Water Mist For Property Protection Purposes

Paul Morrison- Zurich Insurance
Objectives

• 3 stage approach for existing systems
  • Is it in service?
  • Will it work?
  • Is it designed right?

• Zurich Recognized Solutions
  • Listed technology

• Case Studies
  • Sauna
  • Community College
  • Industrial Oil Cooker
• Our three stage approach

- Is it in service?
- Will it work?
- Is it designed right?
Our approach

Is it in service?  Will it work?  Is it designed right?

• Valves open?
• Power at pump?
• Impairments?
• Water in tank?
• Town main water supply available?

Our approach

- Service and maintenance
- Regular testing
- Pumps achieving rated duty?
- Dry systems trip tested?
Our approach

Is it in service?  Will it work?  Is it designed right?

- Zurich Recognized Testing Laboratory
- Acceptable laboratory test protocol
- Zurich recognized property protection principles
- Manufacturer's guidelines
Zurich Recognized Solutions

- May include a range of fire prevention and protection technology products
  - Not limited to active fire protection systems
  - Construction products and passive systems can be assessed

![Building materials](image1)
![Fire protection devices](image2)
![Fire detection devices](image3)

Photo source: Dale Seemans and Rich Gallagher, The Zurich Services Corporation
Listed technology

A product certification body who has been:
• Evaluated by a third-party accreditation body
• Qualified to perform self-accreditation of the product tests they conduct

Image source: Rich Gallagher, The Zurich Services Corporation
Listed technology

A product certification body who has been:
• Evaluated by a third-party accreditation body
• Qualified to perform self-accreditation of the product tests they conduct

A test protocol:
• Used for the evaluation of a product which is acceptable to Zurich

Image source: Rich Gallagher, The Zurich Services Corporation
Listed technology

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- Used for the evaluation of a product
- Which is acceptable to Zurich

A third party codes and standards:
- Recognized by Zurich for property assessment purposes
- Along with additional Zurich insights where provided

Image source: Rich Gallagher, The Zurich Services Corporation
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- Used for the evaluation of a product
- Which is acceptable to Zurich

Zurich Recognized Testing Laboratory

Acceptable laboratory test protocol

Zurich Recognized Solution

Manufacturer's guidelines

Zurich recognized property protection principles

Guidelines Acceptable to Zurich for property assessment purposes with sufficient instructions for: design, installation, commissioning, inspection, testing, and maintenance of listed products

A third party codes and standards:
- Recognized by Zurich for property assessment purposes
- Along with additional Zurich insights where provided

Image source: Rich Gallagher, The Zurich Services Corporation
Case Studies – Water mist

- Sauna
- College / School
- Industrial Oil Cooker

Is it in service?  
Will it work?  
Is it designed right?
Example - How do we consider water mist?

- NFPA 750
- BS8458
- BS8489
- CEN14972
- FM/ANSI 5560
- VdS
- SP
- DNV
- IMO

1.1* Scope. This standard contains the minimum requirements for the design, installation, maintenance, and testing of water mist fire protection systems. This standard does not provide definitive fire performance criteria, nor does it offer specific guidance on how to design a system to control, suppress, or extinguish a fire. Reliance is placed on the procurement and installation of listed water mist equipment or systems that have demonstrated performance in fire tests as part of a listing process.
Example – water mist for saunas
Local application for inception hazard

Photo source: Gary Howe, Zurich Risk Engineering UK
Example – water mist for saunas
Local application for inception hazard

Zurich Recognized Testing Laboratory

Zurich Recognized Solution

Acceptable laboratory test protocol

Manufacturer's guidelines

Fire Test Protocol and Component Approvals
Case study – Community College
Case study – water mist for a Community College

Fire Protection Specification Review
A review of a proposed fire protection design

- Zurich Recognized Testing Laboratory
- Acceptable laboratory test protocol
- Zurich recognized property protection principles
- Manufacturer's guidelines
Case study – water mist for a Community College Proposal statements

