



▲ AquaMist™

Water Mist Systems

2025

Dirk Laibach

The power behind **your mission**



Agenda

- Introduction to Water Mist
- Types of Water Mist Systems
- Water Mist Standards
- Water Mist Applications
- Key System Components
- Comparison with other Technologies
- How to go along with a new project?
- Technical Support & Training



Dirk Laibach

Senior Global Product Manager
Water Mist & Special Hazard Systems

✉ dirk.laibach@jci.com

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Introduction to Water Mist

Water Mist Fire Science

EN14972-1

NFP750



Definition

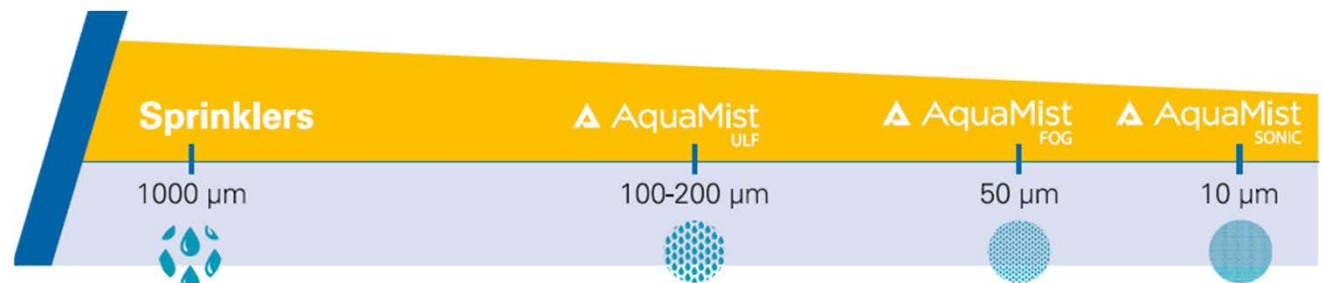
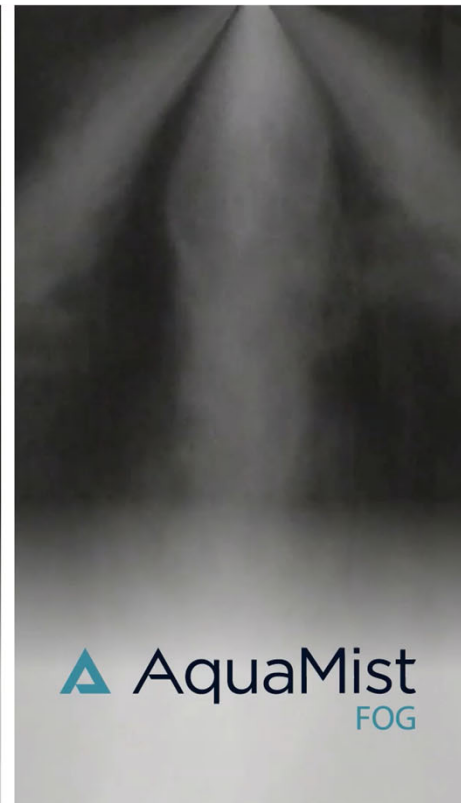


EN 14972-1

Water spray for which the DV0.90 is less than 1mm, measured in a plane 1m from the nozzle, at its minimum operating pressure.

NFPA 750

Water spray for which the Dv0.99, for the flow-weighted cumulative volumetric distribution of water droplets is less than 1000 μm within the nozzle operating pressure range.



