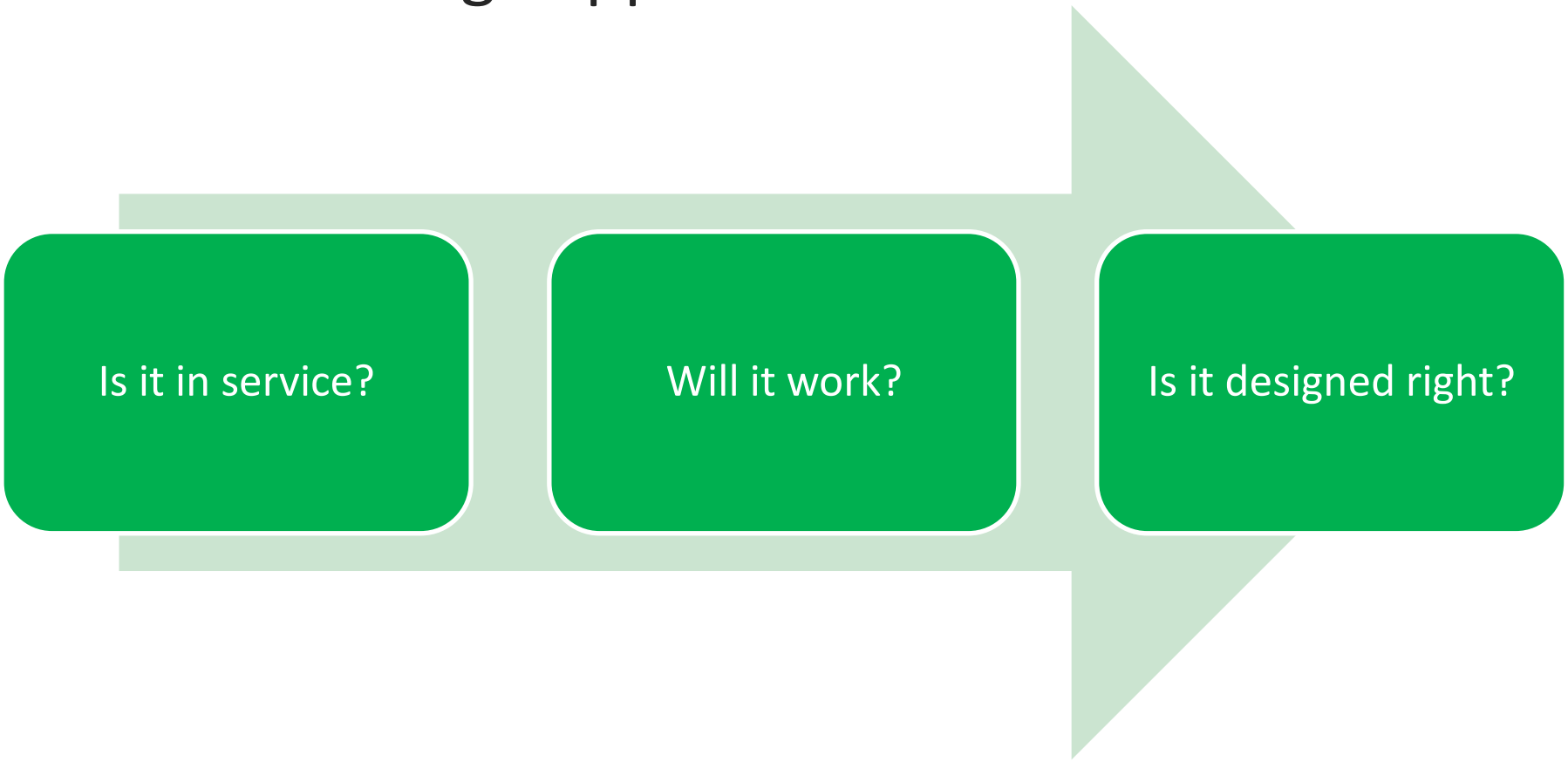
Water Mist For Property Protection Purposes

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



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?

