International Watermist standards.

IWMA
International Water Mist Association

1. Why do watermist standards exist?

2. What do todays standards cover?

As watermist primarily fight fires by cooling chemical processes and inerting the ambient of the oxidation processes….

Water mist is most effective in locations with:

- Large fires => large steam production
- High heat => Large steam production & little steam condensation
- Enclosures => Reduced oxygen supply => fast oxygen depletion
- Little ventilation => increased oxygen depletion effect.

So the safe thing to say is that watermist fits perfect into applications where one wants to reduce water and where:

- Large fires are expected to occur in enclosures.
- The main fire risk consist of small or medium fire loads.
- Ventilation rates are non-existing or small.

For this reason watermist fits perfect into applications such as:

- Industrial applications: Machine rooms, generator rooms, turbines, etc.
- Commercial applications: Schools, hotels, offices, accommodation areas, etc.

2. What do todays standards cover?

And for the same reason most available WM standards also cover these applications. See below:

MARINE STANDARDS

- IMO1165 (Total flooding machine room protection)
- IMO 1387 (local protection machine room protection)
- IMO 1272 (car and truck decks)
- IMO MSC 265 (Accommodation areas)
- ISO 15371 (Fat fryers)
- Etc.

LAND STANDARDS

- FM5560: US light Hazard (EU OH1), machinery, turbines, special object protection, data centers.
- CEN/TS 14972: Offices, special Object protection
- UL2167: NFPA Residential areas, LH, OH1
- VDS : Car parks, cable tunnels, Hotels , Offices, false ceilings.
- UK: LPS1283 Domestic & residential areas, LH & OH1
- INSTA 900: Domestic & residential areas
- CNPP: Turbines
- Etc.

3. Overview of different type standards.

STANDARDS can be divided into three groups:

Fire test standards (protocols):

- Being used to find limitations for installation (e.g. installation height, vent., obstructions)
- Being used to find system specifics (e.g. K-factor, pressure, spacing, obstruction)

Component test standards (protocols):

- Being used to determine if design and construction will be able to withstand 30years lifetime.
- Being used to verify production quality and uniformity.

Often in same document

Overall Design, Installation and Maintenance standards (codes)

- Being used to specify common and overall requirements for all type watermist systems.
- Being used to describe risk classification, system operation area*, system duration time*.

** Sometimes these parameters are found from the fire test standards.*

Sometimes in same document (Notifying Body, FM, VDS, LPCB)