The Importance of Droplet Size

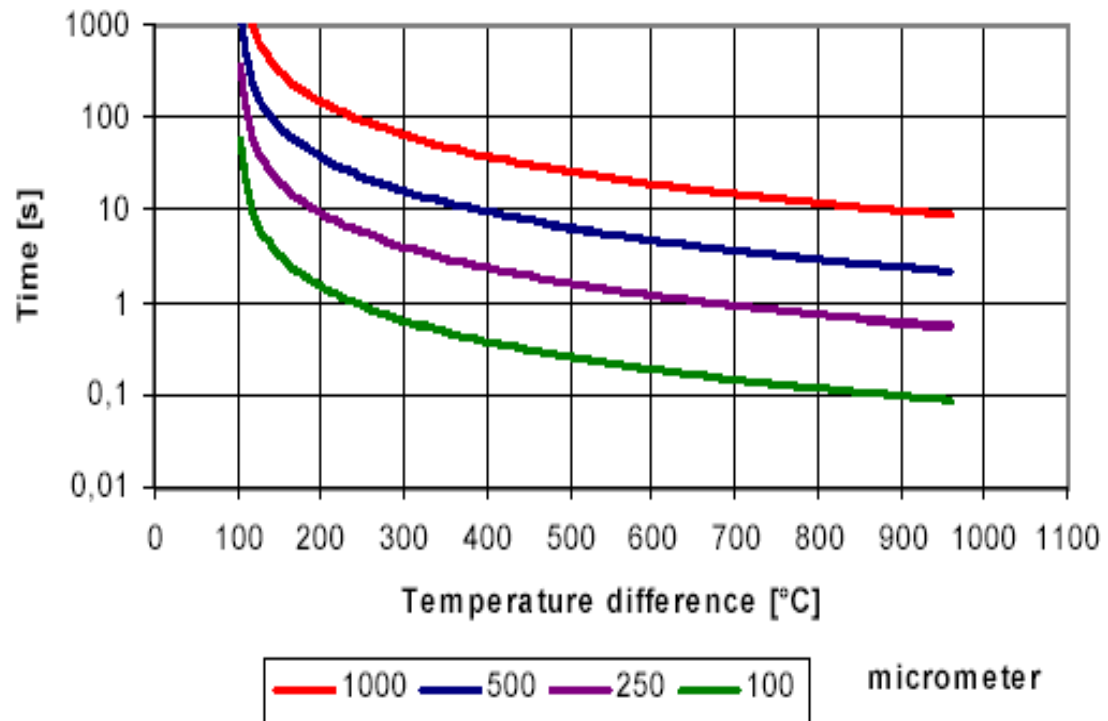
- Water Mist produces a larger surface area than conventional Sprinkler systems
- A larger surface area is more effective at absorbing heat

Diameter	No. Droplets	Surface Area	Example
10 mm	1	314.16 mm ²	ESFR Sprinkler
1 mm	1,000	3,140 mm ²	Residential Sprinkler
0.1 mm	1,000,000	31,000 mm ²	Water Mist Nozzle



The Importance of Droplet Size

Time to evaporation



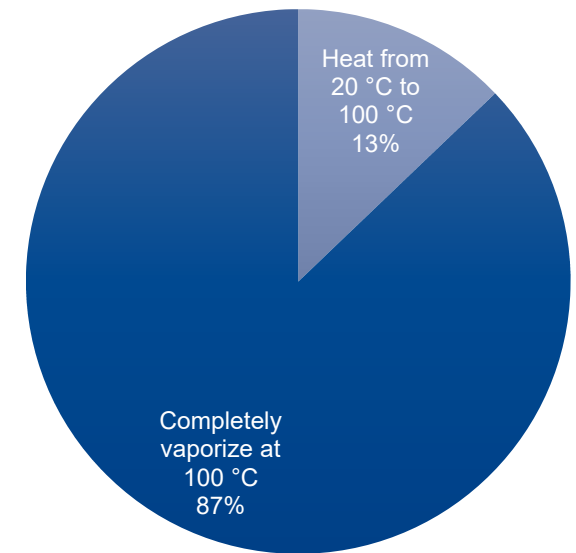
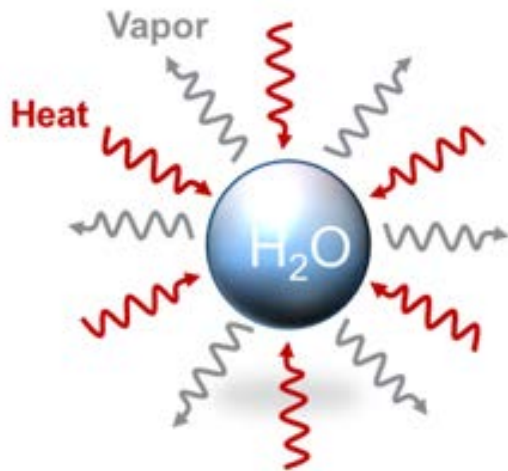
Thermal Properties of Water

Energy Absorbtion

- 335 kJ to heat 1 litre of water from 20°C - 100°C
- 2257 kJ to vapourize water to steam