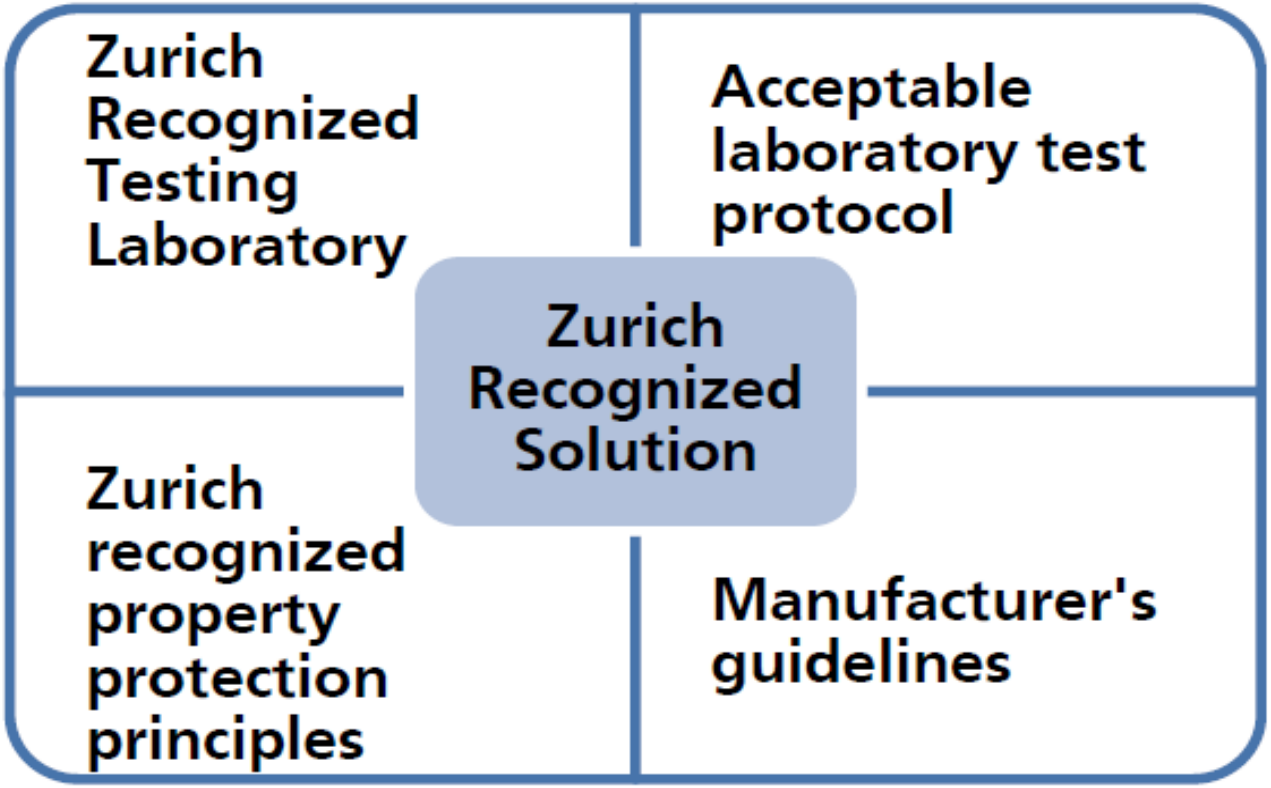
Source: Hall, John R., Jr. US. Experience with Sprinklers. Quincy, MA: NFPA, June 2013

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 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

