

# Water Mist

**Water Mist Protection in accordance with EN14972**

Hans Schipper, March 2024

Johnson Controls / TYCO

# Agenda Water Mist Protection in accordance with EN14972

- Water Mist Standard EN14972-1
  - Standard
  - Design, Installation, Maintenance
  - Approval process
- Fire Test protocols: EN14972 parts 2-17
  - Building Protection Overview
  - Industrial Protection Overview
- Status overview
  - Published standards EN 14972 and EN17450
  - Work Item Overview EN14972 and EN17450
- An insight: OH3 fire testing to VdS 3883 Part 5:2020
  - Manufacturers testing, Low pressure water mist system
  - Shopping/Sales Areas, Libraries, Archives, Technical Rooms, Storage areas and comparable risks
- Summary





# Watermist Design Standards and Fire Test Protocols



| CEN   | VdS   | NFPA  | FM  |
|---|---|---|---|
| <p><b>EN 14972-1</b></p> <ul style="list-style-type: none"><li>Fixed firefighting systems Watermist systems Design and installation</li><li>Installation and maintenance criteria</li><li>Duration</li><li>Design area</li><li>No nozzle design criteria!</li></ul> | <p><b>VdS 3188</b></p> <ul style="list-style-type: none"><li>Water Mist Sprinkler Systems and Water Mist Extinguishing Systems (High Pressure Systems) - Planning and Installation</li></ul> <p><b>VdS CEA 4001</b></p> <ul style="list-style-type: none"><li>Water Mist Sprinkler Systems (Low Pressure Systems) - Planning and Installation</li></ul> | <p><b>NFPA 750</b></p> <ul style="list-style-type: none"><li>Standard on Water Mist Fire Protection Systems</li><li>Installation and maintenance criteria</li><li>Duration</li><li>Design area</li><li>No nozzle design criteria!</li></ul> | <p><b>FM 4-2</b></p> <ul style="list-style-type: none"><li>Water Mist Systems</li><li>Installation and maintenance criteria</li><li>Duration</li><li>Design area</li><li>No nozzle design criteria!</li></ul> |
| <p><b>EN 14972-2...17</b></p> <p>(FM, VdS, LPCB, DFL, ISO)</p> <ul style="list-style-type: none"><li>Fire suppression performance criteria</li><li>Component approval</li></ul>   | <p><b>VdS 3883-1...8</b></p> <p>Reference Tested Against Conventional Sprinklers</p> <ul style="list-style-type: none"><li>Fire suppression performance criteria</li><li>Component approval</li></ul>   | <p><b>FM 5560 Appendix A...P</b></p> <p><b>UL2167</b></p> <p><b>VdS 3883-1...8</b></p> <p><b>EN 14972-2...17</b></p> <ul style="list-style-type: none"><li>Fire suppression performance criteria</li><li>Component approval</li></ul>       | <p><b>FM 5560 Appendix A...P</b></p> <ul style="list-style-type: none"><li>Fire suppression performance criteria</li><li>Component approval</li></ul>   |

