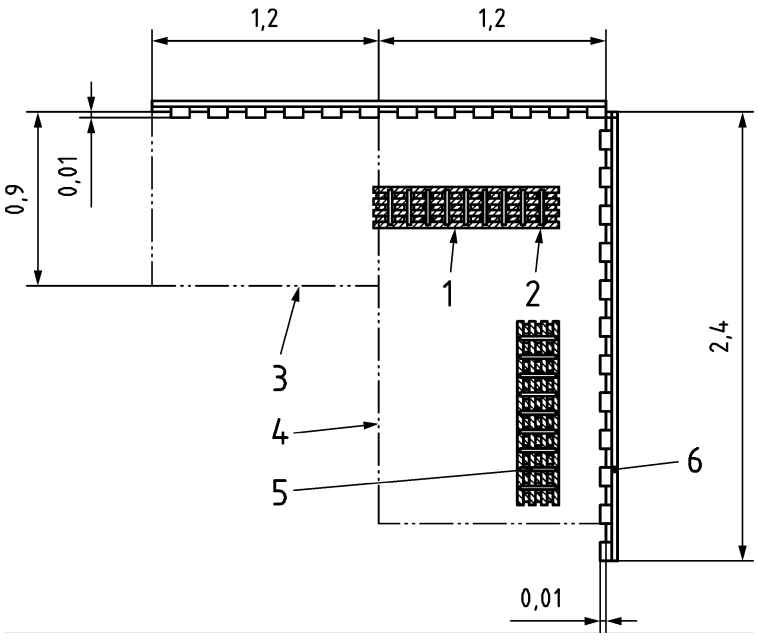
For the box files above the corner crib, the face of the box file closest to the corner shall be 250 mm away from the plywood wall.

For the box files above the target crib, the face of the box file closest to the corner shall be 500 mm away from the plywood wall.

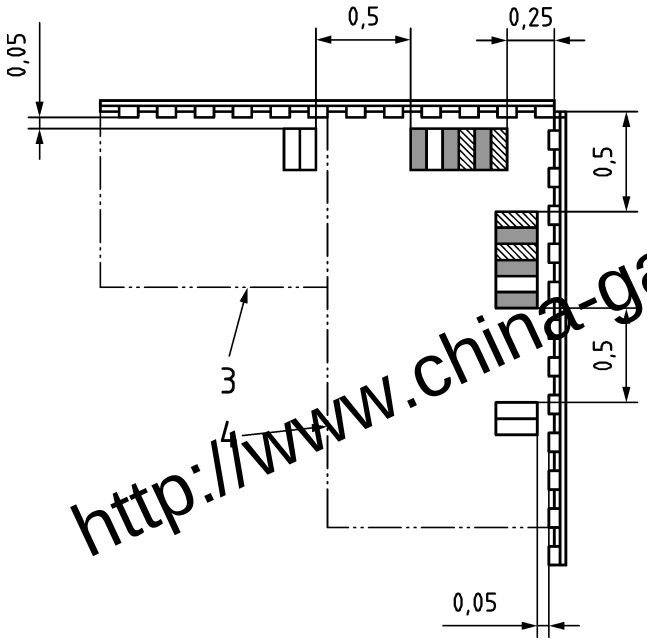
Additionally, two target box files shall be positioned 500 mm away from the face of the end foam sheet and shall also be positioned 50 mm away from the plywood walls.

After being soaked in white spirit (see 9.1.3), igniters shall be positioned in the corner crib (at the end close to the wall) at the base of the crib as shown in Figure 1 d).