Fire protection devices

Fire detection devices

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

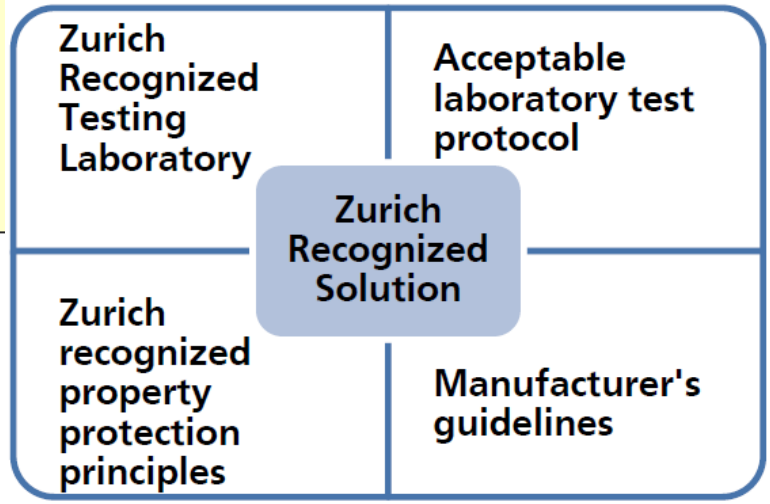


Image source: Rich Gallagher, The Zurich Services Corporation

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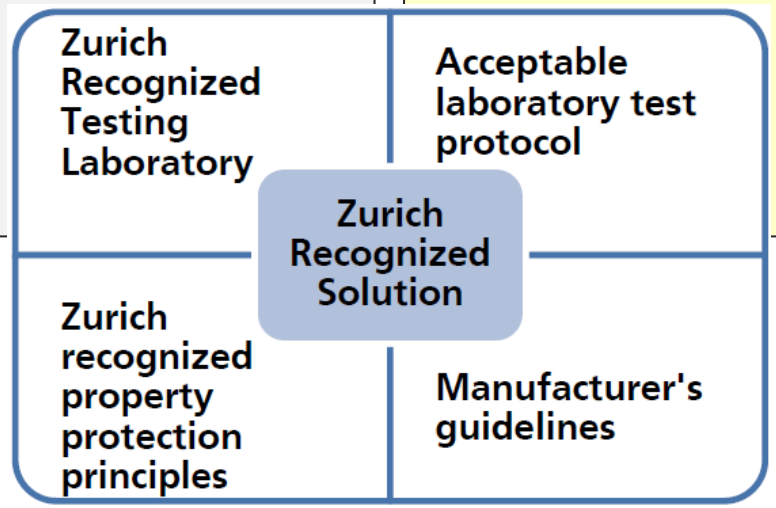
- Used for the evaluation of a product Which is acceptable to Zurich



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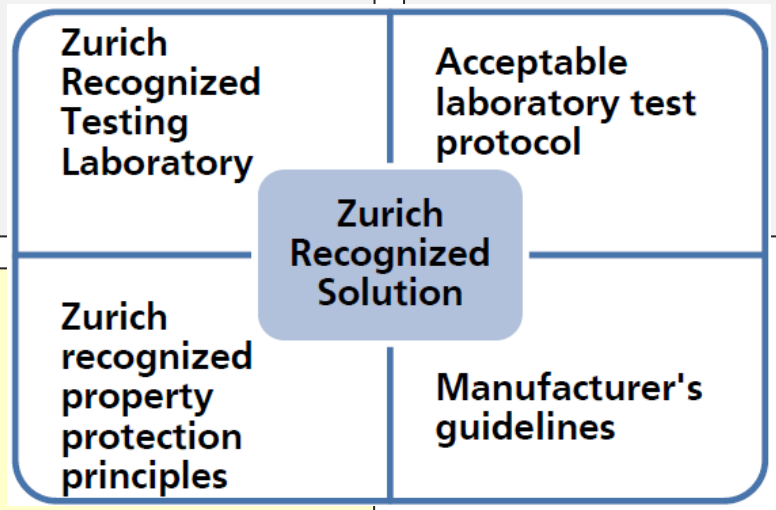

A third party codes and standards:
- Recognized by Zurich for property assessment purposes
- Along with additional Zurich insights where provided

Image source: Rich Gallagher, The Zurich Services Corporation

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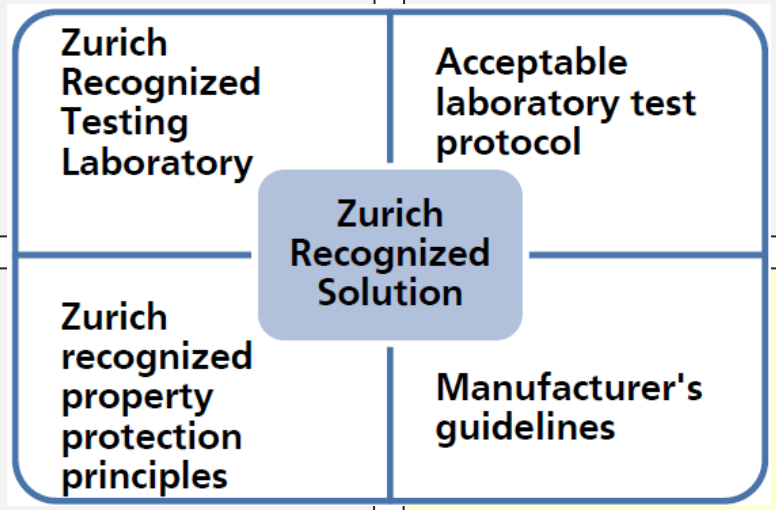