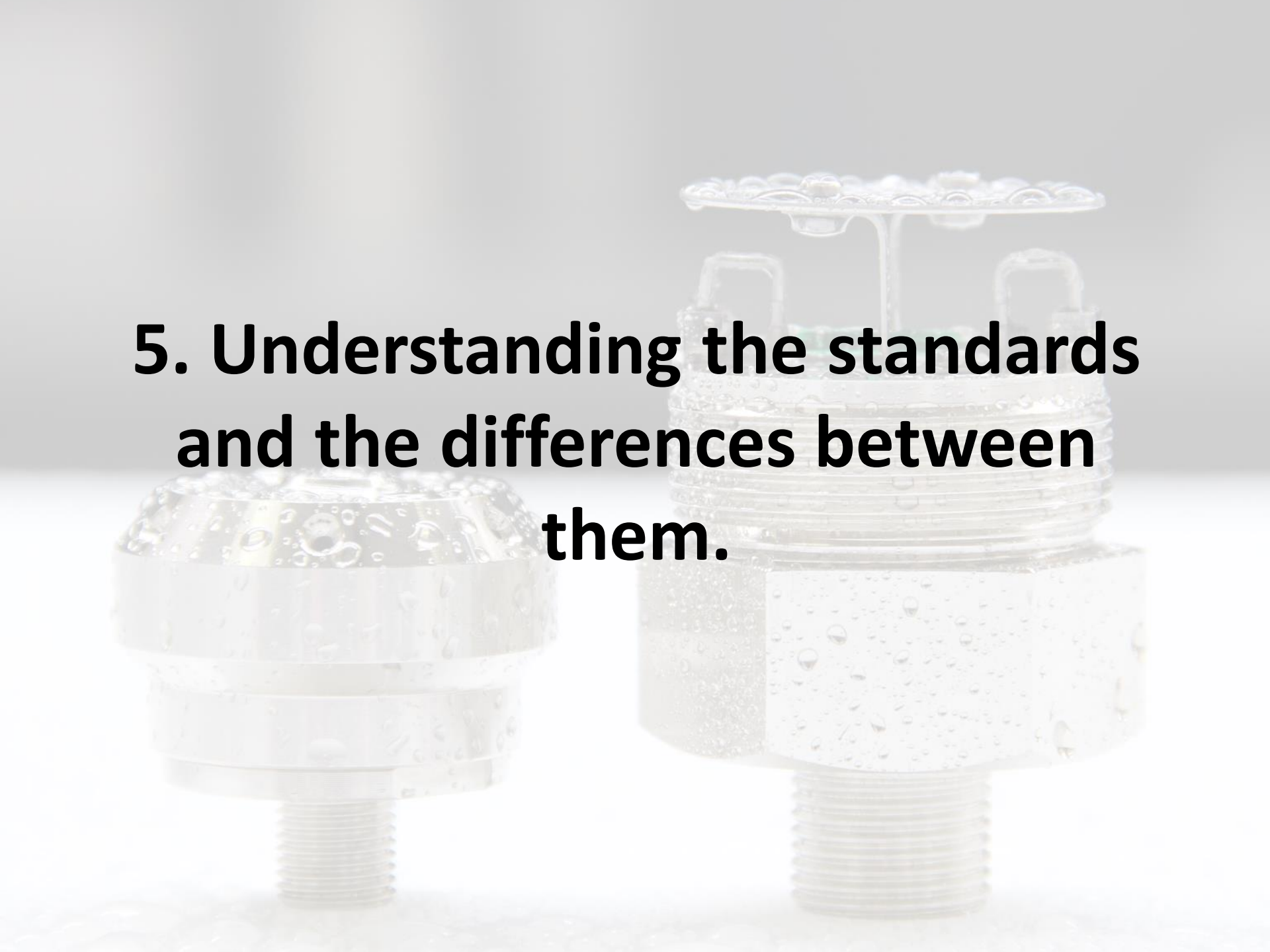
4. Available standards

Test standards examples:

-FM5560: US light Hazard (EU OH1), machinery, turbines, special hazards, more
-UL2167: US LH, OH1, OH2.
-VDS3188 : Car parks, cable tunnels, OH1, Offices, more
-DD8458+ 8489- Domestic & residential areas, EU LH & OH1
-INSTA 900: Domestic & residential areas
-CEN/TS14972: Offices, Fat fryers, special hazards
-CNPP: Turbine
-IMO: All applications found on ships.

Design standard examples:

-USA, Middle East, Far East: NFPA 750
-Europe: CEN/TS14972
-Denmark: RETN. 254-1/2
-Scandinavia: INSTA 900: Domestic & residential areas
-Marine: SOLAS
- FM/VDS insured buildings: FM5560 / VDS 3188



5. Understanding the standards and the differences between them.

An overview starting from the design standards (part 1A)

	NFPA 750 (2015)	CEN/TS 14972 (2014)
Components (pumps)	NFPA 20	Low: EN12845 & EN12259-12 (centrifugal) High: EN 14847 (positive displacement pumps.
Components (tanks, Valves, hangers, pipes, nozzles, strainers, pump controllers)	Listed + minor requirements mentioned in NFPA 750 + Reference to ASTM standards (see **part 3** for nozzles).	Reference to CEN/TS 14972 part 2-? + minor requirements mentioned in CEN/TS14972 part 1.+ Reference to EN standards for sprinkler and gas components. (see **part 3** for nozzles).
Component Materials	Copper, Stainless steel or other listed materials with same corrosion resistance	Stainless steel or equivalent (copper, zinc coated steel (galv) and synthetic materials may be used if found not to create clogging) .
Fire test accepted	See part 2	
Design (Classification, water supply)	Occupancy (minimum 30min). Specific (accordingly to listing, always ext. time x2). Design area accordingly to listing.	Application Specific . Water supply for pumped systems to be calculated as EN 12845 or listed, whatever is greater. Pre-eng.: 10min or ext. time x2, whatever is greater.
Other design and Installation requirement.	DIOM	DIOM
Maintenance requirement	NFPA 25 & DIOM	EN 12845 / EN15004-1 where relevant + DIOM
Final Acceptance	AHJ	AHJ

