

HC2/HC3 approval – a new chapter in water mist market development

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What were the biggest limitations for water mist?

Lack of trust in a technology

Lack of public available knowledge

Lack of design guidelines based on performance

Low level of possible applications in high risk areas (buildings)

Price gap compared to conventional sprinklers



VID

Building Trust

FM Approvals

Real Scale fire testing in FM laboratory

Component testing

Continuous audit

Worldwide recognized benchmark



VID

Publicly available listing and strong knowledge level in FM DS

FM 5560 Examination Standard for Water Mist Systems

FM DS 4-2 Water Mist Systems

FM DS 5-32 Data Center and Related Facilities

FM DS 3-26 Fire Protection for Non-Storage Occupancies



VID



Changing the design approach

EN 14972 part 2-16

Ordinary Hazard Group 1 (OH1)
72 m² – minimum 6 nozzles

Ordinary Hazard Group 2 (OH2)
144 m² – wet system
180 m² – dry system

Ordinary Hazard Group 3 (OH3)
216 m²

Ordinary Hazard Group 4 (OH4)
360 m²

NFPA750

Test protocols developed, carried out and interpreted by international recognized fire testing laboratories

FM DS 3-26

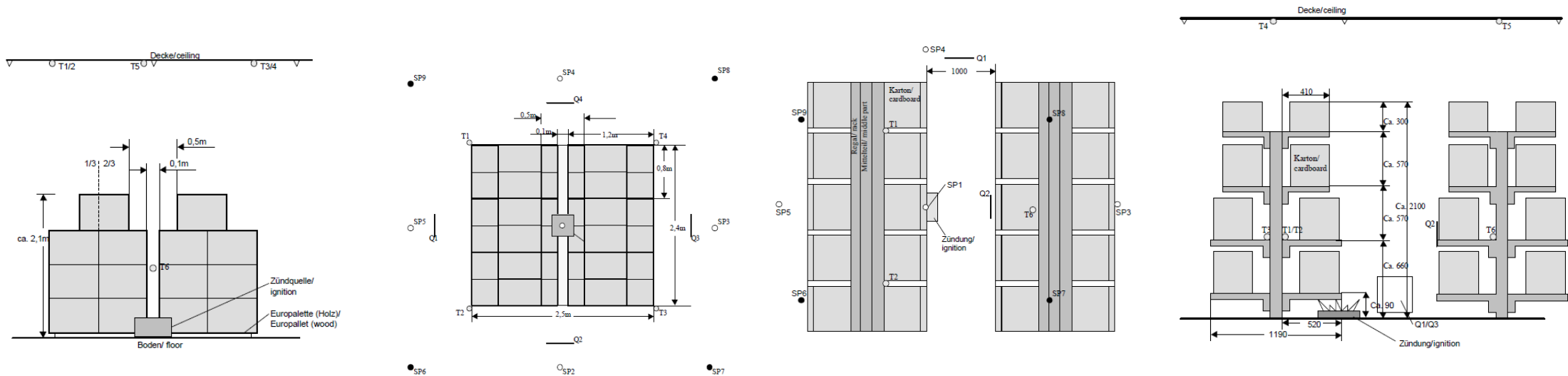
HC1
140 m² – minimum 9 nozzles

HC2: worst case between:
9 nozzles
The approval listing

HC3: worst case between:
9 nozzles
The approval listing

Commercial building protection

Approval Test EN14972-2 for selected sales, storage and technical areas



General limitations:

$H \leq A_s$ tested Nozzle spacing
 $\leq A_s$ tested

Comparison with sprinklers

8 mm/min
 12m² (3,5m x 3,5m)

Commercial building protection

Design criteria from EN 14972-2

Minimum design area (table 1):

- 216 m² wet system

Minimum nozzle quantity:

- N/A

Minimum operation time (table4):