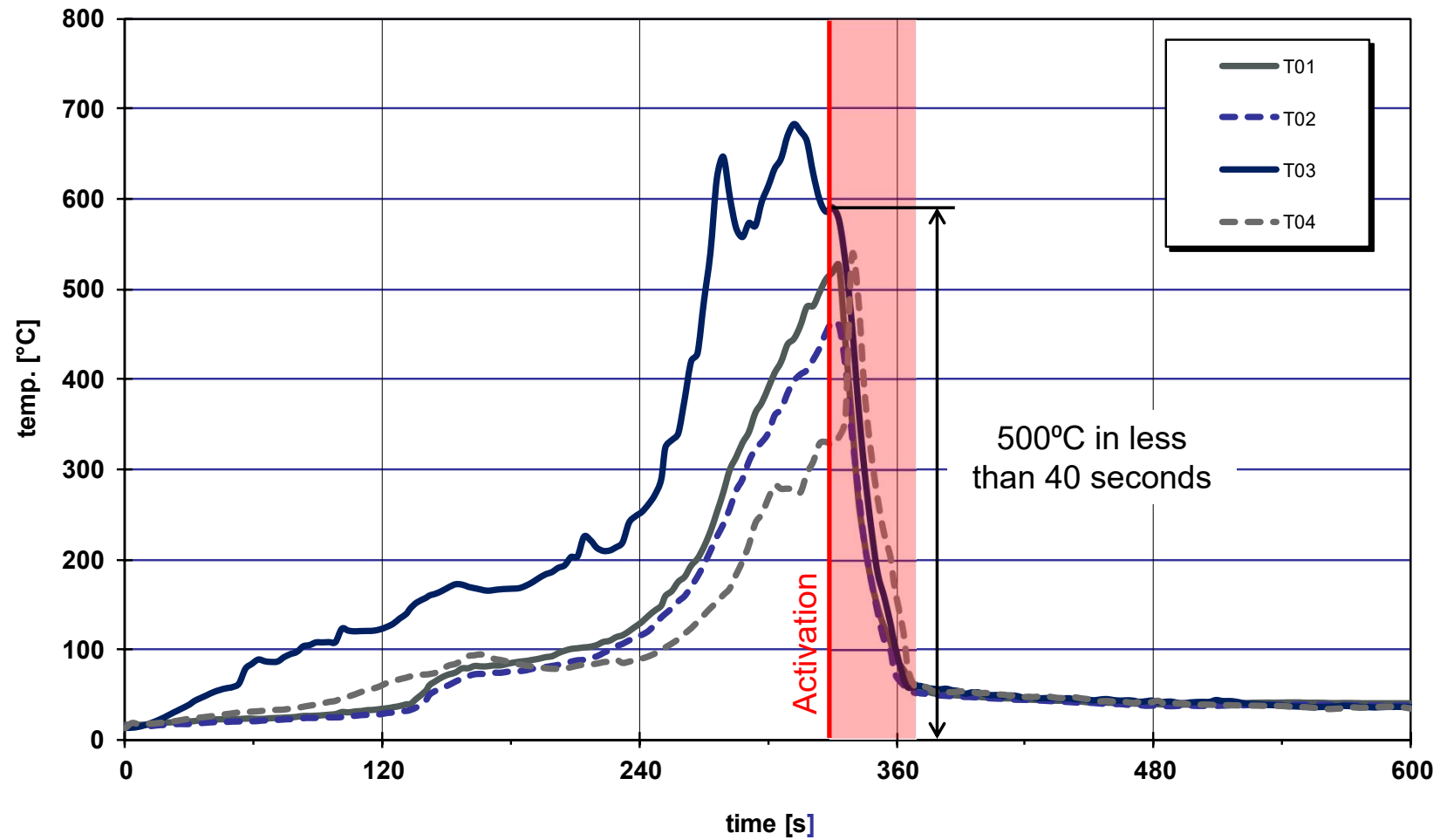
Volumetric Expansion

- Vaporization displaces air equivalent to 1650 times its original volume.
- “Inerting-effect” around the fire