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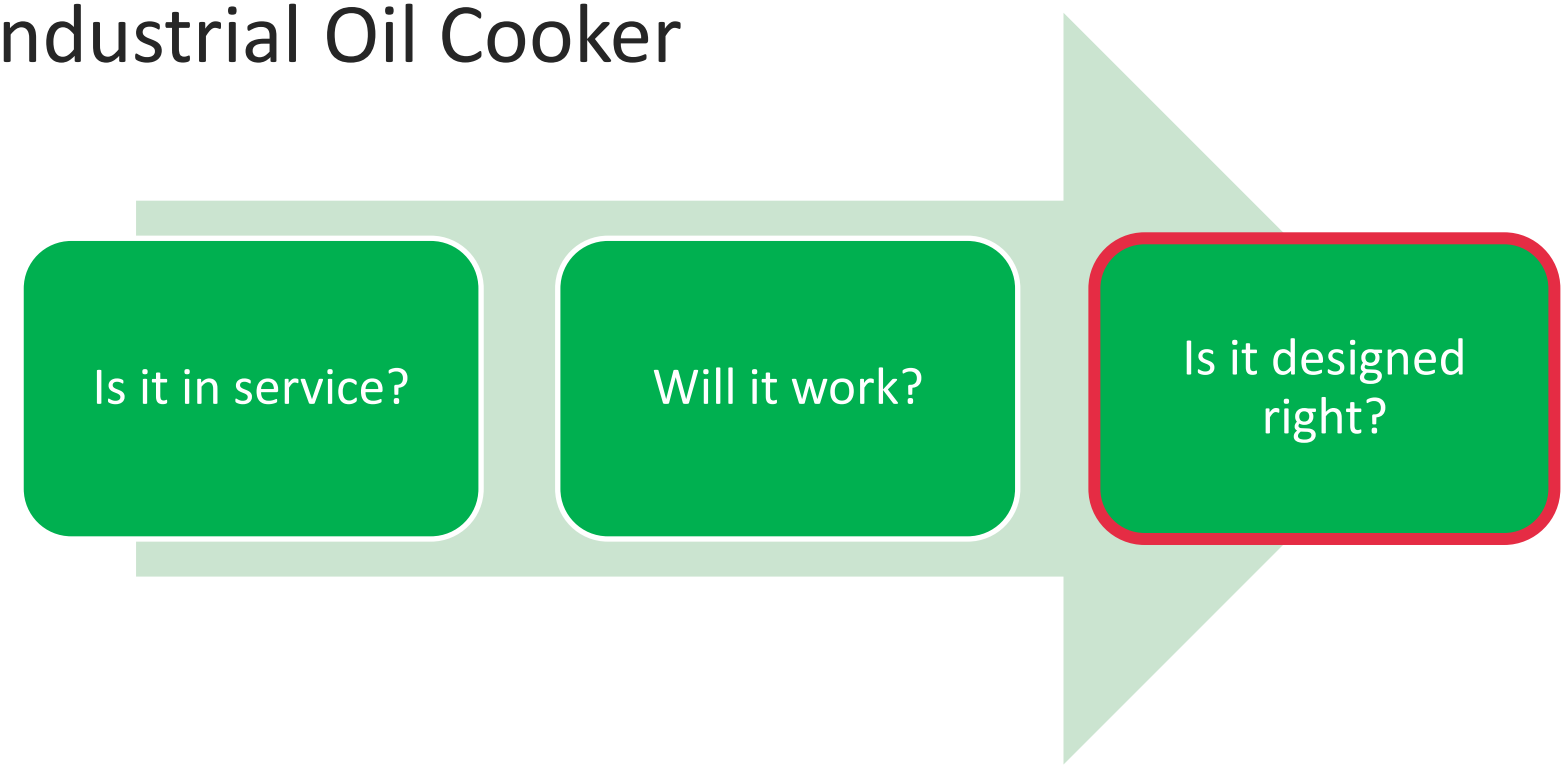
Guidelines Acceptable to Zurich for property assessment purposes with sufficient instructions for: design, installation, commissioning, inspection, testing, and maintenance of listed products

Image source: Rich Gallagher, The Zurich Services Corporation

Case Studies – Water mist

- Sauna
- College / School
- Industrial Oil Cooker



Example - How do we consider water mist?