- Confirm costs for design, supply, installation and commissioning of our approved low pressure water mist system to all relevant areas of the scheme
- 30 minute water supply duration based on 5 nozzles (72m2) to the commercial OH1 classified hazard
- The installation and design will be fully compliant to the relevant British Standards for this development with specific referral to BS 8489:2016
- System proposed has been fully tested by BRE to both residential and commercial standards (BS 8458:2015 and BS 8489:2016)
- Low pressure water mist is an emerging technology...very few companies that can provide a system that fully meets requirements of British Standards
Case study – water mist for a Community College Proposal statements – red flags

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Case study – Community College

3 Terms and definitions

For the purposes of this part of BS 8489, the terms and definitions given in BS 8489-1 and the following apply.

3.1 category I system
system that covers rooms up to and including 37 m² containing low hazard fire loads

3.2 category II system
system that covers rooms above 37 m² containing low hazard fire loads

3.3 category III system
system that covers rooms containing low hazard fire loads

3.4 low hazard occupancy
non-storage, non-manufacturing occupancy where the quantity and/or combustibility of the content is low and fires with relatively low rates of heat release are expected, with maximum fuel loads and obstructions as indicated in 4.7 to 4.10

<table>
<thead>
<tr>
<th>Occupancy</th>
<th>Description of occupancy</th>
<th>Exceptions</th>
<th>Fire test protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apartments (where BS 8458 cannot be complied with or is not appropriate)</td>
<td>Lightly loaded non-storage and non-manufacturing areas with ordinary combustibles</td>
<td>Mat stores</td>
<td>BS 8489-7</td>
</tr>
<tr>
<td>Churches</td>
<td></td>
<td></td>
<td>FM 5560:2016, Appendix G</td>
</tr>
<tr>
<td>Concealed spaces</td>
<td></td>
<td>Expect fire with relatively low rates of heat release in these occupancies</td>
<td></td>
</tr>
<tr>
<td>Gymnasiums</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel bed rooms and their access (only)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local lending libraries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential or nursing or convalescent homes where BS 8458 cannot be complied with or is not appropriate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restaurant seating areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools and university classrooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unused attics in low hazard premises containing no combustible contents or stored materials and no electrical or mechanical services other than lighting</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PERMITTED EXCEPTIONS

Protection is not deemed necessary to the following areas as stated within BS 8489, the specification received or the manufacturer’s guidelines of which the system is designed and installed; therefore these have been omitted from the protected areas detailed above:

<table>
<thead>
<tr>
<th>Bathrooms/Toilets/Shower/Wet Rooms ≤5m²</th>
<th>Ceiling Voids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cupboards, Rooms – with a floor area less than 2m² or the smallest dimension 1m or less</td>
<td>Electrical Rooms / Comms Rooms / Sub Stations</td>
</tr>
<tr>
<td>Enclosed Staircases / Vertical Shafts / Risers / Lifts</td>
<td>Uninhabited Loft/Roof Voids</td>
</tr>
<tr>
<td>Non Communicating/Attached Buildings</td>
<td>Kitchen Extraction Canopies</td>
</tr>
<tr>
<td>Crawl Spaces</td>
<td>External Balconies / Canopies</td>
</tr>
</tbody>
</table>

NOTE The listed test protocols are applicable with the following limited parameters:

- BS 8489-7 covers Category 1, 2 and 3 systems for:
  - fire loads ≤ 500 M/Jm² (covered in Category 3 only);
  - ceiling heights ≤ tested height up to 5 m;
  - floor area restricted and unrestricted;

- FM 5560:2016, Appendix G covers:
  - fire loads ≤ 150 M/Jm²;
  - ceiling heights ≤ tested height up to 5 m;
  - floor area restricted and unrestricted.