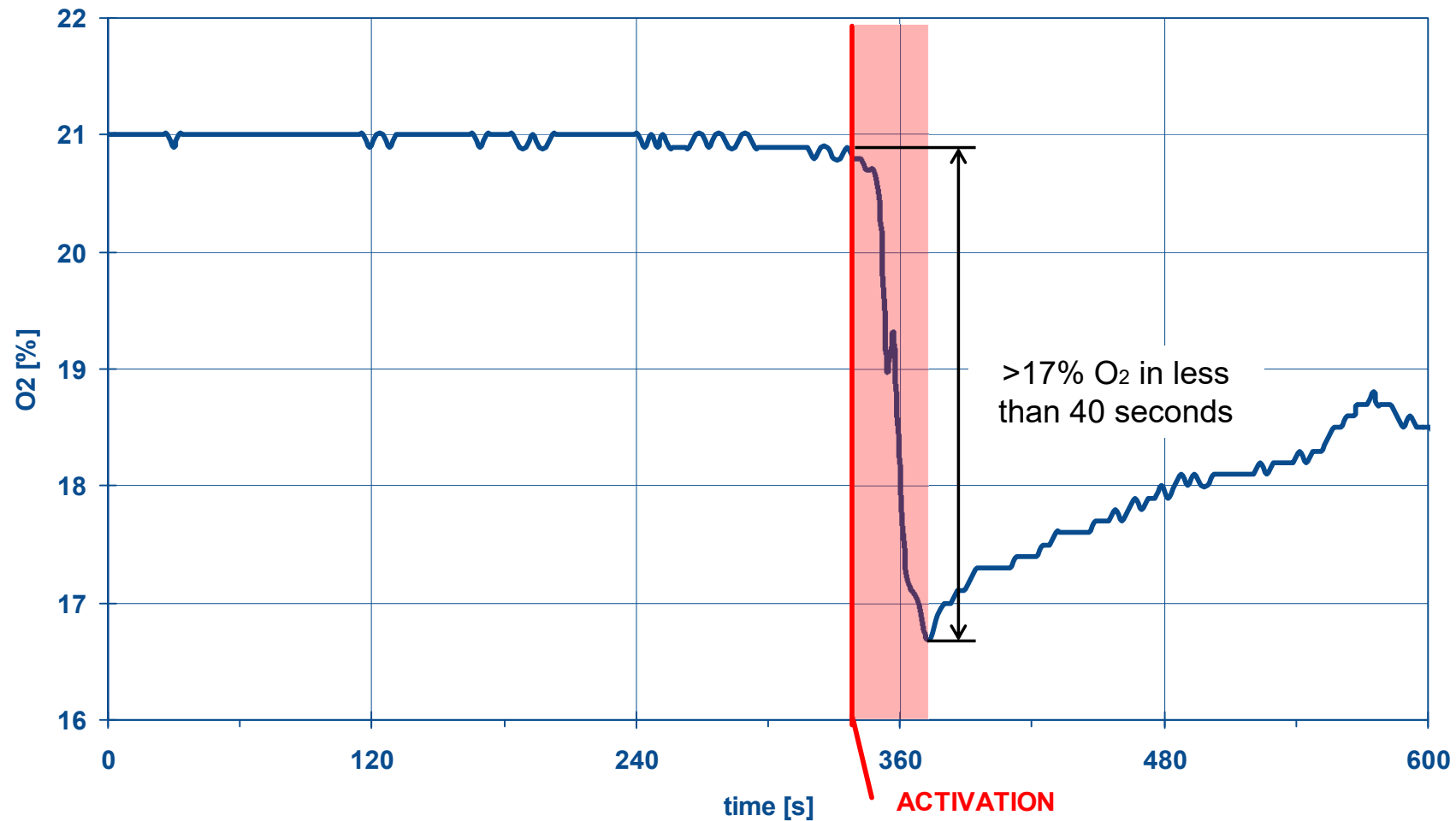


- Heat from 20 °C to 100 °C
- Completely vaporize at 100 °C

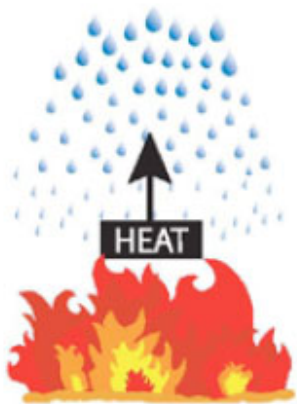
Water Mist Principles - Cooling Effect



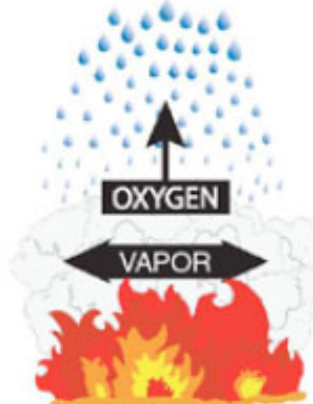
Water Mist Principles – Oxygen Reduction