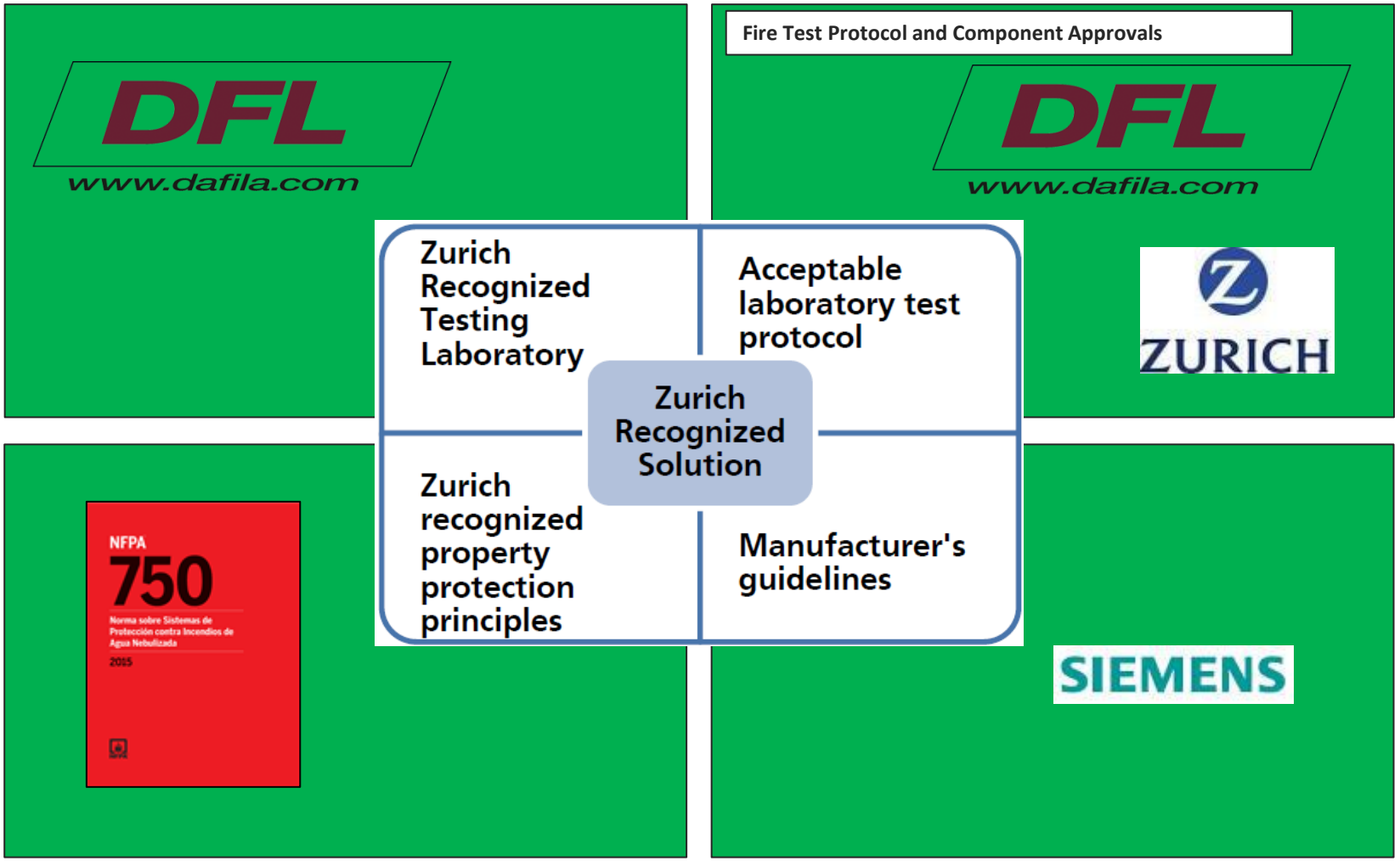
- NFPA 750
- BS8458
- BS8489
- CEN14972
- FM/ANSI 5560
- VdS
- SP
- DNV
- IMO

