Water Mist Standards – different approaches around the World

Presenter: Alex Palle
Title: CEO of VID Fire-Kill
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Place: Dubai
Why standards?
Motivation for my presentation

Watermist often seen as an innovative technology and not getting acceptance on equal terms as conventional solutions. What makes a system a conventional solution – time of cause but also standardization of a technology.

This presentation is to show that the watermist technology is CONVENTIONAL along technologies such as sprinklers, gas, foam etc. because robust standards are available for WM.
Different standards used in different parts of the World.

- NFPA standards (USA, Far East, Middle East Europe)
- EN standards (Europe)
- Local standards (e.g. UAE Civil Defense regulations)

This presentation will try to explain the different approaches and what you can expect from each!
Standard Sub categories

WM STANDARDS can be divided into two categories:

**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)

**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 testing standards.
Examples of available standards

Test standards examples:
- **FM5560**: HC1 (NFPA LH), data centers, machinery, turbines, special hazards, more
- **UL2167**: NFPA LH, OH1, OH2.
- **prEN14972**: NFPA LH, OH1, OH2 applications, machinery, turbines, special hazards, more
- **VDS3188**: Car parks, cable tunnels, OH1 (NFPA LH), Offices, more
- **DD8458+ 8489**: Domestic & residential areas, OH1 (NFPA LH), more.
- **IMO**: All applications found on ships.

Design standard examples:
- **USA**: NFPA 750
- **Europe**: prEN14972
- **Marine**: SOLAS
- **FM/VDS insured buildings**: FM5560 / VDS 3188
# Difference between NFPA750 and prEN14972

<table>
<thead>
<tr>
<th>Component (pumps)</th>
<th>NFPA 750</th>
<th>prEN 14972</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NFPA 20</td>
<td>Low: EN12845 &amp; EN12259-12 (centrifugal pumps) High: EN 14847 (positive displacement pumps)</td>
</tr>
<tr>
<td>Component (tanks, Valves, hangers, pipes, nozzles, strainers, pump controllers)</td>
<td>Listed + minor requirements mentioned in NFPA 750 + Reference to ASTM standards</td>
<td>Minor requirements mentioned in prEN 14972 part 1 + Compliance to EN standards for sprinkler and gas components. <em>In the future unique EN standards will be developed for WM components and “parked” under prEN 14972.</em></td>
</tr>
<tr>
<td>Component Materials</td>
<td>Copper, Stainless steel or other listed materials with same corrosion resistance</td>
<td>Stainless steel or equivalent (copper, zinc coated steel and synthetic materials may be used if found not to create clogging and suited for the purpose).</td>
</tr>
<tr>
<td>Fire test accepted</td>
<td>External test protocols</td>
<td>Internal test protocols</td>
</tr>
<tr>
<td>Design (Classification, water supply)</td>
<td>Occupancy (minimum 30min). Specific (accordingly to listing, always ext. time x2). Design area accordingly to listing.</td>
<td>Application Specific. Defined in prEN 14972 part 1</td>
</tr>
<tr>
<td>Other design and Installation requirements</td>
<td>DIOM</td>
<td>DIOM</td>
</tr>
<tr>
<td>Maintenance requirements</td>
<td>NFPA 25 &amp; DIOM</td>
<td>EN 12845 / EN15004-1 where relevant + DIOM</td>
</tr>
<tr>
<td>Final Acceptance</td>
<td>AHI</td>
<td>AHI</td>
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## Difference between NFPA750 and FM5560

<table>
<thead>
<tr>
<th></th>
<th>NFPA 750</th>
<th>FM5560 (Notifying Body)</th>
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<tbody>
<tr>
<td>Components (pumps)</td>
<td>NFPA 20</td>
<td>FM approved. FM loss prevention datasheets, NFPA 20 and NFPA 750</td>
</tr>
<tr>
<td>Components (tanks, Valves,</td>
<td>Listed + minor requirements mentioned in NFPA 750 + Reference to ASTM</td>
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<tr>
<td>hangers, pipes, nozzles,</td>
<td>standards</td>
<td></td>
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<tr>
<td>strainers, pump controllers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Component Materials</td>
<td>Copper, Stainless steel or other listed materials with same corrosion</td>
<td>Copper or Stainless steel only.</td>
</tr>
<tr>
<td></td>
<td>resistance</td>
<td></td>
</tr>
<tr>
<td>Fire test accepted</td>
<td>External test protocols</td>
<td>FM test protocols</td>
</tr>
<tr>
<td>Design (Classification, water</td>
<td>Occupancy (minimum 30min). Specific (accordingly to listing, always</td>
<td>Occupancy: (FM DataSheet 3-26) Pre-eng.: 10min or ext. time x2, whatever is greater.</td>
</tr>
<tr>
<td>supply)</td>
<td>ext. time x2). Design area accordingly to listing.</td>
<td></td>
</tr>
<tr>
<td>Other design and Installation</td>
<td>DIOM</td>
<td>DIOM</td>
</tr>
<tr>
<td>requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance requirements</td>
<td>NFPA 25 &amp; DIOM</td>
<td>FM Inspection+ DIOM</td>
</tr>
<tr>
<td>Final Acceptance</td>
<td>AHJ</td>
<td>FM Inspection (APPROVAL)</td>
</tr>
</tbody>
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The difference between “Compliance” and “Listing/Approval”
prEN14972 (2019) - “Compliance”

Acceptance: Successful testing to a test protocol in the prEN14972 series (part 2-17 currently).
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 and domestic areas for automatic nozzle systems.
A typical Building
Successful fire and component testing conducted in an ISO 17025 accredited test lab to a test protocol found in CEN/EN 14972 part 2-X.