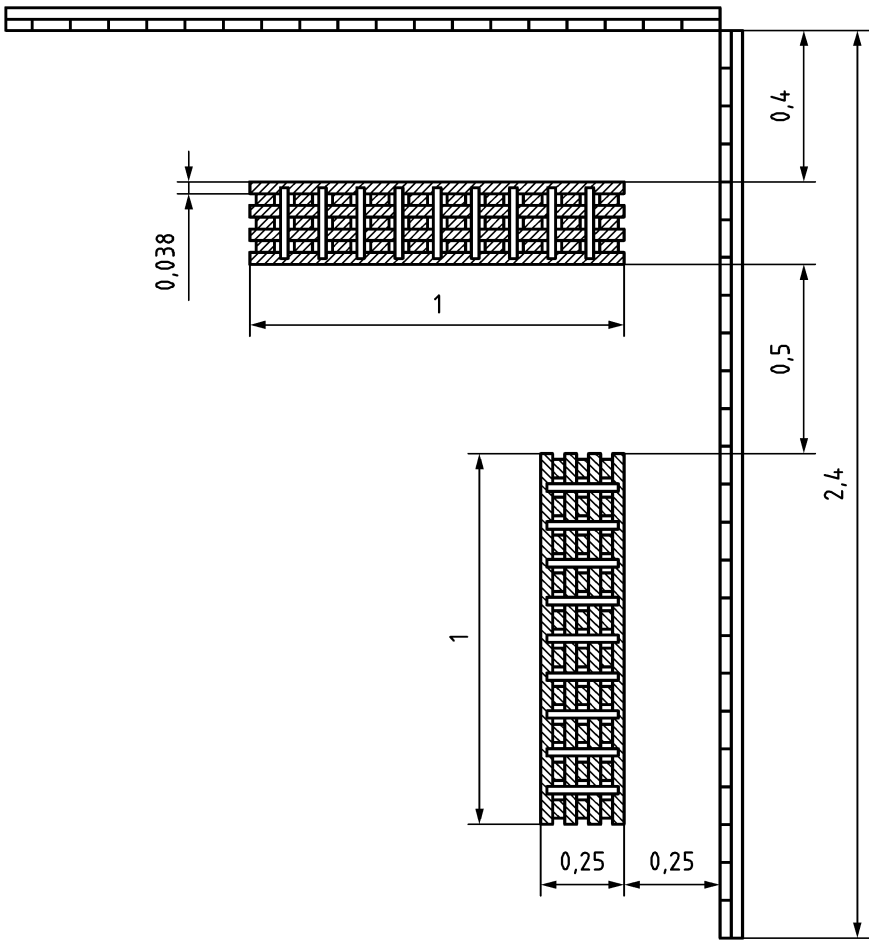
Dimensions in metres



a) Plan view showing the position of the walls, tables and cribs on the floor



b) Plan view showing the position of the walls, tables and table fire load on the tables