- 60 minutes



OH-PX2

Nozzle type: Pendent

Mini pressure: 7 bar to 16 bar

K-factor: 19,0

Max Spacing: 3,5 x 3,5 meters

Max height: 4,0 meters

Water density: 4,1mm/m²

Flow rate@7 bar : $18 \times 50,3 = 905,4$ lpm





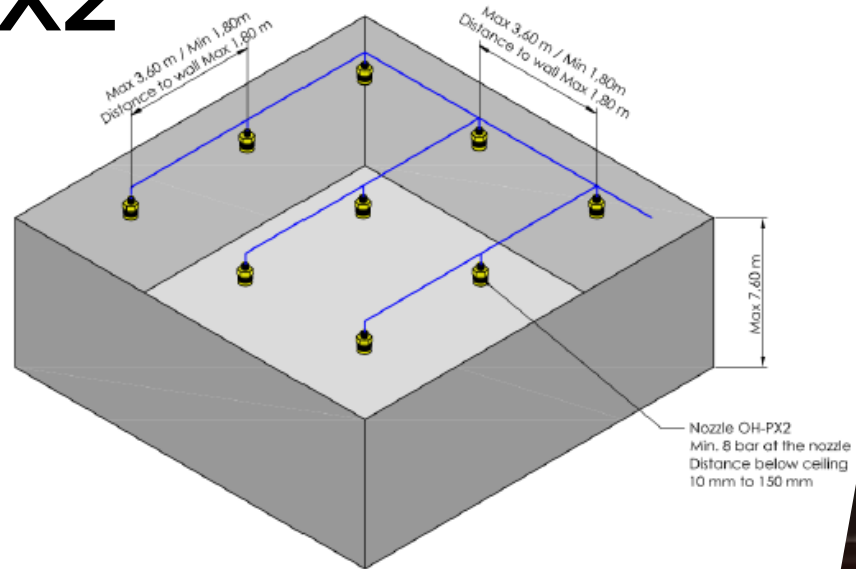
6: Cardboard carton with polystyrene trays



10: 210901-1 Showing no damage to left main fuel end array

OH-PX2

VID



Desing area: 9 Nozzle design for HC-3;

Min pressure: 8 bar;

K-factor: 19.0 metric;

Minimum flow: 53.75;

Max height: 7,6 m – FM; 12 m – IBS;

Max spacing: 3,6 m x 3,6 m;

Total flow: 484 l/min



FM DS. 3-26 hazard classification in Industry

Occupancy	Hazard Classification	Fire Test Protocol	FM Approved Solution
Metal, glass, ceramic or cement production plant.	HC-1	Water Mist: FM5560 Appendix G	OH-VSO
Meat processing plant	HC-2	Water Mist: FM5560 Appendix P	OH-PX2
Chocolate, biscuit factories	HC-2	Water Mist: FM5560 Appendix P	OH-PX2
Woodworking and furniture factories	HC-2	Water Mist: FM5560 Appendix P	OH-PX2
Plastic factories, Injection moulding plants	HC-3	Water Mist: FM5560 Appendix P	OH-PX2
Battery, car assembly plants	HC-3	Water Mist: FM5560 Appendix P	OH-PX2
Electrical room, dry transformer room	HC-2 (technical areas)	Water Mist: FM5560 Appendix P	OH-PX2

FM Approved Water Mist solutions for Data Centers



Office / circulation spaces

Data halls

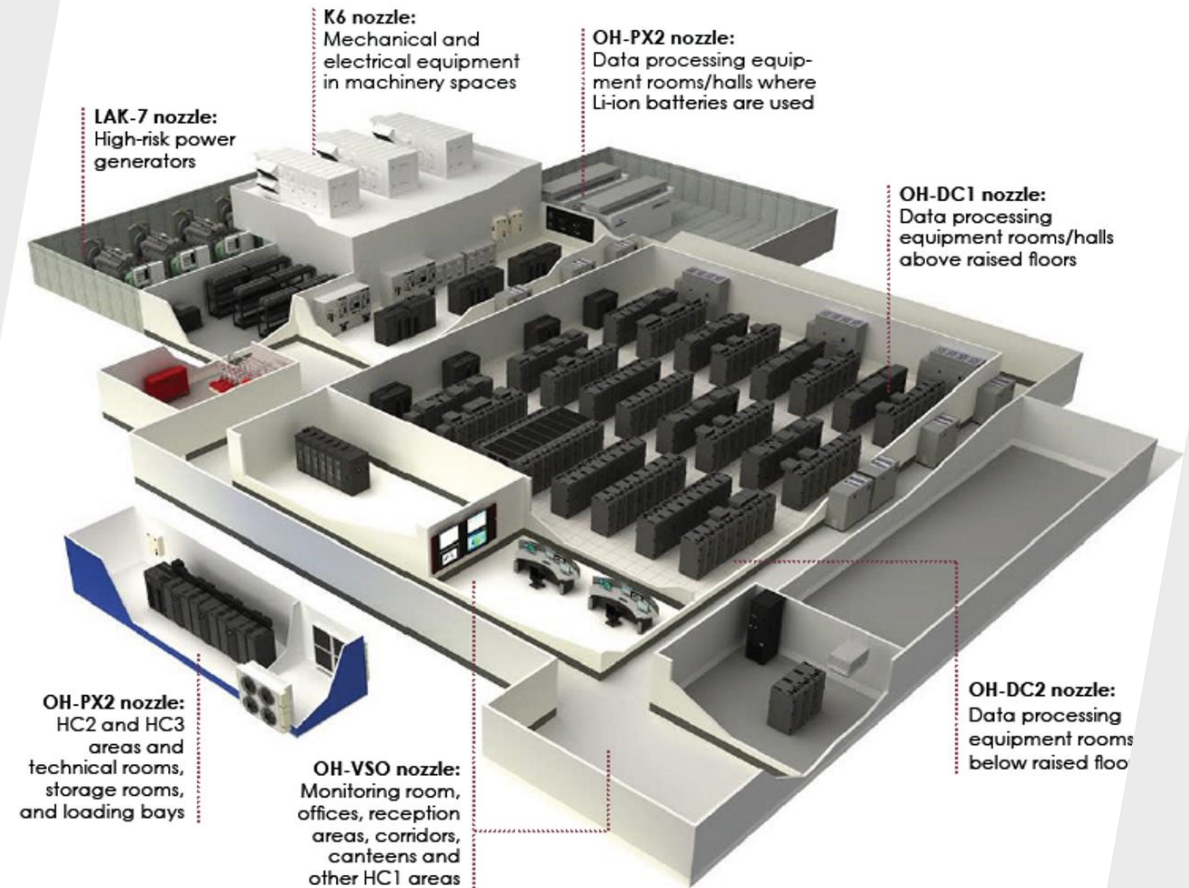
Electrical rooms (MDF / MMR)