Notifying Body Design standards (part 1B)

	NFPA 750 (2015)	FM5560 (2012)
Components (pumps)	NFPA 20	FM approved. FM loss prevention datasheets, NFPA 20 and NFPA 750
Components (tanks, Valves, hangers, pipes, nozzles, strainers, pump controllers)	Listed + minor requirements mentioned in NFPA 750 + Reference to ASTM standards (see **part 3** for nozzles).	FM Approved FM loss prevention datasheets, NFPA 20 and NFPA 750 (see **part 3** for nozzles).
Component Materials	Copper, Stainless steel or other listed materials with same corrosion resistance	Copper or Stainless steel only.
Fire test accepted	See part 2	
Design (Classification, water supply)	Occupancy (minimum 30min). Specific (accordingly to listing, always ext. time x2). Design area accordingly to listing.	Occupancy: (FM DataSheet 3-26) Pre-eng.: 10min or ext. time x2, whatever is greater.
Other design and Installation requirement	DIOM	DIOM
Maintenance requirement	NFPA 25 & DIOM	FM Inspection+ DIOM
Final Acceptance	AHJ	FM Inspection (APPROVAL)

Accepted test protocols (part 2)

NFPA 750 (2015)	CEN/TS 14972 (2014)	FM5560 (2012)
Fire test protocols where a listing can be obtained. The protocol shall be fit to the application and be accepted by the AHJ.	**Fire test protocols are included in CEN/TS 14972 and written in part X-Y . Most protocols are copies from known, used and accepted protocols such as:**	**Fire test protocols are included in FM5560**
Recognized in NFPA750: IMO 668 (1165) and IMO A800 (MSC 265) FM5560, UL2167, CEN/TS 14972, **(VDS?)**	**Existing!:** flammable liquids, cable tunnels, office , certain storage areas (all are copies of VDS protocols with minor changes), commercial deep fat fryer (copy of ISO15371).	FM: machinery spaces, turbine enclosure, HC1 (application specific) , Wet benches, industrial oil cookers, local application, Data centers, wood board presses, Chemical fume hoods,
Definition from chapter 3.2.3 *Equipment, materials, or services included in a list **published by an organization** that is **acceptable** to the **authority having jurisdiction** and concerned with evaluation of products or services, that maintains **periodic inspection** of production of listed equipment or materials or periodic **evaluation** of services, and whose listing states that either the equipment, material, or service **meets appropriate designated standards or has been tested and found suitable for a specified purpose.***	FM (new): machinery spaces, turbine enclosure, HC1 (application specific) , Wet benches, industrial oil cookers.	
	VDS(new): car parks, false floor/ceiling, hotel	
	LPCB(new): residential & domestic, low hazard (application specific).	
	DFL(new): Atrium	

Component test methods (Part 3)

Covers:

- Corrosion (materials)
- Nozzle design (strength)
- Glassbulb QC
- Fast release (RTI)
- Discharge patterns (even distribution)
- K-factor (Flow and pressure)
- Verification of fire test nozzles.
- Protection caps (packaging test)-

Note: no droplet size tests (not needed).

6. If the industry requires a standard.

If no standard is available for the application

CEN/TS 14972:2011, Annex B.

In accordance with this guideline it is possible to:

- Develop a test method for a specific application to any system type.
- Authorities involved in the project, accepts the protocol
- Conduct the fire tests described in the developed standard.
- Get the test results evaluated and documented in a test report.
- An ISO17025 accredited fire test laboratory shall conduct the fire test.
- Often the AHJ is involved throughout the entire test project.

Note: Further requirements are set to component tests and production QC level in the main CEN/TS14972 document.