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

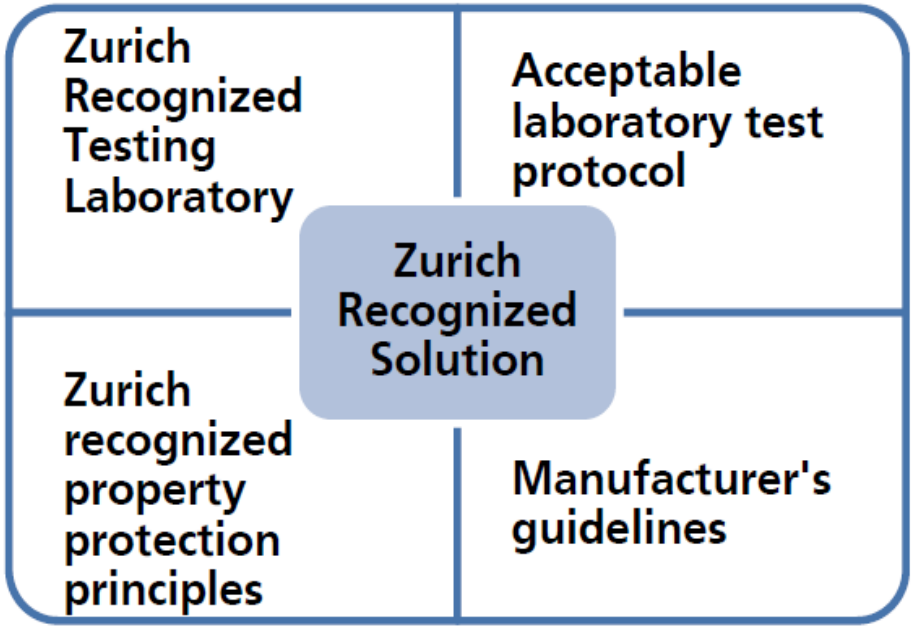


Case study – Community College

Case study – water mist for a Community College

Fire Protection Specification Review

A review of a proposed fire protection design



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**

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:

Bathrooms/Toilets/Showers/Wet Rooms <5m2	Ceiling Voids
Cupboards, Rooms – with a floor area less tan 2m² or the smallest dimension is 1m or less	Electrical Rooms / Comms Rooms / Sub Stations
Enclosed Staircases / Vertical Shafts / Risers / Lifts	Uninhabited Loft/Roof Voids
Non Communicating / Attached Buildings	Kitchen Extraction Canopies
Crawl Spaces	External Balconies / Canopies

Table 1 **Occupancies and acceptable fire test protocols for an automatic watermist system**[A)]

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

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 MJ/m² (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 MJ/m²;*
  - *ceiling heights ≤ tested height up to 5 m;*
  - *floor area = restricted and unrestricted.*