Transformer / generator rooms

UPS / battery rooms

Storage rooms

Loading bays



FM DS 5-32 hazards classification in Data Centers

Occupancy	Hazard Classification	Fire Test Protocol	FM Approved Solution
UPS Battery rooms	HC-2 / HC-3	Water Mist: FM5560 Appendix P	OH-PX2
Data Halls and MMR	HC-2 / HC-3	Water Mist: FM5560 Appendix P	OH-PX2
Office / Circulation spaces	HC-1	Water Mist: FM5560 Appendix G	OH-VSO
Transformer Rooms	HC-3 – dry Machinery space - Oil	Water Mist: FM5560 Appendix P Water Mist: FM5560 Appendices A to F, I	OH-PX2 K6 (Total Flooding) LAK7 (Local Application)
Generator rooms	Machinery space	Water Mist: FM5560 Appendices A to F, I	K6 (Total Flooding) LAK7 (Local Application)
Technical Rooms	HC-2 / HC-3	Water Mist: FM5560 Appendix P	OH-PX2
Data Processing Rooms (old FM protocol)	Data Processing Room	Water Mist: FM5560 Appendices M & N	OH-DC1 (Ambient) OH-DC2 (RF and FC)

Data Processing Room – old FM protocol

FM 5560 Appendix M

Data Halls and MMRs with the following conditions:

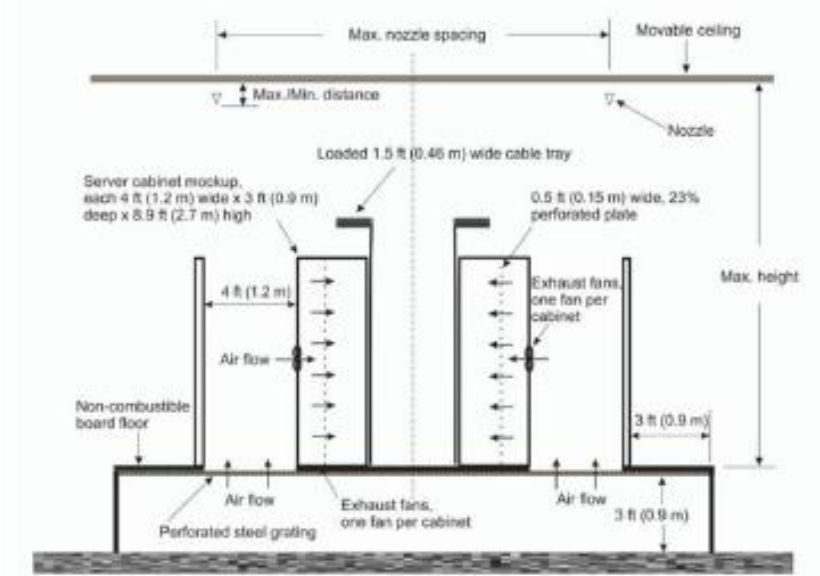
Ceiling height < 5m

No BBU with Li-Ion batteries

Single level of cable trays

Multiple trays non-propagating and/or cable trays/raceways non-combustible equipped with automatic/manual power isolation see 2.3.5.4.1

Non-combustible server racks, rack panels and hot/cold aisle containment



2.3.5.4.1 Power Isolation Method

2.3.5.4.1.1| Provide a power isolation method to achieve the following (separately or together):

A. De-energize all electrical power to the data processing equipment in the room or designated zone(s), except power to lighting, in the event of sprinkler, water mist system, clean agent fire extinguishing system and/or hybrid fire extinguishing system operation.