How to follow CEN/TS14972 appendix B

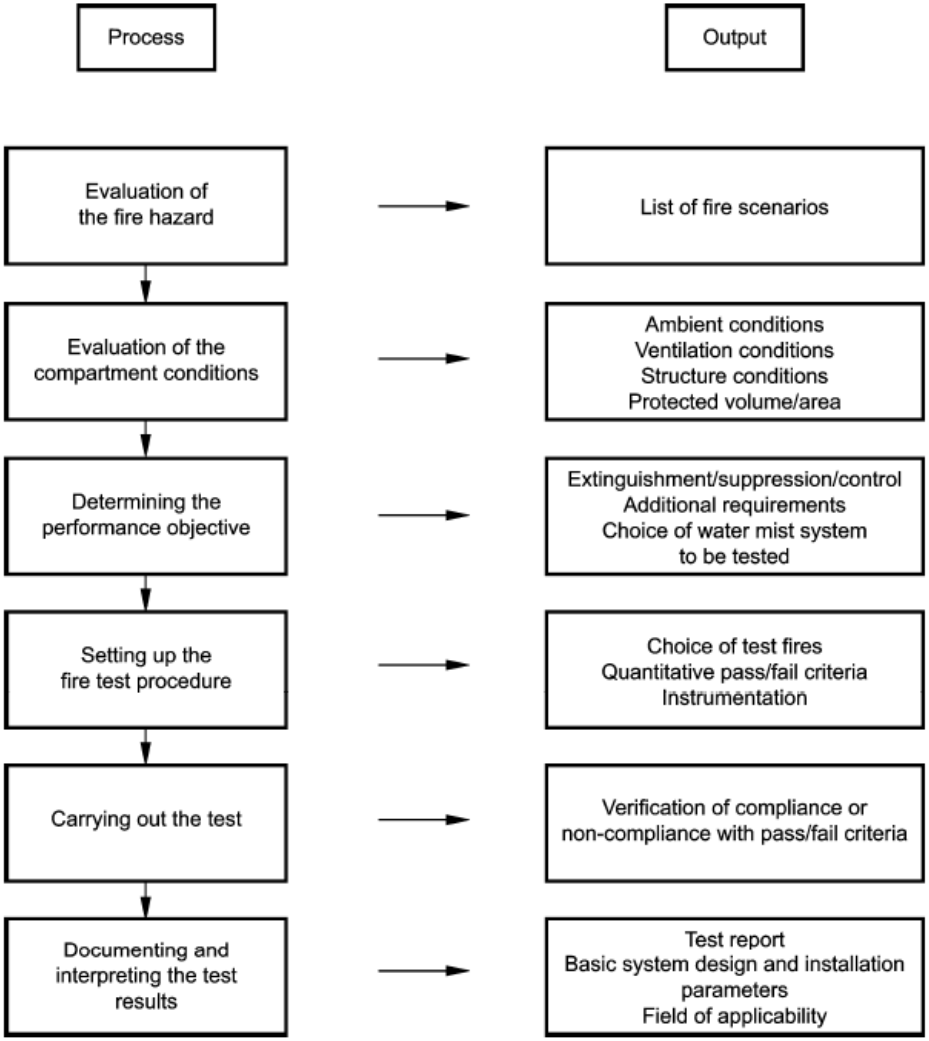
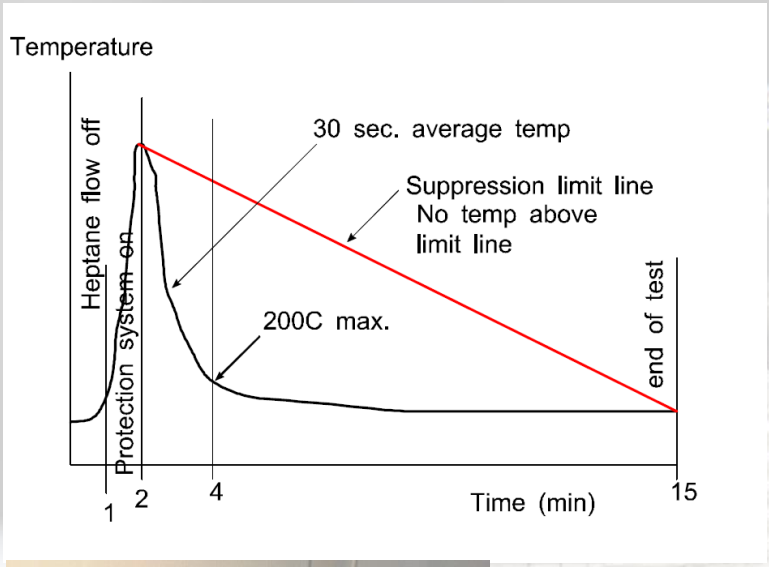


Figure B.1 — Process of developing a fire test procedure

Examples of fuels that could be used.