Specific areas within buildings can be protected by watermist where relevant fire test protocols exist.
Case study – Community College

ISO 17025 ACCREDITED LABORATORY

Fire Test - partial

Zurich Recognized Testing Laboratory

Acceptable laboratory test protocol

Zurich Recognized Solution

Zurich recognized property protection principles

Manufacturer's guidelines

Design, Installation, Operation Manual (DIOM)

BSI Standards Publication

Fixed fire protection systems – Industrial and commercial watermist systems
Part 7: Fire performance tests and requirements for watermist systems for the protection of low hazard occupancies

Component - nozzle

BSI Standards Publication

Fixed fire protection systems – Industrial and commercial watermist systems
Part 1: Code of practice for design and installation

NFPA 750 Norma sobre Sistemas de Protección contra Incendios de Agua Nebulizada 2013
Case study – Bakery

- Industrial oil cooker (deep fat fryer)
- Doughnut production
- 8m x 1.1m containing 2360L oil
Test laboratory certification

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION:
Water Mist Fire extinguishing system for single-vat deep fat fryers.

The system consists of a pressurised cylinder assembly having a volume of 26L, which contains potable water and expellant gas (Nitrogen) at a pressure of 50 bar.

The total pressure of the cylinder is from 130 to 160 bar.

2. DESIGN DRAWINGS and/or SPECIFICATIONS
2.1 - As per the Manufacturer's drawings.
2.2 - As per design, installation operation and maintenance manual from the Manufacturer.

2.3 - Manual(s) for installation, use and maintenance (in any) to be stamped by the Society and supplied in the language prescribed by the Maritime National Administration to whom the ship is registered.

3. TYPE TEST REPORTS / LABORATORY RECOGNITION STATUS

4. MATERIALS or COMPONENTS REQUIRED TO BE TYPE APPROVED or TYPE TESTED
None.

5. OTHER MATERIALS and/or COMPONENTS
None.

6. APPLICATION / LIMITATION OF USE
6.1 - This system can protect single-vat fryers not exceeding 0.1332 m³ in surface and 195 mm in depth.

6.2 - Approval valid for ships having to comply with SOLAS 74 Convention, as amended, and for units having to comply with IMO Resolution A649 (The “MODU Code”).

6.3 - The arrangement of the system is to be submitted for each ship application.
Test laboratory certification

1.0 Purpose of tests:
The fire tests were conducted in a 1 x 3m tray with 150 l of frying oil to test the fire fighting performance of the VID FIRE-KILL N-pipe with BM1 nozzles installed in a Low Pressure Water Mist System.

2.0 Test hall:
DFL is an international accredited fire test laboratory. The fire test laboratory is accredited in accordance with DS/EN ISO/IEC 17025:2005 by DANAK accreditation Reg. No. 487.

The fire tests were conducted by Danish Fire Laboratories (DFL) in DFL’s fire test hall at Svalbardvej 13, DK-5700 Svendborg, Denmark.

The test hall is insulated and heated. The test hall volume has a floor area of approx. 19,5m x 19,5m and a height of 15m. The test hall is equipped with an adjustable pendent ceiling. The ceiling size, position and height are adjustable. The test laboratory has water storage tanks and continuous fresh water supply, pump station with controlled water pressure supply and installations for handling of smoke and waste water.

2.1 Fire test room:
The sides of the hall were measured to 19,6m x 19,65m.
The mock-up was placed in centre of the test hall.

2.2 Fire test set up:
2.2.1 Test fire was constructed as the drawing shows underneath.

![Diagram of fire test setup]
Test laboratory certification
Take away messages

• Zurich Recognized Solutions Methodologies is a powerful tool to evaluate existing and proposed installations.

• It is based on basic fundamental criteria that should be expected to provide a suitable level of compliance and protection

• Zurich’s goal is beyond ‘Life Safety’ we also want Property Protection systems.
  • People can escape a fire safely
  • The building can be occupied quickly after an event
  • Businesses can re-start operations from the same location

• Your objective may be a different one – is it fully considered?
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