A) 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

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

Zurich Recognized Testing Laboratory

Acceptable laboratory test protocol

Zurich Recognized Solution

Zurich recognized property protection principles

Manufacturer's guidelines

BSI Standards Publication

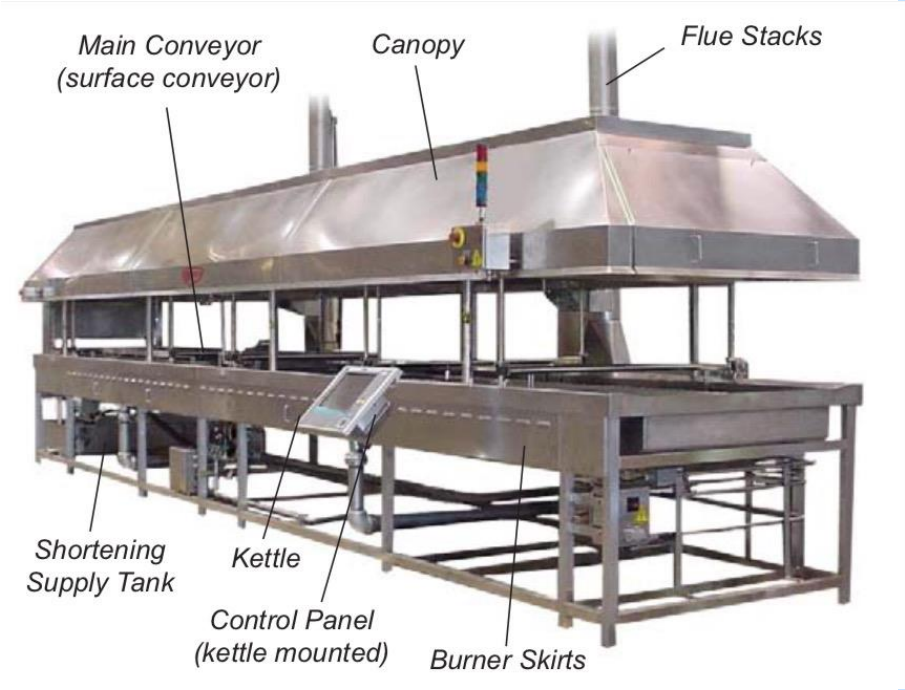
Fixed fire protection systems – Industrial and commercial watermist systems

Part 1: Code of practice for design and installation

Design, Installation, Operation Manual (DIOM)

Case study – Bakery

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



Test laboratory certification

EC Certificate n°: 13844/A0 EC

BUREAU VERITAS
MARINE DIVISION

File Number : ACT 2[illegible]/010/001

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 is(are) 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

Test report n° P401767 as per ISO 15371 : 2000 issued 2004-06-10 by SP, Sweden.

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.

$0.1332 \times 0.195 = 0.0259$

$= 25.9\ \mathrm{L}$

- Page 2

Test laboratory certification

DFL Danish Fire Laboratories
www.dafila.com

DFL ApS
Svalbardvej 13, DK-5700 Svendborg, Denmark
Tel: +45 6262 1024 – Fax: +45 6262 3661
CVR nr. 2921 3542

Test report no: 081219

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 performances of the VID FIRE-KILL N-pipe with BM1 nozzles installed in a Low Pressure Water Mist System.

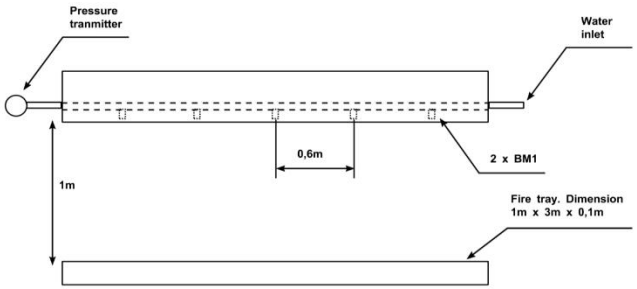
2.0 Test hall:
DFL is an international accredited fire test laboratory. The fire test laboratory is accredited in accordance with DS/EN ISO/IEC 17025:2005 by DANAK accreditation Reg. No. 487.