Evaluation of the compartment conditions.

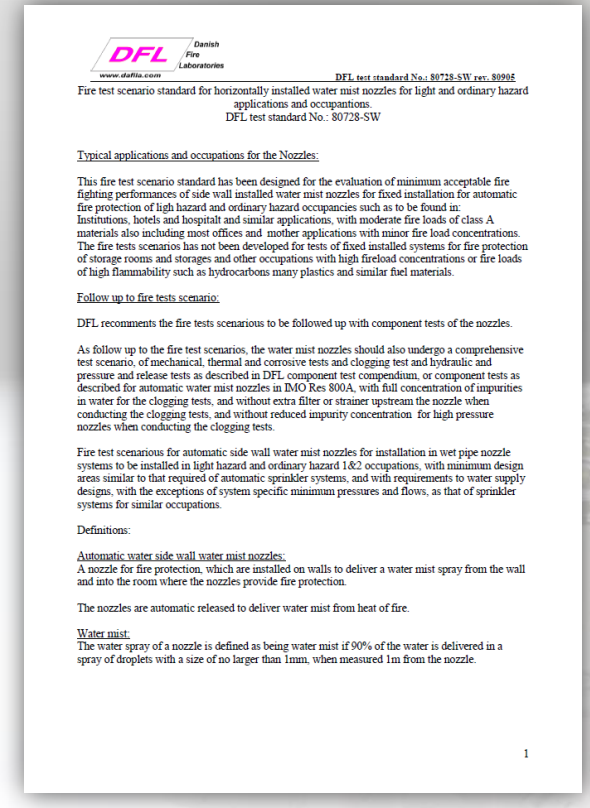
Evaluation of pass/fail.



Control, suppression or comparison?

The results

Test Method



DFL Danish Fire Laboratories
www.dafila.com

DFL test standard No.: 80728-SW rev. 80905

Fire test scenario standard for horizontally installed water mist nozzles for light and ordinary hazard applications and occupantions.
DFL test standard No.: 80728-SW

Typical applications and occupations for the Nozzles:

This fire test scenario standard has been designed for the evaluation of minimum acceptable fire fighting performances of side wall installed water mist nozzles for fixed installation for automatic fire protection of ligh hazard and ordinary hazard occupancies such as to be found in:
Institutions, hotels and hospitalt and similar applications, with moderate fire loads of class A materials also including most offices and mother applications with minor fire load concentrations.
The fire tests scenarios has not been developed for tests of fixed installed systems for fire protection of storage rooms and storages and other occupations with high fireload concentrations or fire loads of high flammability such as hydrocarbons many plastics and similar fuel materials.

Follow up to fire tests scenario:

DFL recomments the fire tests scenarious to be followed up with component tests of the nozzles.

As follow up to the fire test scenarios, the water mist nozzles should also undergo a comprehensive test scenario, of mechanical, thermal and corrosive tests and clogging test and hydraulic and pressure and release tests as described in DFL component test compendium, or component tests as described for automatic water mist nozzles in IMO Res 800A, with full concentration of impurities in water for the clogging tests, and without extra filter or strainer upstream the nozzle when conducting the clogging tests, and without reduced impurity concentration for high pressure nozzles when conducting the clogging tests.

Fire test scenarious for automatic side wall water mist nozzles for installation in wet pipe nozzle systems to be installed in light hazard and ordinary hazard 1&2 occupations, with minimum design areas similar to that required of automatic sprinkler systems, and with requirements to water supply designs, with the exceptions of system specific minimum pressures and flows, as that of sprinkler systems for similar occupations.