c) Plan view showing the position of the cribs in relation to the walls

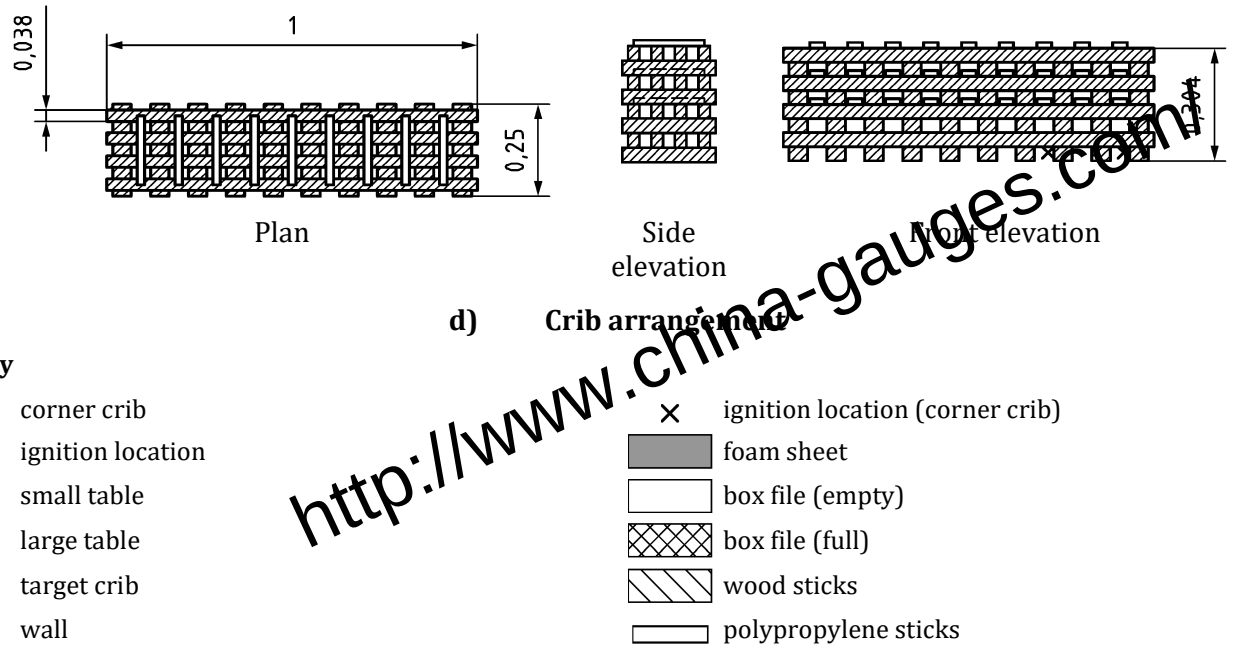


Figure 1 — Fuel package 4 (simulated work station)

6 Test arrangement

6.1 Test room A (small compartment)

This test room is specified in EN 14972-4:—[1], 6.1.

6.2 Test room B (large compartment)

This test room is specified in EN 14972-4:—[1], 6.2.

6.3 Test room C (open space)

This test room is specified in EN 14972-4:—[1], 6.3.

6.4 Test room D: open space

The test room shall have a ceiling area of at least 36 m^2 in order to simulate an uninterrupted open space, and shall be 5 m in height or the maximum ceiling height specified in the manufacturer's design instructions, whichever is the lowest.

The ceiling shall be constructed from 12 mm calcium silicate board.

The thermocouples (7.14) shall be centred directly over the ignition source.

7 Test equipment requirements

7.1 Test hall of appropriate size to accommodate the largest test room (6.2), with natural or minimal ventilation that will not interfere with the fire testing within the enclosure or test rig.

Unless otherwise stated, the following tolerances apply:

— length: ± 2 %;

— volume: ± 5 %;

— pressure: ± 3 %;

— temperature: ± 5 %.

7.2 Water mist system comprising nozzles, piping, control valves and water supplies. The individual nozzles shall be automatic and shall include either a fusible or a glass bulb assembly which meets EN 12259-1 quick response criteria. The nominal operating temperature of the nozzle shall not exceed 107 °C. The system shall be configured in accordance with the manufacturer's instructions and the test conditions specified in Clause 6.

7.3 Test room A (small compartment), as specified in 6.1.

7.4 Test room B (large compartment), as specified in 6.2.

7.5 Test room C (open space), as specified in 6.3.

7.6 Test room D (simulated work station), as specified in 6.4.

7.7 Fuel package 1 (bunk beds), as specified in 5.1.

7.8 Fuel package 2 (corner crib and simulated furniture), as specified in 5.2.

7.9 Fuel package 3 (sofas), as specified in 5.3.

7.10 Fuel package 4 (simulated work station), as specified in 5.4.

7.11 Igniter, (Fuel Package 1 and 3) consisting of porous material (e.g. pieces of insulating fibreboard), 75 mm in length, and either oblong with a depth and height of 60 mm or cylindrical with a diameter of 75 mm. Igniter, (Fuel Package 4) consisting of porous material (e.g. pieces of insulating fibreboard), 250 mm in length, 25 mm wide and 10 mm thick.

7.12 Heptane.

7.13 White spirit.

7.14 Thermocouples, suitable for measuring ceiling surface temperatures, which shall be fabricated from Chromel-alumel (Type K) thermocouple wires not exceeding 0,5 mm diameter welded together. In each test room, one thermocouple shall be embedded within the ceiling tiles, such that the thermocouple bead is located 6,5 mm above the bottom surface of the ceiling, and a second thermocouple shall be located 76 mm below the ceiling surface. To prevent water impingement from affecting thermocouple measurements, thermocouples subject to water mist shall be protected with a shield which is large enough to cover the thermocouple ends. The shield shall be made from metallic tape which is formed into an umbrella shape and attached to the wire above each thermocouple end.