High pressure = System approval  
Low pressure = Component approval

# Water Mist Standard – European Norm EN14972



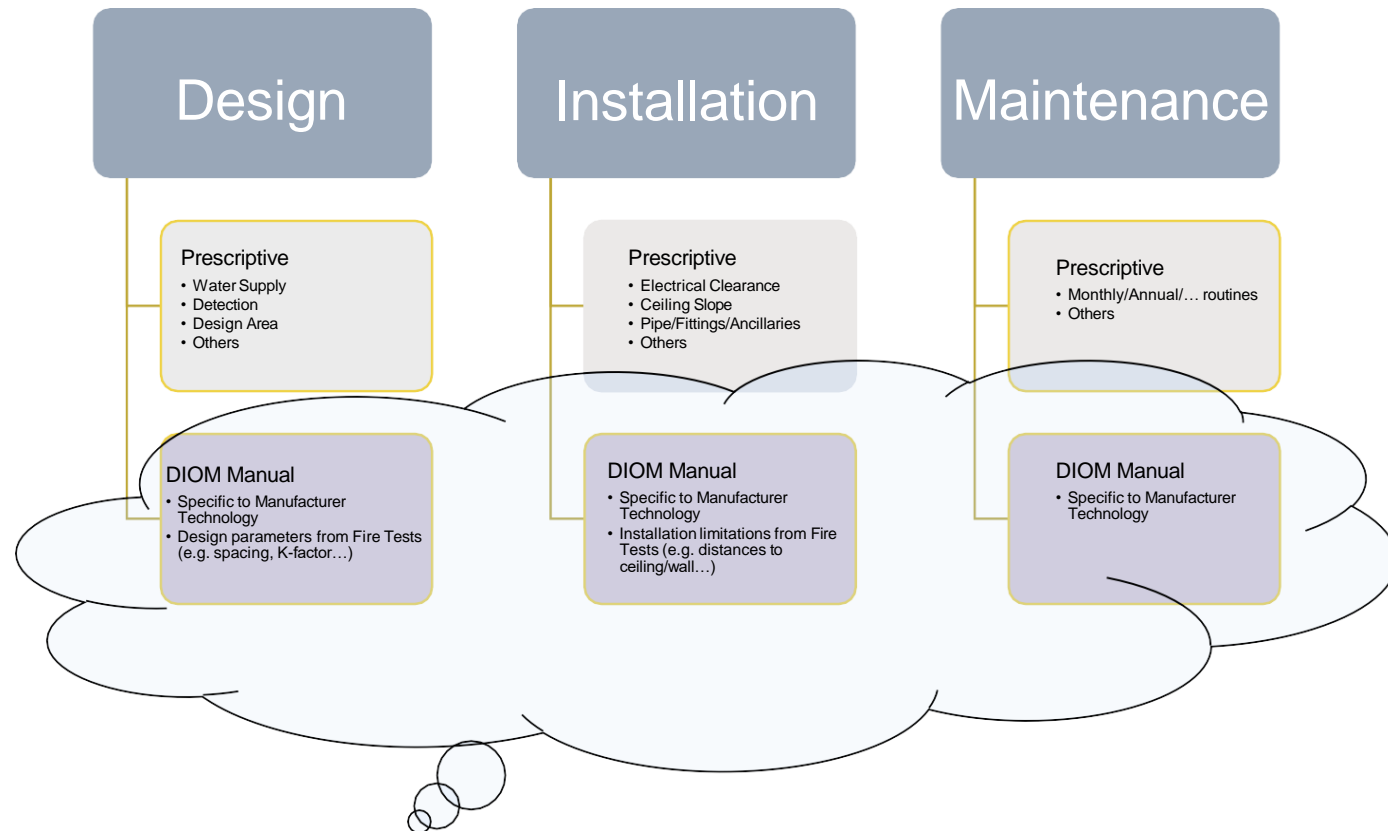
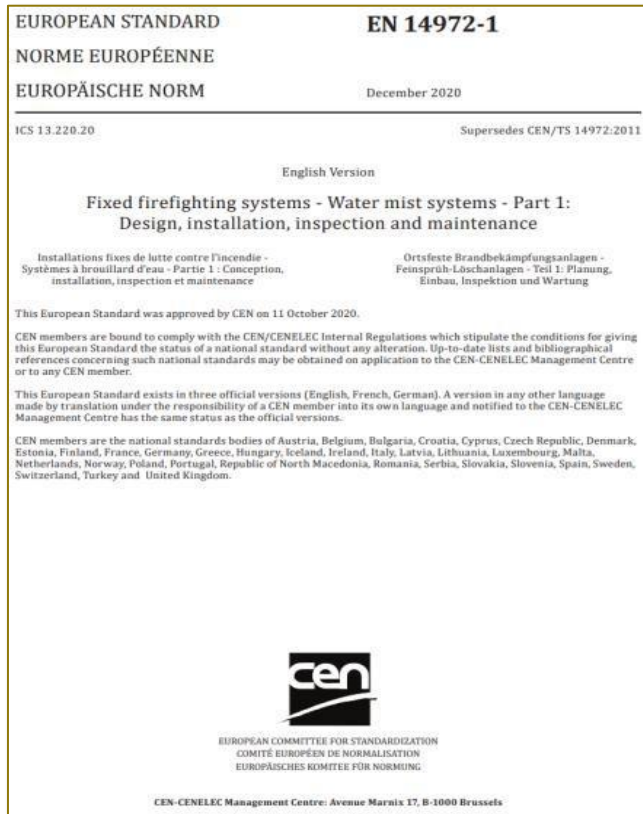
- The EN14972 part 1 standard specifies requirements and gives recommendations for the **design, installation, inspection and maintenance of all types of fixed land-based water mist systems.**
- The standard requires that Water Mist systems shall be designed for specific hazards or occupancies covered by **EN 14972 series (parts 2-17) fire test protocols** and being applied in accordance with information and limitations obtained from these fire test protocols and the manufacturers **DIOM (Design, Installation, Operation, Maintenance) manual.**
- EN14972 is the European Water Mist Standard **equivalent to NFPA 750**
- EN14972 series (part 2-17) includes established fire test protocols from all well-known approval and standardization bodies like **FM, VdS, LPCB, ISO etc.**
- Water Mist component test procedures are in preparation under the **EN 17450 series**



# Water Mist Standard – European Norm EN14972-1

Published 03-2021

→ Implemented at National Level June 30<sup>th</sup> 2021!



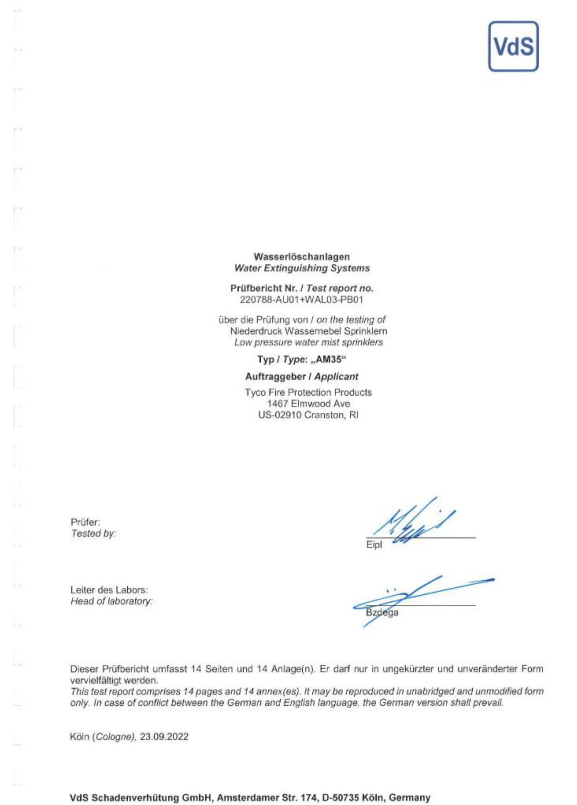
Notified Body (FM/VdS) / 3<sup>rd</sup> Party (AHJ)