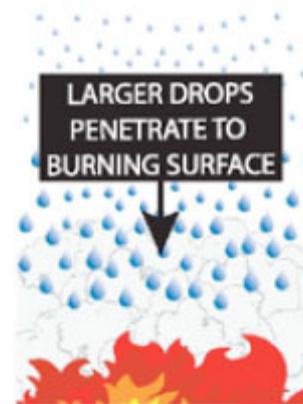
Fire Suppression Mechanics



- Evaporation (Heat extraction)
- Small Droplet Size & Large Surface Area
- Increased Cooling Effect



- Water Converts to Vapour
- Expanding by a factor of 1650
- Oxygen is displaced
- Higher Temperature Fire = Faster Vaporisation



- Mixture of Droplet Sizes Enhance Performance
- Small Droplets Extract Heat
- Larger Droplets Help to Penetrate Fire Plume



- Small droplets remain suspended in air
- Cooling the gasses and other fuel.
- Blocking Radiant Heat to Adjacent Combustibles
- Pre-Wetting

Types of Water Mist Systems



Types of Water Mist Systems (NFPA 750)



High Pressure System

- A water mist system where the distribution system piping is exposed to pressures of 34.5bar or greater (500psi).



Intermediate Pressure System

- A water mist system where the distribution system piping is exposed to pressures of greater than 12.1 bar (175psi) but less than 34.5 bar (500psi).



Low Pressure System

- A water mist system where the distribution system piping is exposed to pressures of 12.1bar or less (175psi).

Types of Water Mist Systems

- NFPA 750 Introduced Pressure Definitions;
 - High Pressure Systems
 - Intermediate Pressure Systems
 - Low Pressure Systems
- EN 14972-1 Has No Pressure Definitions
- BS 8489-1 Has No Pressure Definitions

Water Mist is Water Mist

Not Matter How it is Generated!

Pressure does not define effectiveness and design criteria – fire tests and resulting approvals do!



Does Pressure Matter?



Aquamist FOG - High Pressure (100 Bar)

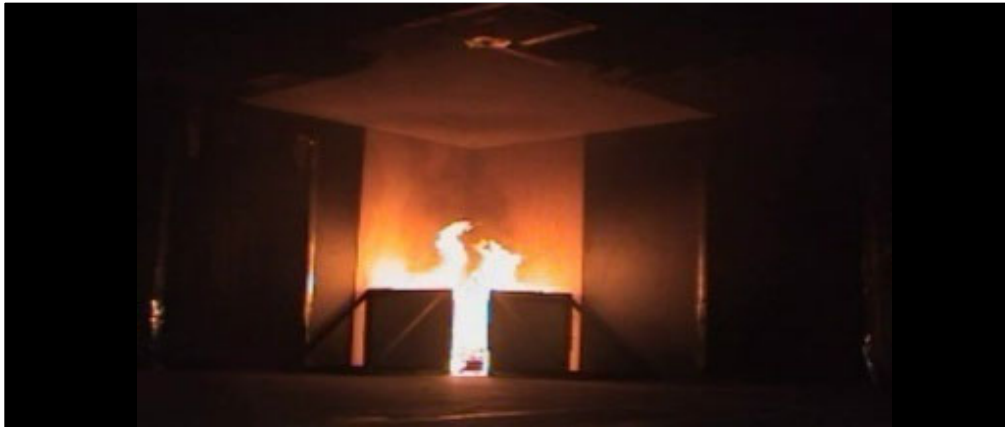
- IMO 913 Local Application (6 MW Spray Fire)
- ~8L/min
- 3m x 3m Nozzle Spacing
- 0.88mm/m²
- 12% More Efficient than Low-Pressure



Aquamist ULF - Low Pressure (12 Bar)