7.15 Instrumentation to measure and record the following parameters, as appropriate to the type of test:

— test enclosure temperatures;

— extinguishing agent flow and pressure in the extinguishing system;

— water supply pressure (including tank pressure if applicable) and nozzle discharge pressures;

— extinguishing agent pressure at the most remote nozzle branch line;

— gas pressure at its storage outlet and distribution sources;

— oxygen, carbon monoxide and carbon dioxide concentrations;

— consumption of foam concentrate or other additive, recorded by means of a load cell on which the concentrate/additive tank is placed during the tests;

— gas consumption, measured by means of pressure or load cell on which the gas tank is placed during the tests, or mass flow measurement.

7.16 Additional baffles or obstructions, if needed, to prevent the direct impact of mist on the fire.

7.17 Stopwatch.

8 Test conditions

8.1 The maximum nozzle spacing (as specified by the manufacturer) shall be used for all tests except the bunk bed test (see 6.1). This includes utilizing the maximum ceiling spacing of nozzles from walls.

8.2 Corridor nozzles for the small compartment test (see 6.1) shall be installed at the maximum spacing as specified by the manufacturer, at an equal distance from the centreline of the small compartment doorway.

8.3 Where applicable a target, automatic closed nozzle, with a thermosensitive component rating equal to the four nozzles installed in the enclosure, shall be located in the two adjacent exit doorways (see 7.4), to determine potential operation of these nozzles. For upright and pendent nozzles, the target nozzles shall be installed 102 mm inside the doorway, in the pendent position, such that the centre of the thermal release element is 51 mm below the ceiling. For sidewall nozzles, the target nozzles shall be installed in the most protrusive position possible such that the centre of the thermal release element is 102 mm below the ceiling.

8.4 The thermal release element and temperature rating of the nozzles used in all fire tests shall be identical.

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

— 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

— 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.

8.6 The air in the test enclosure shall be conditioned to an ambient temperature of (15 ± 10) °C, measured with the thermocouple located 76 mm below the ceiling.

8.7 The fuel load materials for the category III test shall be conditioned at normal room temperature (20 ± 10) °C for a period of seven days prior to testing commencing. The wood crib sticks shall have a moisture content between 9 % and 13 %.

9 Fire tests

9.1 Procedure

9.1.1 The following individual tests shall be conducted:

a) for category I systems:

   1) small compartment with bunk beds (9.2);

   2) large compartment with corner crib and simulated furniture up to 37 m^2 compartment size (9.3);

b) for category II systems:

   1) large compartment with corner crib and simulated furniture up to maximum coverage of four nozzles (9.3);

   2) open space with sofas under one nozzle (9.4);

   3) open space with sofas between two nozzles (9.5);

   4) open space with sofas between four nozzles (9.6).

c) for category III systems:

   1) open space with simulated work station under one nozzle (9.7);

   2) open space with simulated work station between two nozzles (9.8);

   3) open space with simulated work station between four nozzles (9.9).

9.1.2 System components, component locations, operating conditions and test enclosure details shall remain unaltered throughout all of the fire tests for a given application. During each test, all systems shall operate without manual intervention. All tests shall be conducted using the specifications from the manufacturer's design and installation manual with regard to nozzle placement, spray flux, and spray duration.

9.1.3 Prior to the start of each test:

— the igniter (7.11) shall be soaked in 120 ml of heptane for the category I and II (see 9.2 to 9.6) and 120 ml of white spirit for the category III (see 9.7 to 9.9);

— the room shall be dried and all water from previous testing shall be removed;

— there shall be no visible water on the floor, ceiling or walls.

9.1.4 The category I and II tests (see 9.2 to 9.6) shall be conducted for 10 min after the activation of the first nozzle. The category III tests (see 9.7 to 9.9) shall be conducted for 30 min after the activation of the first nozzle. After this period, any remaining fire shall be extinguished manually.