# Water Mist Standard – European Norm EN14972

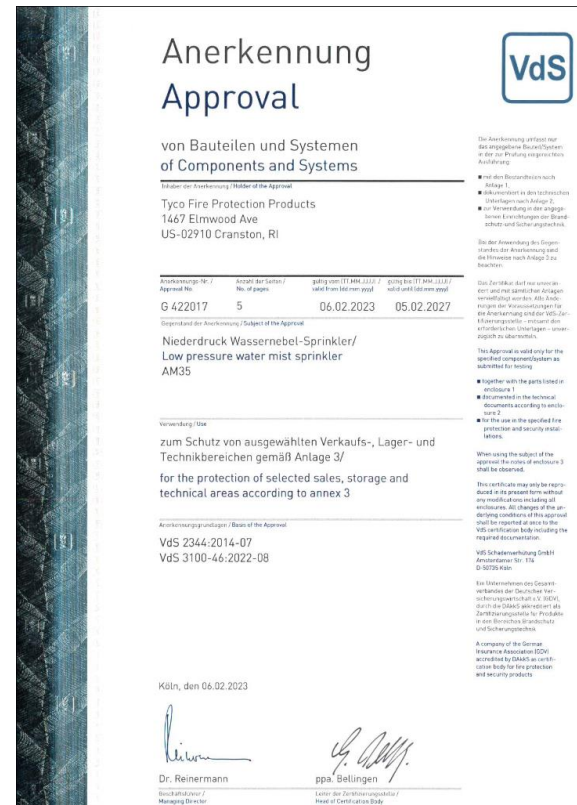


## Notified Body Type Approvals to VdS, FM, etc

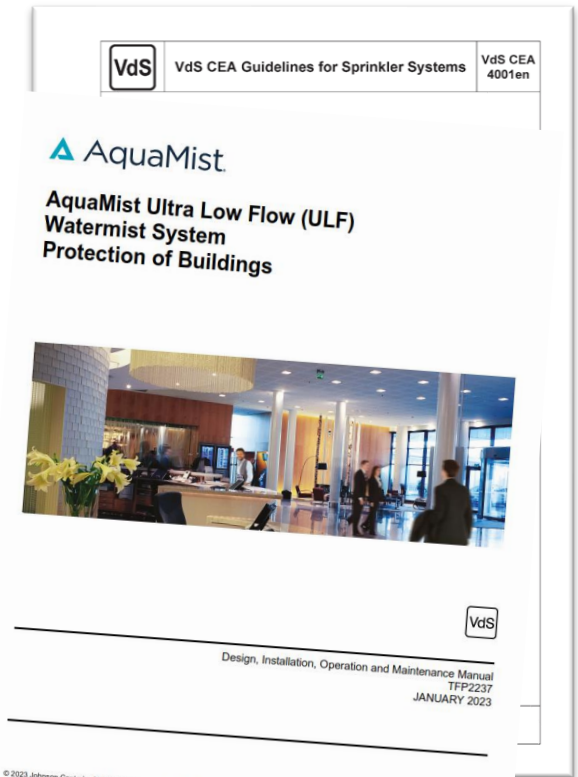
- Full Scale Fire Test
  - Approved by notified body



- Components Test
  - Approved by notified body



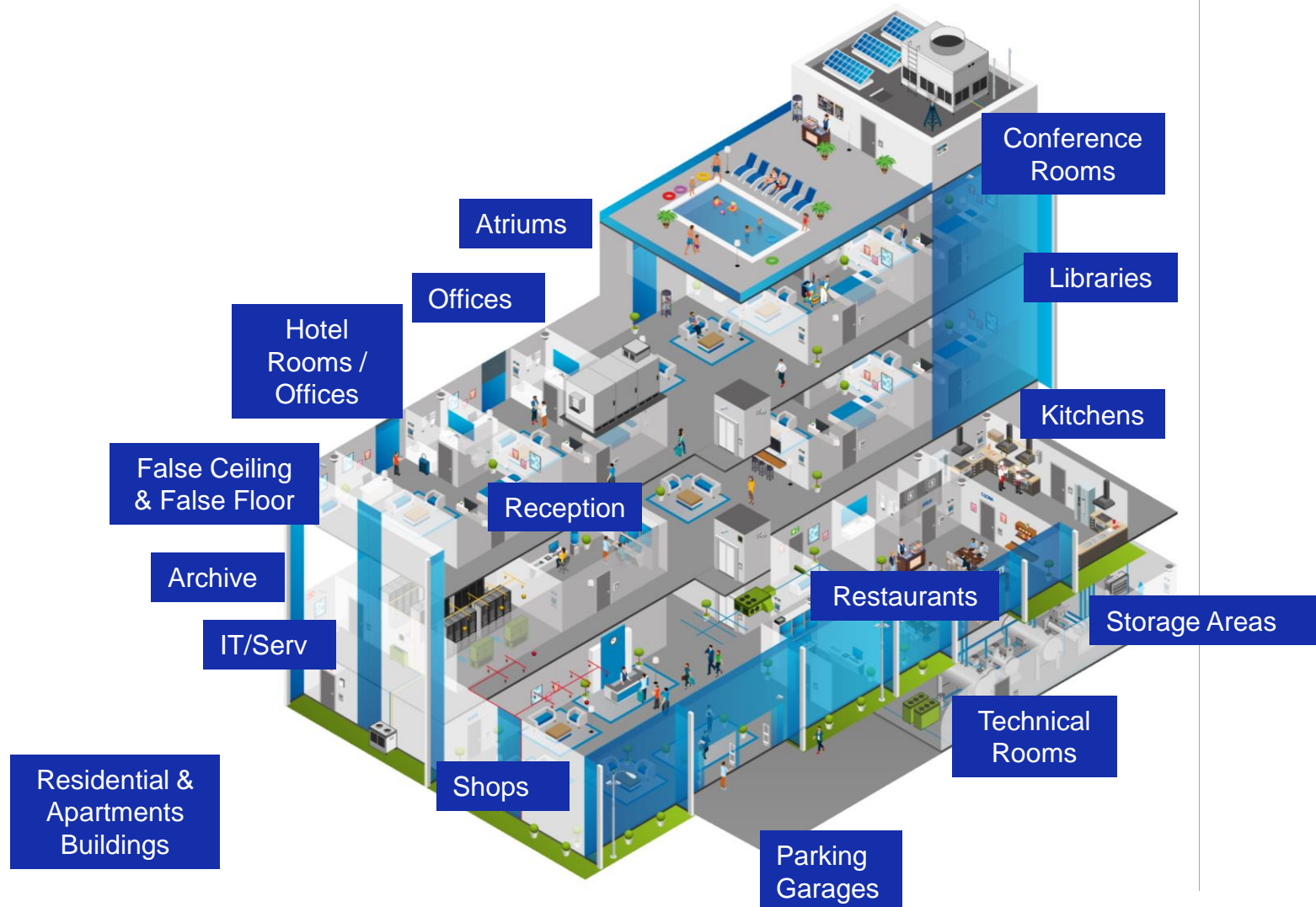
- Manufacturers DIOM
  - Approved by notified body