3. party to witness fire tests / approve test reports, and approve DIOM manual.

Product + datasheet sent to fire and component test lab.

Manufacturer makes DIOM manual based on results found in tests including all system specific details.

OK documentation: Certificate

OK documentation: Witness letter + fire- and component test reports.

Certificate of Compliance

FM Approvals

VdS

LPCB

DNV-GL

Verification Statement

DIOM manual

Witness letter

Fire and component test reports
Acceptance: Fire test protocols where a listing can be obtained. The protocol shall be fit to the application and be accepted by the AHJ.

Recognized in NFPA750:
IMO 1165, IMO1387 and IMO A800 + MSC 265
FM5560, UL2167, CEN/TS 14972, etc.

“Listing” 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.
Listing (FM) example

Successful fire and component testing conducted by FM or/and witnessed by FM to the FM5560 code.

Product + datasheet sent to FM approved fire and component test lab.

Manufacturer makes DIOM manual based on results found in tests including all system specific details.

FM approves the test reports and the DIOM manual.
Listing (FM) example

NOTE: When the listed system is used accordingly to NFPA750 the local AHJ can diverge from the FM rules but the system still has to be listed!
In short...

When following prEN14972 watermist systems has to be designed in accordance with the standard but they do not need to be approved by a third party. All parts of the system however has to comply to EN standards. The AHJ has to have knowledge about EN standards and in general there has to be a certain trust-level between stakeholders.

When following NFPA750 watermist systems has to be designed in accordance with the standard and all components has to be listed but the project specific AHJ decides if the listings are appropriate for the project.

If following a notifying body standard fully (FM5560) then a watermist system and the design of that has to be approved by the notifying body - And the project specific AHJ is the notifying body.
... what about local watermist standards..

When following a local WM standard you can expect it to require the watermist system to be “listed” as it is an “easy” way to ensure that the system has a certain quality level but the rules for system design and how the listed components are combined is very specific set, designed to cover certain aspects of local regulations or/and specific challenges only met locally.

More or less local WM standards follow the methodology of NFPA750 but the difference is that there is an AHJ layer on top of the project specific AHJ.
Example UAE

Certificate of Compliance
This certificate is issued for the following:

Water Mist System

System Designation:
FIREKILL™ Total Flooding System Using Model K6 Open Nozzles for the protection of machinery in enclosures with volumes up to and including, 167,800 ft³ (4610 m³) at a maximum height of 39.4 ft (12 m)

Design, Installation, Operation and Maintenance Manual:
FIREKILL™ Total Flooding System Using Model K6 Open Nozzles

Preparations:
VID FIRE
SVALBA
SVEN
Dänemark

Acceptance:
David B. Ingels
VP, Mass. FM Approvals
1151 Boston Providence Turnpike
Norwood, MA 02062

Quality Assurance:
United Arab Emirates
Ministry of Interior
Civil Defense, D.C.O.
Fire International Lab & House
Of Expertise & Training Center
Approval Committee

Laboratory and Certification body details

<table>
<thead>
<tr>
<th>Laboratory and Certification body details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NAME OF CERTIFICATION BODY</strong></td>
</tr>
<tr>
<td><strong>CERTIFICATION BODY ADDRESS / REGION</strong></td>
</tr>
<tr>
<td><strong>WEBSITE</strong></td>
</tr>
<tr>
<td><strong>EMAIL</strong></td>
</tr>
<tr>
<td><strong>FM APPROVALS IS ACCREDITED BY</strong></td>
</tr>
<tr>
<td><strong>DATE OF APPROVAL</strong></td>
</tr>
<tr>
<td><strong>TEST FACILITY ADDRESS / REGION</strong></td>
</tr>
<tr>
<td><strong>WEBSITE</strong></td>
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FM Approvals
Member of the FM Global Group

United Arab Emirates
Ministry of Interior
Civil Defense, D.C.O.
Fire International Lab & House
Of Expertise & Training Center
Approval Committee

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Civil Defense, D.C.O.
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Of Expertise & Training Center
Approval Committee

Automatic Water Mist System

Water Spray System:
Model: K6
Usage: Protection of Machinery and Combustion or Steam Turbines in Enclosures up to 4610 m³ and 42 m in Height
Mix Water Droplets: 115.7 pph

Emergency
997

www.dcd.gov.ae
Final words

Watermist is “conventional” as standardization level is as high as any other fire protection solution!
Thank you for your attention