9.1.5 During each test, the following temperatures shall be measured continuously, at least every 2 s, throughout the tests:

— the embedded ceiling surface temperature above the ignition source in the room, with the thermocouple bead flush with the ceiling;

— the ceiling gas temperature, with a thermocouple (75 ± 1) mm below the ceiling in the centre of the room;

— the ceiling surface temperature in the centre of the corridor, directly opposite the doorway, with a thermocouple embedded in the ceiling material such that the thermocouple bead is flush with the ceiling;

— the ceiling gas temperature, with a thermocouple (75 ± 1) mm below the ceiling in the centre of the corridor directly opposite the doorway.

For the category III tests (see 9.7 to 9.9), the gas temperatures:

— above each wood crib, centrally positioned and approximately 100 mm above the top of the crib;

— above the box files and foam sheet arrangements, approximately 200 mm above the top of the files and protruding 250 mm away from the plywood walls;

— at a height of 2,5 m directly above the plywood walls, in the corner of the array and 2 m away on both sides of the fuel load arrangement.

9.1.6 The gas temperature values measured during the test shall be averaged over 30 s (maximum time between measurements shall be 2 s). The maximum gas temperature shall be determined from the averaged temperatures.

Each thermocouple shall be treated individually and not averaged with other thermocouples.

9.1.7 The first nozzle operating time from ignition shall be recorded.

9.2 Small compartment with bunk beds

9.2.1 For upright and pendent nozzles, a single nozzle shall be placed in the centre of test room A (see 6.1). For sidewall nozzles, a single nozzle shall be placed at the centre of the wall opposite the fire location (see 6.1).

9.2.2 The apparatus used shall be test room A (7.3) and fuel package 1 (7.7).

9.2.3 For each test, new acoustical panels (see Figure 1) shall be installed in the 2,4 m × 2,4 m area directly over the fire source.

9.2.4 The test fire shall be ignited in the lower bunk of fuel package 1 (7.7), using the igniter (7.11) and a lighted match.

9.2.5 Each test shall be conducted twice. If the design of the nozzle is such that it might have a best case and worst case orientation or position, then the tests shall be conducted using each orientation or position. Sidewall nozzles shall be tested at their highest and lowest positions.

9.3 Large compartment with corner crib and simulated furniture

9.3.1 Nozzles shall be installed in test room B, as described in 6.2.

9.3.2 The apparatus used shall be test room B (7.4) and fuel package 2 (7.8).

9.3.3 The heptane in the pan shall be ignited using a suitable open flame heat source. Immediately following ignition of heptane in the pan, the heptane soaked cotton wicks shall be ignited.

9.3.4 The test shall be conducted twice. If the design of the nozzle is such that it might have a best case and worst case orientation or position, then the tests shall be conducted using each orientation or position. Sidewall nozzles shall be tested at their highest and lowest positions.

9.4 Open space with sofas under one nozzle

9.4.1 Nozzles shall be installed in the ceiling at the maximum nozzle spacing specified in the manufacturer's design instructions.

9.4.2 The apparatus used shall be test room C (7.5) and fuel package 3 (7.9).

9.4.3 The ignition source shall be centred under one nozzle.

9.4.4 The fuel package shall be ignited with a lighted match using the igniter (7.11).

9.5 Open space with sofas between two nozzles

9.5.1 Nozzles shall be installed in the ceiling at the maximum nozzle spacing specified in the manufacturer's design instructions.

9.5.2 The apparatus used shall be test room C (7.5) and fuel package 3 (7.9).

9.5.3 The ignition source shall be centred between two nozzles.

9.5.4 The fuel package shall be ignited with a lighted match using the igniter (7.11).

9.6 Open space with sofas between four nozzles

9.6.1 Nozzles shall be installed in the ceiling at the maximum nozzle spacing specified in the manufacturer's design instructions.