# Building Protection areas according to EN14972



prEN14972-2  
EN14972-3  
prEN14972-4  
prEN14972-5  
EN14972-6  
EN14972-7  
prEN14972-17





# Industrial Applications according to EN14972 Machinery Spaces & Combustion Turbines



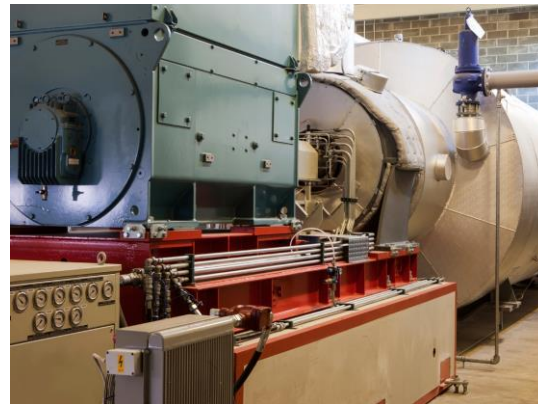
EN14972-8  
EN14972-9  
EN14972-14  
EN14972-15



**DRUPS Generator & MS Rooms**



**Transformer Rooms**



**Combustion Turbines**



**Engine Test Cells**



# Industrial Applications according to EN14972 Oil Cooking Fryers (Commercial and Industrial)



prEN14972-12  
EN14972-16



# Industrial Applications according to EN14972

## Cable Tunnels



EN14972-11



# Industrial Applications according to EN14972 Wet Benches



prEN14972-13





# Water Mist Standard – EN14972: fire test protocols parts 2-17



| Standard         | Name   | Based on |
|------------------|--|----------|
| EN 14972 part 1  | Design, Installation, inspection and Maintenance |          |
| EN 14972 part 2  | Shopping and sales areas                         | VdS      |
| EN 14972 part 3  | Office, school and hotel                         | VdS      |
| EN 14972 part 4  | Non storage occupancies                          | FM5560   |
| EN 14972 part 5  | Car garage                                       | VdS      |
| EN 14972 part 6  | False floor and ceiling                          | VdS      |
| EN 14972 part 7  | Commercial low hazard occupancies                | BS8489   |
| EN 14972 part 8  | Machinery enclosures >260m <sup>3</sup>          | FM5560   |
| EN 14972 part 9  | Machinery enclosures <260m <sup>3</sup>          | FM5560   |
| EN 14972 part 10 | Atrium   | DFL      |
| EN 14972 part 11 | Cable tunnels                                    | VdS      |
| EN 14972 part 12 | Commercial deep fat fryers                       | ISO      |
| EN 14972 part 11 | Cable tunnels                                    | VdS      |
| EN 14972 part 12 | Commercial deep fat fryers                       | ISO      |
| EN 14972 part 13 | Wet benches and similar processing equipment     | FM5560   |
| EN 14972 part 14 | Combustion turbine enclosures >260m <sup>3</sup> | FM5560   |
| EN 14972 part 15 | Combustion turbine enclosures <260m <sup>3</sup> | FM5560   |
| EN 14972 part 16 | Industrial Oil cookers                           | FM5560   |
| EN 14972 part 17 | Residential and domestic occupancies             | BS8458   |



EN 17450 part 1-X: Requirements for watermist components such as nozzles, valves, filters/strainers, pumps