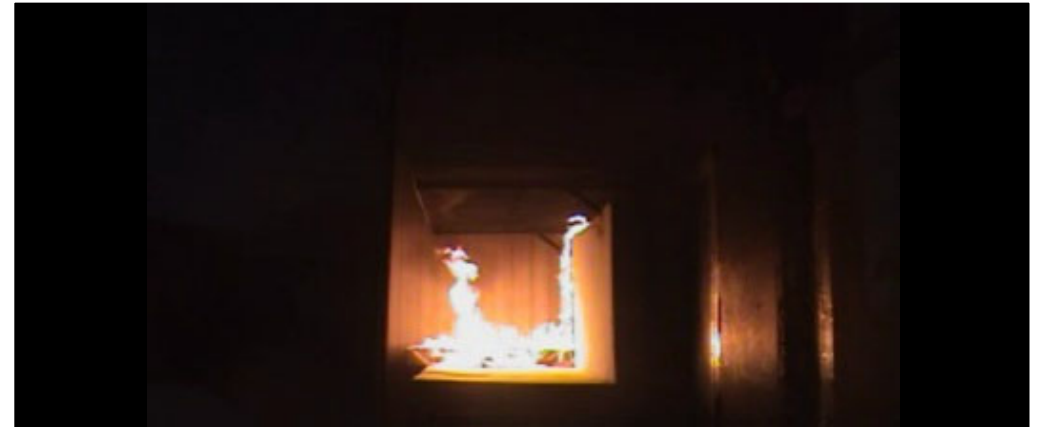
- IMO 913 Local Application (6 MW Spray Fire)
- ~16L/min
- 4m x 4m Nozzle Spacing
- 1mm/m²

Does Pressure Matter?



Aquamist FOG - High Pressure (70 Bar)

- VdS Office Space Test Protocol
- ~40L/min
- 4.25m x 4.25m Nozzle Spacing
- 2.2mm/m²



Aquamist ULF - Low Pressure (7.6 Bar)

- FM5560 Fire Test Protocol (HC-1 Applications)
- ~23.5L/min
- 3.7m x 3.7m Nozzle Spacing
- 1.7mm/m²
- 20% More Efficient than High-Pressure

Comparison with Conventional Sprinklers (OH-1)



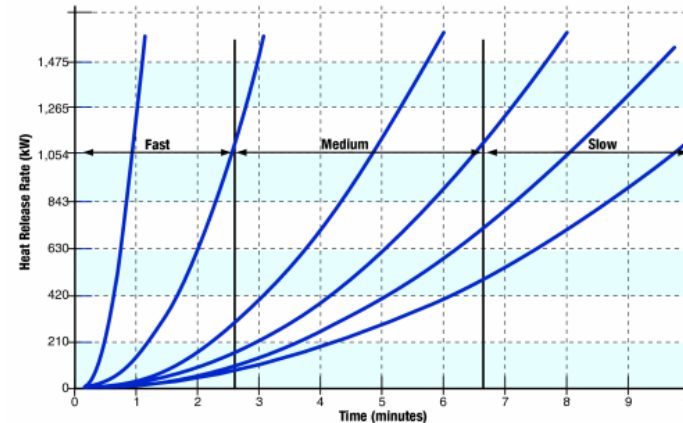
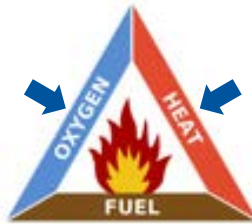
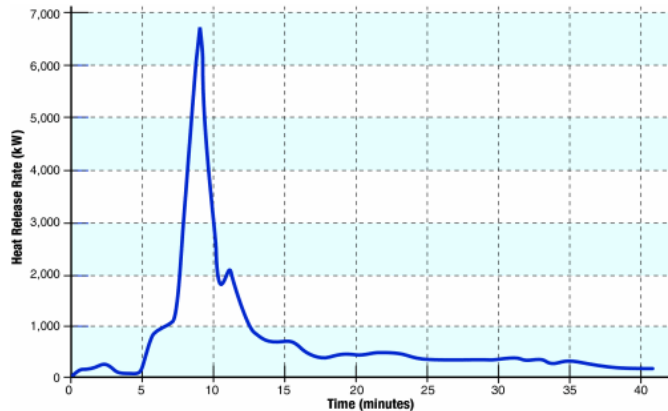
Building Protection
Ordinary Hazard 1 (OH-1)
AquaMist ULF AM29 Nozzle
23.5 l/min



Building Protection
Ordinary Hazard 1 (OH-1)
Standard Coverage Sprinkler
60.0 l/min



Types of Water Mist Systems - Objective



Extinguishing

- Flammable Liquid Fires (Class B / Class F)
- High Heat Release Rates
- Heat Absorption & Oxygen Reduction, Cooling
- Radiant Heat Blocking
- Alternative to conventional sprinklers and gas suppression