9.6.2 The apparatus used shall be test room C (7.5) and fuel package 3 (7.9).

9.6.3 The ignition source shall be centred between four nozzles.

9.6.4 The fuel package shall be ignited with a lighted match using the igniter (7.11).

9.7 Open space with simulated work station under one nozzle

9.7.1 Nozzles shall be installed in the ceiling at the maximum nozzle spacing specified in the manufacturer's design instructions.

9.7.2 The apparatus used shall be test room D (7.6) and fuel package 4 (7.10).

9.7.3 The ignition source (see Figure 1) shall be centred under one nozzle.

9.7.4 The fuel package shall be ignited with a lighted match using the igniter (7.11).

9.8 Open space with simulated work station between two nozzles

9.8.1 Nozzles shall be installed in the ceiling at the maximum nozzle spacing specified in the manufacturer's design instructions.

9.8.2 The apparatus used shall be test room D (7.6) and fuel package 4 (7.10).

9.8.3 The ignition source (see Figure 1) shall be centred between two nozzles.

9.8.4 The fuel package shall be ignited with a lighted match using the igniter (7.11).

9.9 Open space with simulated work station between four nozzles

9.9.1 Nozzles shall be installed in the ceiling at the maximum nozzle spacing specified in the manufacturer's design instructions.

9.9.2 The apparatus used shall be test room D (7.6) and fuel package 4 (7.10).

9.9.3 The ignition source (see Figure 1) shall be centred between four nozzles.

9.9.4 The fuel package shall be ignited with a lighted match using the igniter (7.11).

10 Pass/fail criteria

For each individual test, the water mist system shall be deemed to have passed the test if the following criteria are met:

a) for test 9.2:

   1) damage to the cushions of the lower bunk bed does not exceed 40 % by volume or dry weight, including the horizontal mattress, pillow, and vertical mattress;

   2) the maximum ceiling surface temperature over ignition does not exceed 260 °C;

   3) the maximum gas temperature over ignition 76 mm below the ceiling does not exceed 315 °C;

   4) after 5 min, the mean temperatures (see 9.1.6) remain steady or decrease until the end of the test;

b) for test 9.3:

   1) the target doorway nozzles do not operate;

   2) the maximum ceiling surface temperature over ignition does not exceed 265 °C;

   3) the maximum gas temperature over ignition, 76 mm below the ceiling, does not exceed 315 °C;

   4) after 5 min, the mean temperatures (see 9.1.6) remain steady or decrease until the end of the test;

c) for test 9.4:

   1) damage to the sofas does not exceed 50 % by volume or dry weight;

   2) the maximum ceiling surface temperature over ignition does not exceed 260 °C;

   3) the maximum gas temperature over ignition 76 mm below the ceiling does not exceed 315 °C;

d) for test 9.5:

1) damage to the sofas does not exceed 50 % by volume or dry weight;

2) the maximum ceiling surface temperature over ignition does not exceed 260 °C;

3) the maximum gas temperature over ignition 76 mm below the ceiling does not exceed 315 °C;

e) for test 9.6:

1) damage to the sofas does not exceed 50 % by volume;

2) the maximum ceiling surface temperature over ignition does not exceed 260 °C;

3) the maximum gas temperature over ignition 76 mm below the ceiling does not exceed 315 °C;

f) for tests 9.7, for ceiling heights up to 5 m:

1) damage to the plywood walls does not extend to the full height at the ends of the walls;

2) damage to the foam and box files above the table does not extend to all areas;

3) the maximum gas temperature in the centre of the ceiling, 76 mm below the ceiling, does not exceed 80 °C for a duration longer than 3 min for the 30 min system discharge;

g) for tests 9.7, for ceiling heights up to 3 m:

1) damage to the plywood walls does not extend to the full height at the ends of the walls;

2) damage to the foam and box files above the table does not extend to all areas;

3) the maximum gas temperature in the centre of the ceiling, 76 mm below the ceiling, does not exceed 160 °C for a duration longer than 3 min for the 30 min system discharge;

h) for tests 9.8 and 9.9, for ceiling heights up to 5 m:

1) damage to the plywood walls does not extend to the full height at the ends of the walls;

2) damage to the foam and box files above the table does not extend to all areas;

3) the maximum gas temperature over ignition 76 mm below the ceiling does not exceed 80 °C for a duration longer than 3 min for the 30 min system discharge;

i) for tests 9.8 and 9.9, for ceiling heights up to 3 m:

1) damage to the plywood walls does not extend to the full height at the ends of the walls;

2) damage to the foam and box files above the table does not extend to all areas;

3) the maximum gas temperature over ignition 76 mm below the ceiling does not exceed 160 °C for a duration longer than 3 min for the 30 min system discharge.