# Water Mist Standard – EN14972: Published standards



| Standard    | Name   | Published  |
|-------------|--|------------|
| EN 14972-1  | Design, installation, inspection and maintenance                   | 2020-12-23 |
| EN 14972-3  | Office, school classrooms and hotel                                | 2021-08-04 |
| EN 14972-6  | False floors and false ceilings                                    | 2023-05-24 |
| EN 14972-7  | Commercial low hazard occupancies                                  | 2023-07-26 |
| EN 14972-8  | Machinery in enclosures exceeding 260 m <sup>3</sup>               | 2020-01-22 |
| EN 14972-9  | Machinery in enclosures not exceeding 260 m <sup>3</sup>           | 2020-01-22 |
| EN 14972-10 | Atrium protection with sidewall nozzles                            | 2022-04-06 |
| EN 14972-11 | Cable tunnels  | 2023-05-24 |
| EN 14972-14 | Combustion turbines in enclosures exceeding 260 m <sup>3</sup>     | 2021-09-15 |
| EN 14972-15 | Combustion turbines in enclosures not exceeding 260 m <sup>3</sup> | 2021-09-15 |
| EN 14972-16 | Industrial oil cookers   | 2019-08-28 |
| EN 17450-1  | Strainer and filter components                                     | 2021-02-24 |

# Water Mist Standard – EN14972: Work Items EN14972 & EN17450

| Work items    | Title  | Public Enquiry                    | Formal Vote  | Publication  |
|---------------|--|-----------------------------------|--------------|--------------|
| EN 14972-1/A1 | Design, installation, inspection and maintenance; Amendment A1 | Request for Public Enquiry        | -            | -            |
| EN 14972-2    | Shopping areas   | Request for Public Enquiry        | -            | -            |
| EN 14972-4    | Non-storage occupancies  | 2023-02-09                        | 2023-11-02   | 2024-02-22   |
| EN 14972-5    | Car garages  | 2023-05-18                        | *            | *            |
| EN 14972-12   | Commercial deep fat cooking fryers                             | 2023-02-09                        | 2024-05-27   | 2024-09-16   |
| EN 14972-13   | Wet benches and similar processing equipment                   | -                                 | -            | -            |
| EN 14972-17   | Residential occupancies  | 2022-07-14                        | 2024-04-05   | 2024-07-26   |
| EN 17450-2    | Nozzles  | 2023-04-20                        | 2024-12-25** | 2025-04-16** |
| EN 17450-3    | Check valves   | Request for Public Enquiry        | -            | -            |
| EN 17450-4    | Control deluge valves and actuators                            | WG task will start in February 24 | -            | -            |
| EN 17450-5    | Pressure switches  | -                                 | -            | -            |

\* 2025 via CEN-Projex. Realistic estimate FV: 2024-05-26, PUB: 2024-09-15

\*\* Date via CEN-Projex. Realistic estimate FV: 2024-02, PUB 2024-06



# OH3 Testing: An Insight

VdS 3883 - Fire Test Protocol for Water Mist Systems

VdS 3883 – Part 5 (prEN14972 part 2)

# VdS 3883 - Fire Test Protocol for Water Mist Systems



- Part 1 **Protection of office spaces and accommodation areas**
- Part 2 **Protection of office spaces and accommodation areas with water mist sidewall sprinklers**
- Part 3 **Protection of false ceilings and false floor of OH Group 1**
- Part 4 **Protection of car garages**
- Part 5 **Protection of selected sales and storage areas and mechanical floors (technical rooms)**
- Part 6 Protection of Paint Booths
- Part 7 Protection of Areas with Combustible Liquids
- Part 8 Protection of Cable Ducts

# OH3 fire testing to VdS 3883 Part 5:2020 (latest new protocol)



- Ceiling mounted water mist sprinklers to be used in *unlimited volumes/areas*
- Ceilings with heights of 2.6m and above to max tested ceiling heights
- Shopping/Sales Areas, Libraries, Archives, Technical Rooms, Storage areas and comparable risks
- **Reference testing** with a prescribed conventional sprinkler system to indicate baseline testing



Shopping/Sales Areas



Libraries & Archives



Technical Rooms



Storage Areas



# OH3 fire testing to VdS 3883 Part 5:2020 (latest new protocol)



## Pass Fail Criteria:

- Total **averaged damage** of water mist test is less than or equal to total **averaged damage** of sprinkler test series
- Total **averaged ceiling** gas temperatures of water mist test is less than or equal to total **averaged ceiling** gas temperatures of sprinkler test series
- Max allowed total no. activated and allowed no. activated in outer ring as specified

Shopping/Sales Areas

Libraries & Archives

Technical Rooms

Storage Areas

- EN14972 part 2 (in future based on VdS)
- Typical known as OH3 applications

| VdS  | VdS Guidelines for Water Mist Systems | VdS 3883-5en |
|--|---------------------------------------|--------------|
| <p><b>Fire Test Protocol for Water Mist Systems</b></p> <p><b>Part 5: Protection of selected sales and storage areas and mechanical floors</b></p> |                                       |              |