Definitions:

Automatic water side wall water mist nozzles:
A nozzle for fire protection, which are installed on walls to deliver a water mist spray from the wall and into the room where the nozzles provide fire protection.

The nozzles are automatic released to deliver water mist from heat of fire.

Water mist:
The water spray of a nozzle is defined as being water mist if 90% of the water is delivered in a spray of droplets with a size of no larger than 1mm, when measured 1m from the nozzle.

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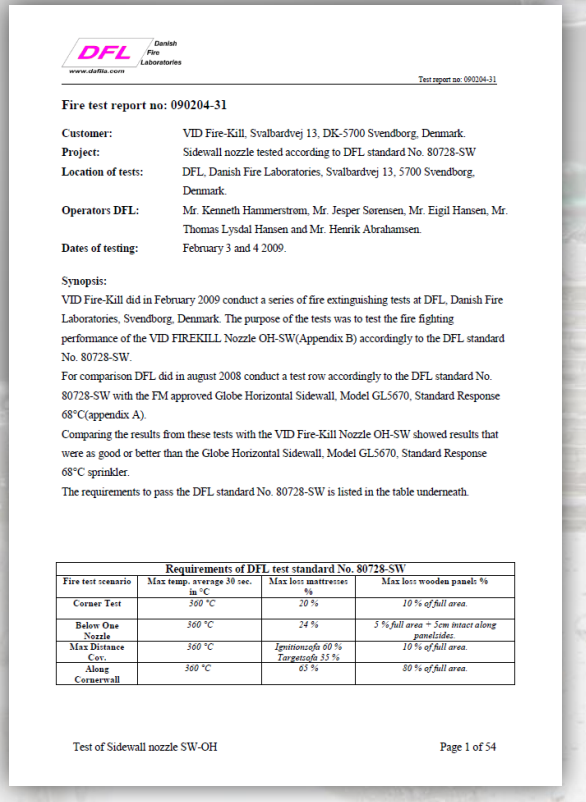
Test report



DFL Danish Fire Laboratories
www.dafila.com

Test report no: 090204-31

Fire test report no: 090204-31

Customer:	VID Fire-Kill, Svalbardvej 13, DK-5700 Svendborg, Denmark.
Project:	Sidewall nozzle tested according to DFL standard No. 80728-SW
Location of tests:	DFL, Danish Fire Laboratories, Svalbardvej 13, 5700 Svendborg, Denmark.
Operators DFL:	Mr. Kenneth Hammerstrom, Mr. Jesper Sørensen, Mr. Eigil Hansen, Mr. Thomas Lysdal Hansen and Mr. Henrik Abrahamsen.
Dates of testing:	February 3 and 4 2009.

Synopsis:

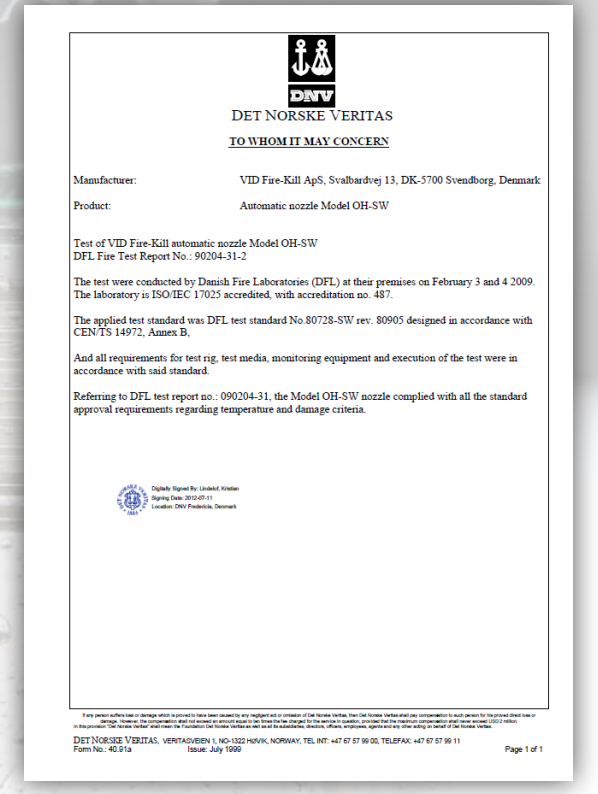
VID Fire-Kill did in February 2009 conduct a series of fire extinguishing tests at DFL, Danish Fire Laboratories, Svendborg, Denmark. The purpose of the tests was to test the fire fighting performance of the VID FIREKILL Nozzle OH-SW(Appendix B) accordingly to the DFL standard No. 80728-SW.
For comparison DFL did in august 2008 conduct a test row accordingly to the DFL standard No. 80728-SW with the FM approved Globe Horizontal Sidewall, Model GL5670, Standard Response 68°C(appendix A).
Comparing the results from these tests with the VID Fire-Kill Nozzle OH-SW showed results that were as good or better than the Globe Horizontal Sidewall, Model GL5670, Standard Response 68°C sprinkler.
The requirements to pass the DFL standard No. 80728-SW is listed in the table underneath.