Control

- Ordinary combustibles (Class A)
- Low Heat Release Rates
- Heat Absorption, Cooling
- Radiant Heat Blocking & Pre-Wetting Combustibles
- Alternative to traditional sprinklers

Types of Water Mist Systems - Operation



Deluge

- Open Nozzles
- Activated by Fire Detection System
- All Nozzles Discharge Simultaneously
- Total Compartment (Total Flooding) Systems
- Local Application Systems



Automatic

- “Closed” Nozzles (Wet System)
- Activated by Integrated Temperature Bulb
- Only Nozzles Affected by Fire Will Operate
- Building Protection Systems
- Hydraulically Most Remote / Most Favourable Design Area

Water Mist System Standards



Watermist Design Standards and Fire Test Protocols

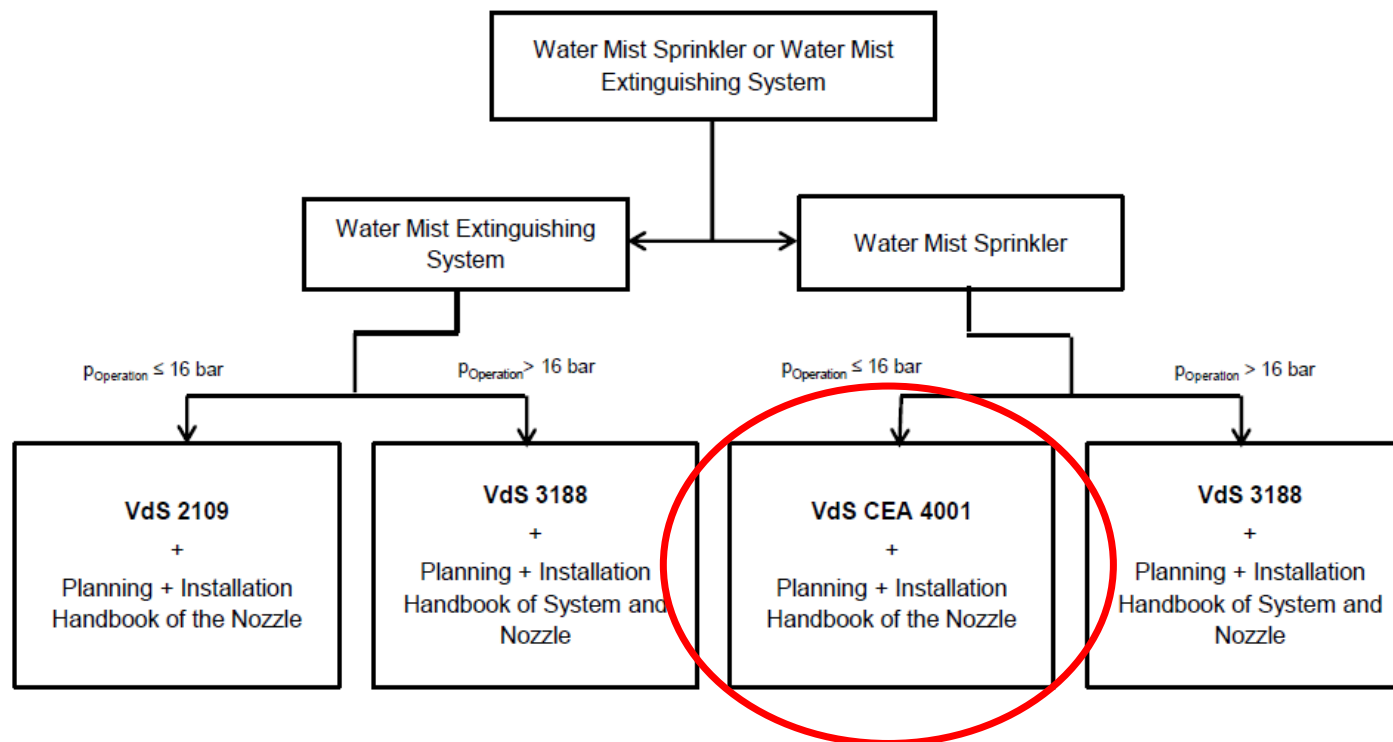
CEN	VdS	NFPA	FM
EN 14972-1 - Fixed firefighting systems Watermist systems Design and installation - Installation and maintenance criteria - Duration - Design area - No nozzle design criteria!	VdS 3188 - Water Mist Sprinkler Systems and Water Mist Extinguishing Systems (High Pressure Systems) - Planning and Installation - Installation and maintenance criteria - Duration - Design area - No nozzle design criteria!	NFPA 750 - Standard on Water Mist Fire Protection Systems - Installation and maintenance criteria - Duration - Design area - No nozzle design criteria!	FM 4-2 - Water Mist Systems - Installation and maintenance criteria - Duration - Design area - No nozzle design criteria!
EN 14972-2...17 (FM, VdS, LPCB, DFL, ISO) - Fire suppression performance criteria - Component approval	VdS 3883-1...8 Reference Tested Against Conventional Sprinklers - Fire suppression performance criteria - Component approval	FM 5560 Appendix A...P UL2167 VdS 3883-1...8 EN 14972-2...17 - Fire suppression performance criteria - Component approval	FM 5560 Appendix A...P - Fire suppression performance criteria - Component approval