**Two test scenarios:**  
Rack storage & block storage

## Rack Storage

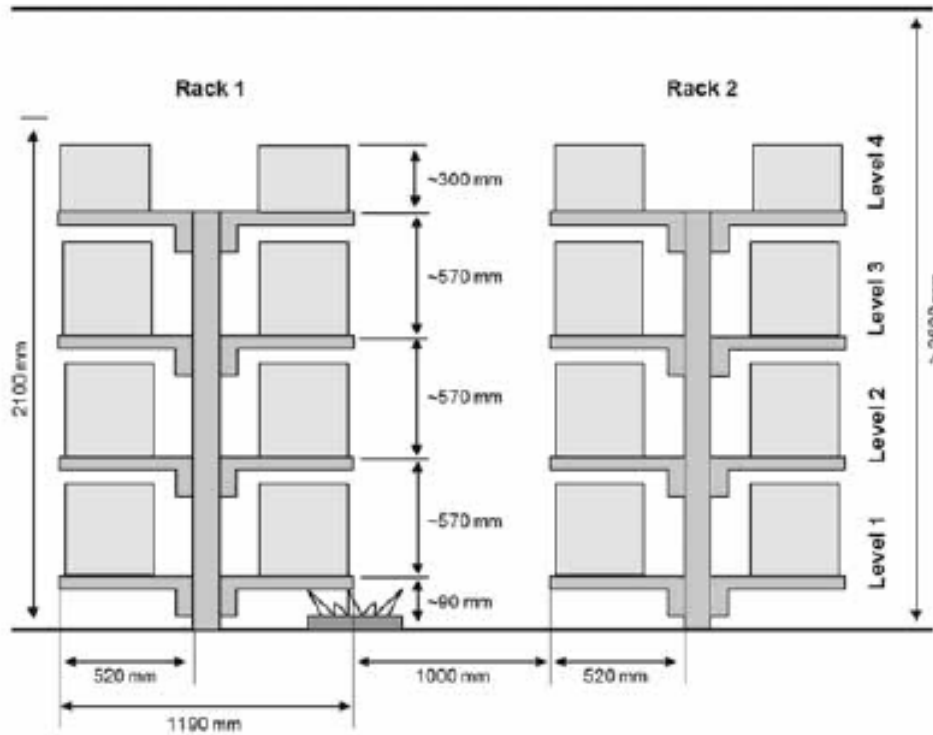


Figure 4-1: Layout of fire loads and position of ignition source for rack storage (side view)

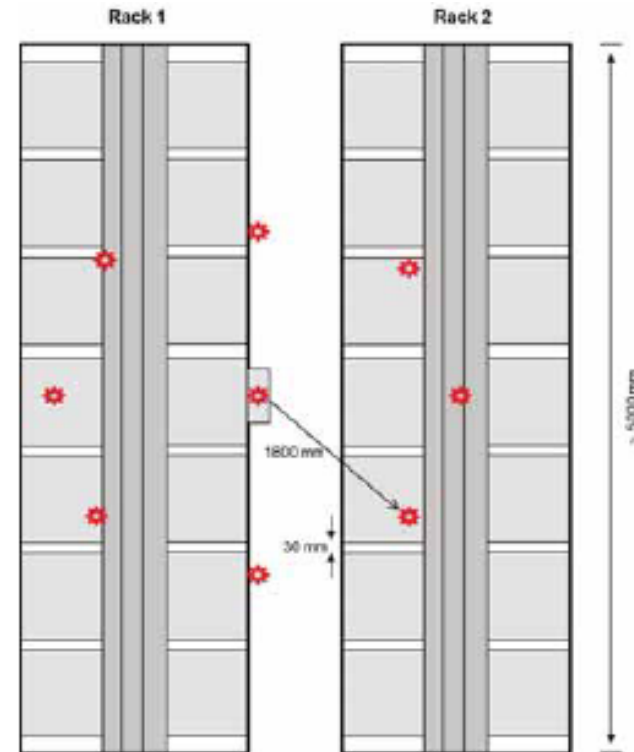


Figure 4-2: Layout of fire loads and position of ignition source for rack storage (top view)