Requirements of DFL test standard No. 80728-SW

Fire test scenario	Max temp. average 30 sec. in °C	Max loss mattresses %	Max loss wooden panels %
Corner Test	*360 °C*	*20 %*	*10 % of full area.*
Below One Nozzle	*360 °C*	*24 %*	*5 % full area + 5cm intact along panelsides.*
Max Distance Cov.	*360 °C*	*Ignitionsofa 60 % Targetsofa 35 %*	*10 % of full area.*
Along Cornerwall	*360 °C*	*65 %*	*80 % of full area.*

Test of Sidewall nozzle SW-OH Page 1 of 54

AHJ witness letter



DET NORSKE VERITAS

TO WHOM IT MAY CONCERN

Manufacturer: VID Fire-Kill ApS, Svalbardvej 13, DK-5700 Svendborg, Denmark

Product: Automatic nozzle Model OH-SW

Test of VID Fire-Kill automatic nozzle Model OH-SW
DFL Fire Test Report No.: 90204-31-2

The test were conducted by Danish Fire Laboratories (DFL) at their premises on February 3 and 4 2009. The laboratory is ISO/IEC 17025 accredited, with accreditation no. 487.

The applied test standard was DFL test standard No.80728-SW rev. 80905 designed in accordance with CEN/TS 14972, Annex B,

And all requirements for test rig, test media, monitoring equipment and execution of the test were in accordance with said standard.

Referring to DFL test report no.: 090204-31, the Model OH-SW nozzle complied with all the standard approval requirements regarding temperature and damage criteria.

Digitally Signed By: Lindelof, Kristian
Signing Date: 2012-07-11
Location: DNV Fredericia, Denmark

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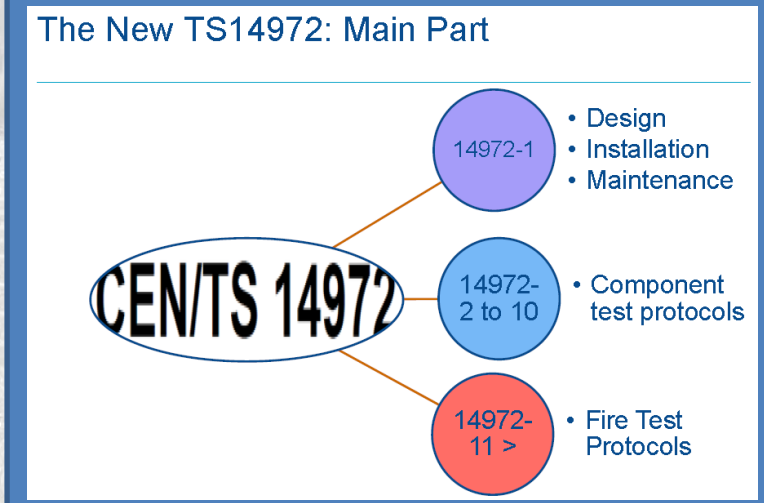
7. Summary

NFPA 750 (2015)

FM5560:2012 (Notifying body)

CEN/TS 14972:2014



Appendix B (Other applications)

Summary

The chicken or the egg?