11 Test report

The results of the tests shall be documented in a test report prepared in accordance with EN 14972-1:2020, A.8.

Bibliography

[1] EN 520, *Gypsum plasterboards — Definitions, requirements and test methods*

National Annex NA
(Informative)
Commentary of BS EN 14972-7

NA.1 General

This National Annex contains recommendations that the UK committee believes would be beneficial in the application of all water mist systems utilizing automatic nozzles.

The BS EN 14972-7:2023 test protocol has been adopted from BS 8489-7:2016.

Users are encouraged to ensure that a risk assessment is undertaken on any proposed application of BS EN 14972-7:2023 to ensure that the fire test protocol and performance objectives match the occupancy and protection requirements.

NOTE Users are guided to Subclauses 41.3.2 and 4.7.3 of BS EN 14972-1:2020 and Clause 4 of BS 5306-0:2020 for methodologies of these risk assessments.

NA.2 Hazard evaluation

The UK committee suggests that nozzles be in accordance with BS 8663-1:2019.

Intermediate (e.g. supplementary below obstructions) pendent or upright nozzles that are not at ceiling level, as well as intermediate wall-mounted nozzles and including obstruction and intermediate nozzles, are not recommended unless supported by appropriate fire test data.

NA.3 Limits of application

It is the view of the UK committee that the ceiling height in the fire test define the application limit.

If fire tests have been carried out using only flat ceiling arrangements, the UK committee recommends using additional fire testing for other ceilings types (e.g. sloped, beamed, ribbed, pocketed, etc.).

NA.4 Ventilation conditions

It is encouraged that ventilation conditions in the application be within the limits of the ventilation as simulated in the fire test protocol. Where ventilation effects do not feature in the test protocol, application should be in unventilated conditions, as these may not exist in practice.

Occupancies with forced or natural air flow might require additional fire testing to achieve the same performance criteria or a means, where permissible, to shut down the ventilation.

NA.5 Obstructions

Fire tests should be undertaken with limited obstructions. Types of obstruction can include, for example:

- cable trays;
- light fittings;
- ducts;
- architectural features;
- beams; and
- columns.

Further testing is recommended to derive installation obstruction rule sets.

It would be beneficial for the designer to consider (and mitigate) the presence of obstructions, and their effect on ventilation (e.g. with additional testing and/or additional nozzles).

NOTE Obstructions impede the distribution of water mist and could prevent the system from achieving the fire suppression objectives as defined in the fire test protocol.

NATIONAL ANNEX B

WATER MIST COMPONENT

MANUFACTURER'S DECLARATION OF CONFORMITY (MDOC)

For manufacturer supplied nozzles and fire testing results

Address of manufacturer

……

……

Component: (including description, model, unique identifier)

Nozzle tested: ……

Other component (integral to test): ……

Declaration of Conformity

I/we* hereby declare that the water mist nozzles and components detailed above conform, to the best of my/our* knowledge and belief, to the appropriate recommendations given in BS EN 14972-7:2023, BS EN 14972-1:2020, and BS 8663-1, except as stated below/overleaf.