## Block Storage

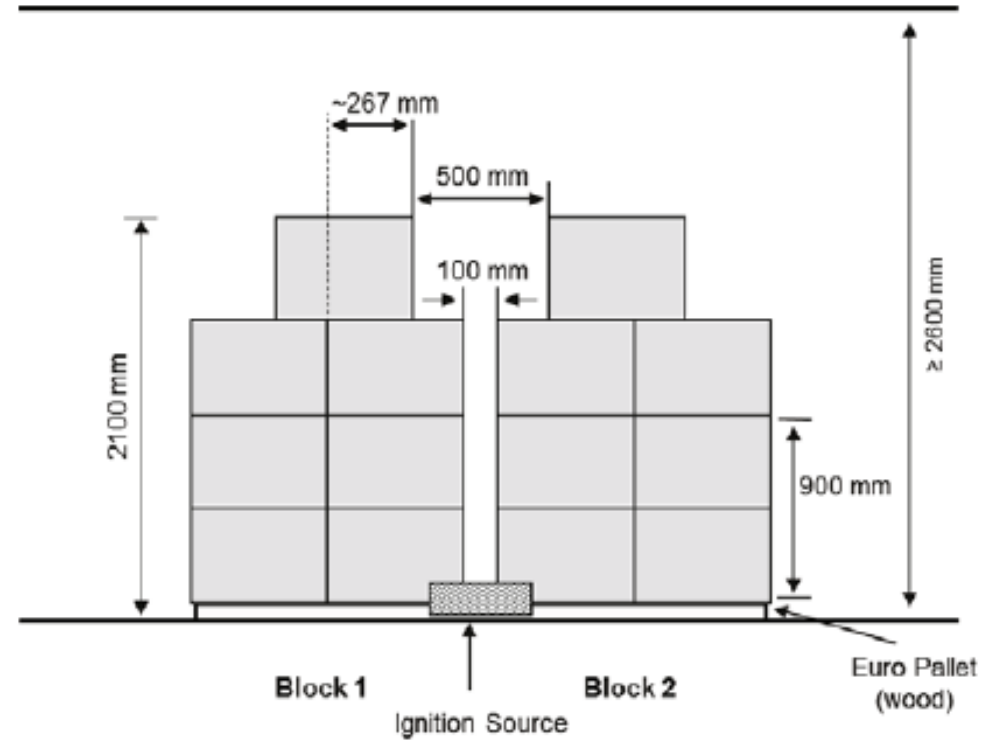
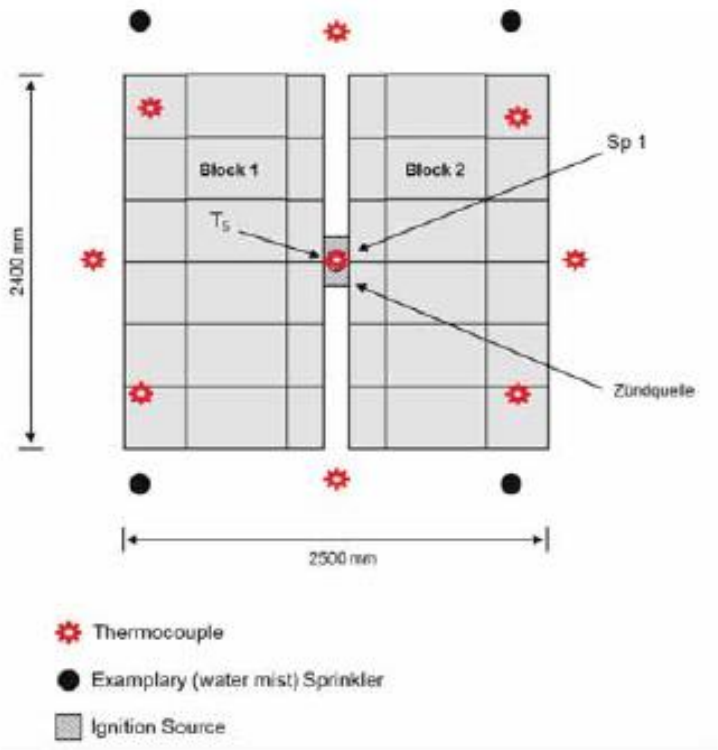


Figure 4-3: Layout of fire loads and position of ignition source for block storage (top view)

Figure 4-4: Layout of fire loads and position of ignition source for block storage (side view)



## Fire loads: cardboard boxes and plastic cups

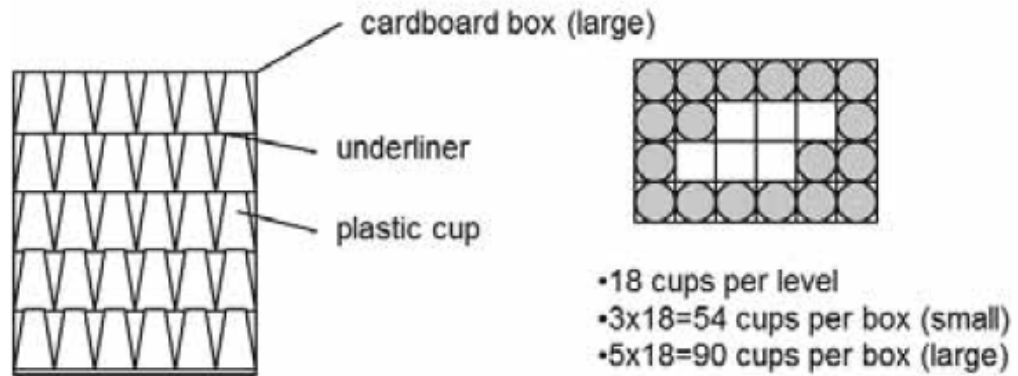


Figure 4-5: Packaging scheme of cups in the cardboard box



Figure 4-6: Prepared cardboard box

## Four test scenarios for sprinkler baseline & water mist test series

### Rack Storage

- Ignition under 1 sprinkler/nozzle (U1 Rack)
- Ignition between 4 sprinklers/nozzles (B4 Rack)