B. When appropriate, de-energize all dedicated heating, ventilation and air-conditioning (HVAC) systems for the data processing equipment serving the room or designated zone(s) in the event of sprinkler, water mist system, clean agent fire extinguishing system and/or hybrid fire extinguishing system operation. See Section 2.3.5.3 for further guidance on the impact of power isolation to HVAC equipment.

C. If abrupt power isolation will damage the data processing equipment, use a controlled shutdown of the data processing equipment prior to isolation of the power source.

HC-2 and HC-3 occupancies

FM 5560 Appendix P

Areas defined as HC-2 and HC-3 by FM DS 3-26 and FM DS 5-32:

Data Halls with ceiling >5m

Data Halls with BBU with Li-ion

Data Halls with multiple cable trays

Technical Rooms

Dry transformer

Battery room

UPS

MER

Storage (see FM DS 3-26 limitation)

Loading bay

2.3.5.9 Determine the design area for water mist systems FM Approved for HC-2 and HC-3 occupancies using whichever of the following is greater:

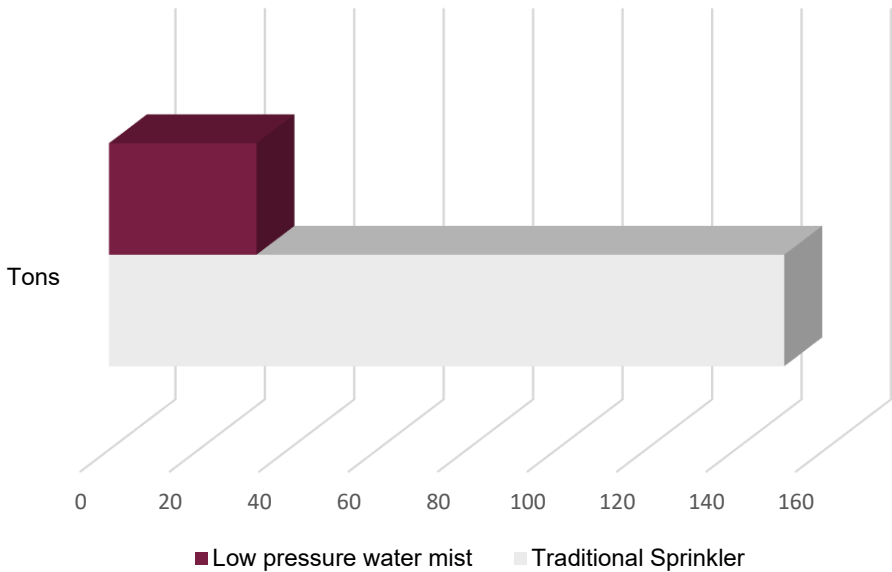
- A. The hydraulically most remote nine (9) automatic nozzles.
- B. The hydraulically most remote number of automatic nozzles as specified in the FM Approval listing.

2.4.3.2.2.2 Use one of the following automatic water mist systems for Data Processing Equipment Rooms/Halls:

- A. FM Approved for "HC-2 or HC-3 Occupancies".
- B. FM Approved for "Protection of Data Processing Equipment Rooms/Halls" if the following conditions are met:
 - The maximum nominal upward velocity through perforated floor openings is 3.3 ft/sec. (1 m/s) or meets the provisions of the system's FM Approval listing.
 - The maximum horizontal airflow is 4 ft/sec. (1.2 m/s) horizontal airflow or meets the provisions of the system's FM Approval listing.
 - No overhead, multi-tiered, combustible cable raceways are present.
 - No overhead, multi-tiered open cable trays of propagating cables are present.
 - No Li-ion battery backup units (BBUs) or UPS systems are present.

Environmental and cost effect

Water mist is an environmental friendly technology with 70% less CO2-e compared to sprinkler*



Traditional Sprinkler	kg/m	m	kg
DN25	2.41	5456	19723
DN32	3.1	3780	17577
DN40	3.56	765	4085
DN50	5.03	6600	49797
DN80	6.76	153	1551
DN100	9.83	1084	15984
DN150	17.15	1656	42601
			151318

Low pressure water mist	kg/m	m	kg
18x1	0.426	2350	1502
22x1	0.625	5366	5031
28x1	0.805	1419	1713
35x1.5	1.258	3355	6331
42x1.5	1.521	1000	2282
54x1.5	1.972	3932	11631
76.1x2	3.711	900	5010
			33499

Data from a case study of a Data Center with 4000 nozzles head

*Verified by independent testing (Multiconsult 2024), demonstrating reduced water and energy use compared with conventional sprinkler systems (EN 12845 / NFPA 13 equivalent) under equivalent fire-performance conditions.

FM HC2/HC3 approval is a highway for water mist

Instead of narrow application approval – full risk classification approval

Instead of sprinkler design guidelines – performance based area of operation.

Finally after many years Water Mist is close to be „conventional system” instead of special hazards.



Thank you

www.vidfirekill.com