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

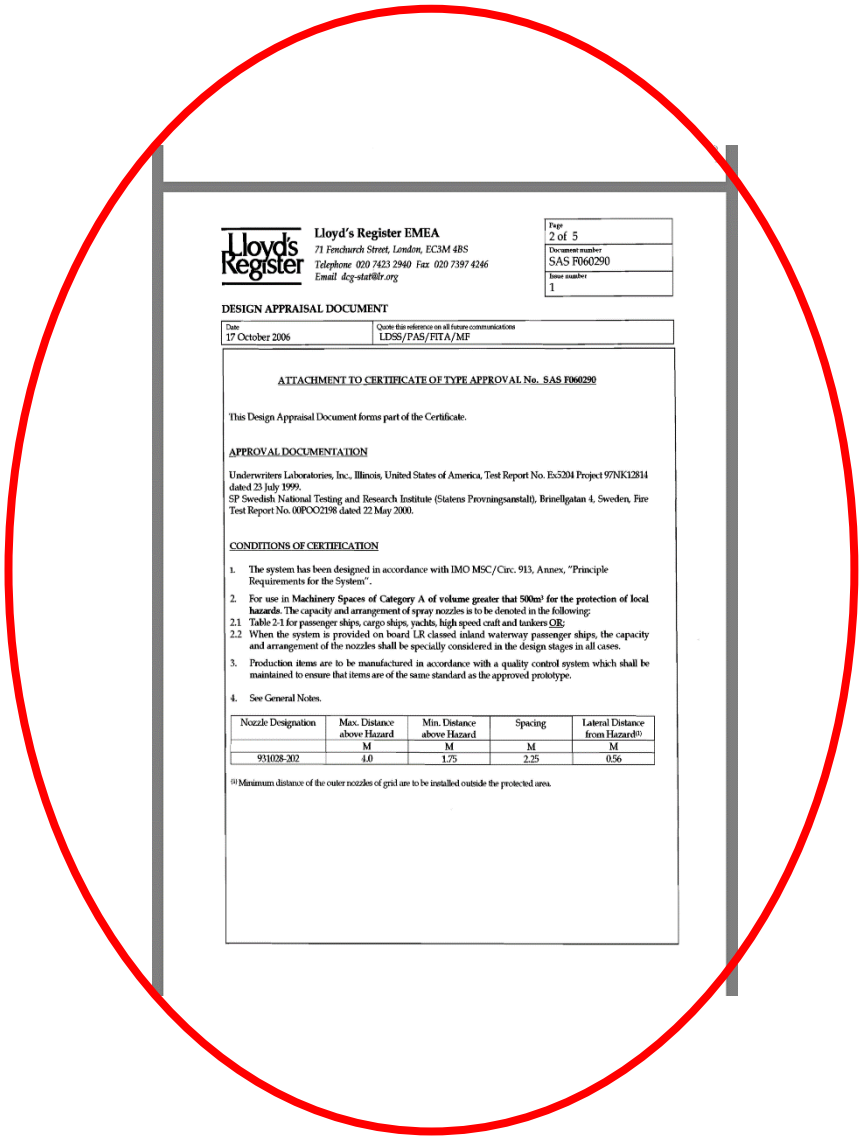
The test hall is insulated and heated. The test hall volume has a floor area of approx. 19,5m x 19,5m and a height of 15m. The test hall is equipped with an adjustable pendent ceiling. The ceiling size, position and height are adjustable. The test laboratory has water storage tanks and continuous fresh 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.



Test laboratory certification



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Email dcg-staff@lr.org

Page: 2 of 5
Document number: SAS F060290
Issue number: 1

DESIGN APPRAISAL DOCUMENT

Date: 17 October 2006
Quote this reference on all future communications: LDSS/PAS/FITA/MF

ATTACHMENT TO CERTIFICATE OF TYPE APPROVAL No. SAS F060290

This Design Appraisal Document forms part of the Certificate.

APPROVAL DOCUMENTATION

Underwriters Laboratories, Inc., Illinois, United States of America, Test Report No. Ex5204 Project 97NK12814 dated 23 July 1999.
SP Swedish National Testing and Research Institute (Statens Provningsanstalt), Brinellgatan 4, Sweden, Fire Test Report No. 00PO02198 dated 22 May 2000.

CONDITIONS OF CERTIFICATION

1. The system has been designed in accordance with IMO MSC/Circ. 913, Annex, "Principle Requirements for the System".
2. For use in **Machinery Spaces of Category A of volume greater that 500m³ for the protection of local hazards.** The capacity and arrangement of spray nozzles is to be denoted in the following:
2.1 Table 2-1 for passenger ships, cargo ships, yachts, high speed craft and tankers OR;
2.2 When the system is provided on board LR classed inland waterway passenger ships, the capacity and arrangement of the nozzles shall be specially considered in the design stages in all cases.
3. Production items are to be manufactured in accordance with a quality control system which shall be maintained to ensure that items are of the same standard as the approved prototype.
4. See General Notes.

Nozzle Designation	Max. Distance above Hazard	Min. Distance above Hazard	Spacing	Lateral Distance from Hazard(1)
	M	M	M	M
931028-202	4.0	1.75	2.25	0.56

(1) Minimum distance of the outer nozzles of grid are to be installed outside the protected area.

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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