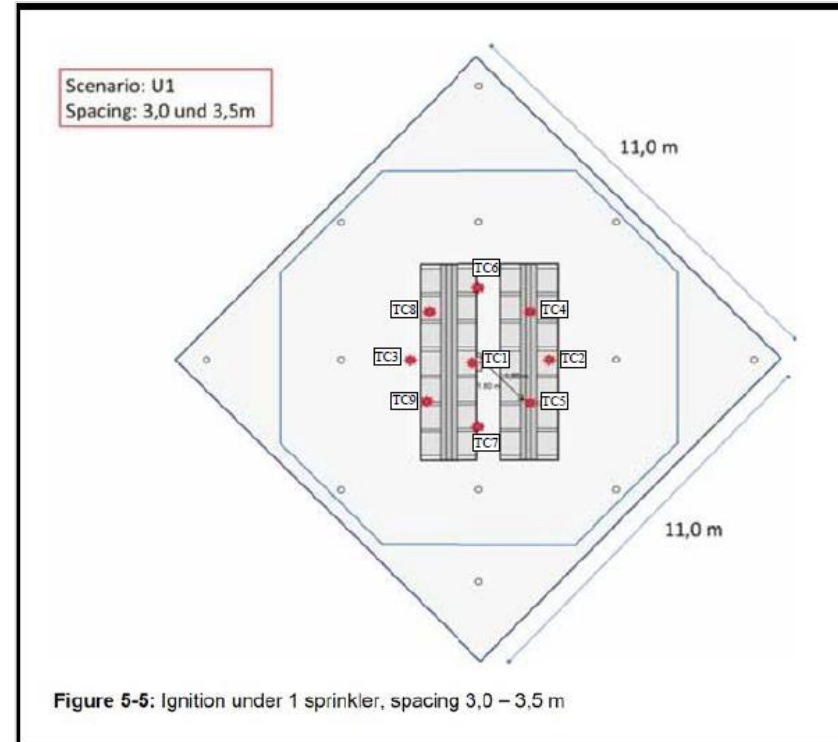
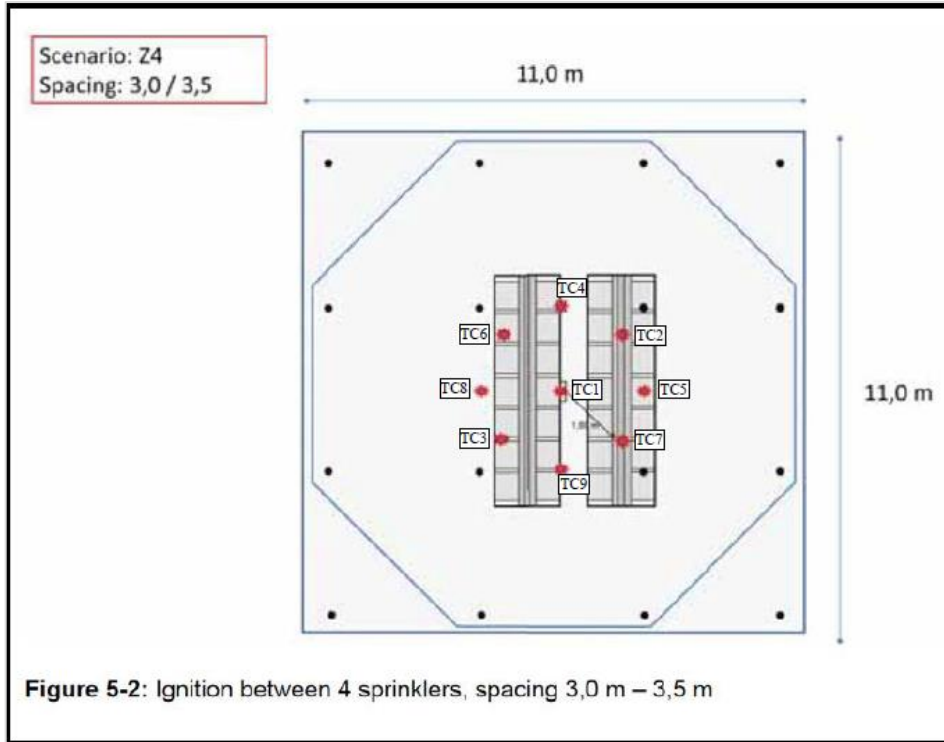
### Block Storage

- Ignition under 1 sprinkler/nozzle (U1 Block)
- Ignition between 4 sprinklers/nozzles (B4 Block)



# OH3 fire testing to VdS 3883 Part 5:2020 (latest new protocol)

- Water mist test series (for block storage configuration same sprinkler grids are used)
- Max activated nozzles in outer ring (9m<sup>2</sup> → 12 → 3)
- *Unlimited volumes/areas*



# OH3 fire testing to VdS 3883 Part 5:2020 (latest new protocol)

## WM U1 Block





# OH3 fire testing to VdS 3883 Part 5:2020 (latest new protocol)



## WM B4 Block



# OH3 fire testing to VdS 3883 Part 5:2020 (latest new protocol)



## WM U1 Rack



# OH3 fire testing to VdS 3883 Part 5:2020 (latest new protocol)



## WM B4 Rack



# AquaMist ULF

A complete system for water mist building protection from Johnson Controls

- Low Pressure Water Mist
- Pump Based
- Control / Automatic
- System Supply



**Pumps**



**Nozzles**



**Valves**



**G-Press**



# AquaMist ULF Nozzles for Building Protection

## Full range of approved solutions



AM4



AM28



AM30 (Up)



AM34 (SW)



AM35



AM29



AM27



**MS**

12,8 bar

12,5 lpm

**OH1**

7 bar

31 lpm

**OH1/HC2**

7 bar

24 lpm

**OH1**

7 bar

71 lpm

**OH2/OH3**

7 bar

41 lpm

**HC1/HC2**

7.6 bar

24 lpm

**HC1**

9,7 bar

36,4 lpm

# Summary

---

- In general, it can be concluded that for the protection of Buildings Watermist systems, having **executed the fire test protocols** of the EN14972 parts 2-17 or equivalent test protocols like **VdS 3883, FM5560**, DFL etc, planned in accordance with 14972-1, manufacturers **DIOM** and having **validated/prooved components** in their systems (laboratory component test passed) Water Mist systems are a valuable and economic alternative to conventional sprinkler systems.
- AquaMist Water Mist systems have proven enhanced cooling capabilities compared to conventional sprinkler systems (40-50% lower ceiling temperatures).
- AquaMist Water Mist systems have proven providing the same safety and performance level by using up to 60% less water compared to a conventional sprinkler system to protect your buildings.

# Thank You.

Hans Schipper  
Technical Product Support & Training  
Water Mist Systems

[hans.schipper@jci.com](mailto:hans.schipper@jci.com)