* Delete as appropriate

Signed, on behalf of manufacturer (as appropriate)

……

Name (print):…….. Company name: ……

Job title/qualification…… Date……

Deviations from standards

Declaration	**BS EN 14972-7; BS EN 14972-1; or BS 8663-1 clause number**	**Details of deviation**

This document is only valid when accompanied by current documents:

Type	**Title, issue, date**	**For official use**	
		Received	**Notes**
Manufacturer's component data sheet			
Manufacturer's component data drawings (on request)			
Manufacturer's system design manual and installation manual			
Manufacturer's MDOC Table 1			
Manufacturer's MDOC Table 2			

Table NB.1 – MDOC Table 1 – Declaration of nozzle details and system design parameters

Parameter	Nozzle specification and limits	Details to be completed by manufacturer	For official use Notes
Nozzle	Manufacturer		
	Nozzle designation (model, unique identifier)		
	Datasheet (name, issue, date)		
	Type (upright/pendent/concealed/sidewall)		
	Temperature rating (°C) and RTI		
	K-factor (lpm/bar ½)		
	Nozzle orifice diameter(s)		
	Form of construction • Nozzle body material • Pipework fitting requirements • Valve type		
	Strainer and filter requirements and minimum strainer area(s)		
	Water quality requirements (e.g. statement that potable water may be used, or specific limits in terms of total dissolved solids and/or ppm of dissolved substances, and levels of hardness and chlorine		
	Additives dependency, requirements to ensure enhance fire protection requirements (e.g. concentration and rates of application), if required		
	Product approval, certificate number and date (confirmation of compliance to BS 8663-1 or LPCB LPS 1283 scheme of requirements) Note: Compliance with these requirements includes: • Tests for nozzle function at min standby pressure • Tests for nozzle aging (heat exposure tested at 121°C for 90 days at max standby pressure), • Test for sulfur dioxide exposure of dynamic 'o' rings		
Flow	Supply type (pump or cylinder) Note: If the system relies upon propellant gas cylinder(s), full details shall be provided.		
	Minimum operating pressure (bar) and flow rate (l/min)		
	Maximum operating pressure (bar) and flow rate (l/min)		
	Standby pressure, minimum (bar)		
	Standby pressure, maximum (bar)		
	Operating pressure, min (bar) and flowrate min (l/min)		
	Operating pressure, max (bar) and flowrate max (l/min)		
Installation design	Maximum nozzle spacing (m)		
	Minimum nozzle spacing (m)		
	Maximum depth below ceiling (mm)		
	Maximum room area (m^2)		
	Maximum ceiling height (m)		

	Minimum ceiling height (m)		
Dimensioning of water supply	Minimum design area (m^2)		
	Minimum number of nozzles		
	Minimum design duration (min)		
	Wet system only (dry and pre-action not allowed)		
	Flat ceilings and limited slopes		
	Deviations from standard/extensions to scope	**Details and additional supporting information**	
	Obstructions		
	Other		

Table NB.2 – MDOC Table 2 – Declaration of conformance to BS EN 14972-7 fire test protocol for the nozzle in MDOC Table 1

Information required	Details to be completed by manufacturer	For official use
Fire Test Report (report number, number of pages, date, issue number)		
Name and address of test laboratory (independent third-party with appropriately skills and accreditation)		
Nozzle arrangement (model, material, unique identifier), type, orientation, k-factor, temperature rating, spacing, operating pressure		
Details of any additives used in the test programme		
Details of the water supply method used in the test programme (pump/cylinder specification as well as pressure/flow and duration)		
Fire test series arrangements completed (as defined in BS EN 14972-7:2023)		
Any other supporting data		
Questions	**Answer (yes/no)** **If no, detail non-compliances and provide supporting data**	
Is the test report by an independent third-party, UKAS accredited test laboratory or equivalent?		
Is the nozzle in MDOC Table 1 identical to that used for all fire tests?		
Is the nozzle arrangement (e.g. spacing, pressure, flow, height depth) in MDOC Table 1 identical to that used for all fire tests?		
Is the maximum room area in MDOC Table 1 confirmed by successful completion of all tests and against all clauses of BS EN 14972-7:2023 and National Annexes?		
Is the maximum room height in MDOC Table 1 confirmed by successful completion of all tests and against all clauses of BS EN 14972-7:2023 and National Annexes?		
Does the water mist system and test report show full compliance with all of the clauses of BS EN 14972-7:2023 and National Annexes?		

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