High pressure = System approval
Low pressure = Component approval

VdS Design Standards for Water Mist



Guidelines for Water Mist at VdS



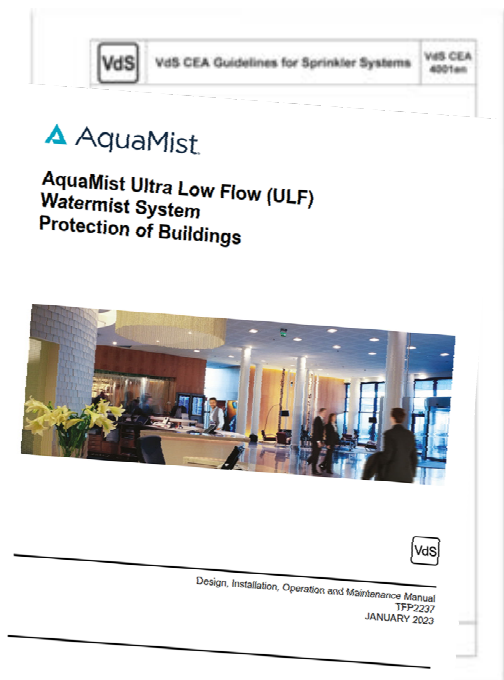
Water Mist Systems Approval Process

3rd party type approvals to VdS, FM, etc

- Full Scale Fire Test
 - Approved by third party
- Components Test
 - Approved by third party



- Manufacturers DIOM
 - Design standard



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

EN 14972 consists of the following parts:	Section name	Based on	Status October 2025
EN 14972 part 1 + A1	Design, Installation, inspection and Maintenance		published
EN 14972 part 2	Shopping and sales areas	VdS	Formal Vote
EN 14972 part 3	Office, school and hotel	VdS	published
EN 14972 part 4	Non storage occupancies	FM5560	published
EN 14972 part 5	Car garage	VdS	published
EN 14972 part 6	False floor and ceiling	VdS	published
EN 14972 part 7	Commercial low hazard occupancies	BS8489	published
EN 14972 part 8	Machinery enclosures>260m ³	FM5560	published
EN 14972 part 9	Machinery enclosures<260m ³	FM5560	published
EN 14972 part 10	Atrium	DFL	published
EN 14972 part 11	Cable tunnels	VdS	published
EN 14972 part 12	Commercial deep fat fryers	ISO	published
EN 14972 part 13	Wet benches and similar processing equipment	FM5560	Formal Vote
EN 14972 part 14	Combustion turbine enclosures>260m ³	FM5560	published
EN 14972 part 15	Combustion turbine enclosures<260m ³	FM5560	published
EN 14972 part 16	Industrial Oil cookers	FM5560	published
EN 14972 part 17	Residential and domestic occupancies	BS8458	published



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



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 (<i>note: incl. Residential and Domestic</i>)	VdS
EN 14972 part 4	Non storage occupancies (<i>note: incl. Residential and Domestic</i>)	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 ³	FM5560
EN 14972 part 9	Machinery enclosures <260m ³	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 ³	FM5560
EN 14972 part 15	Combustion turbine enclosures <260m ³	FM5560
EN 14972 part 16	Industrial Oil cookers	FM5560
EN 14972 part 17	Residential and domestic occupancies	BS8458



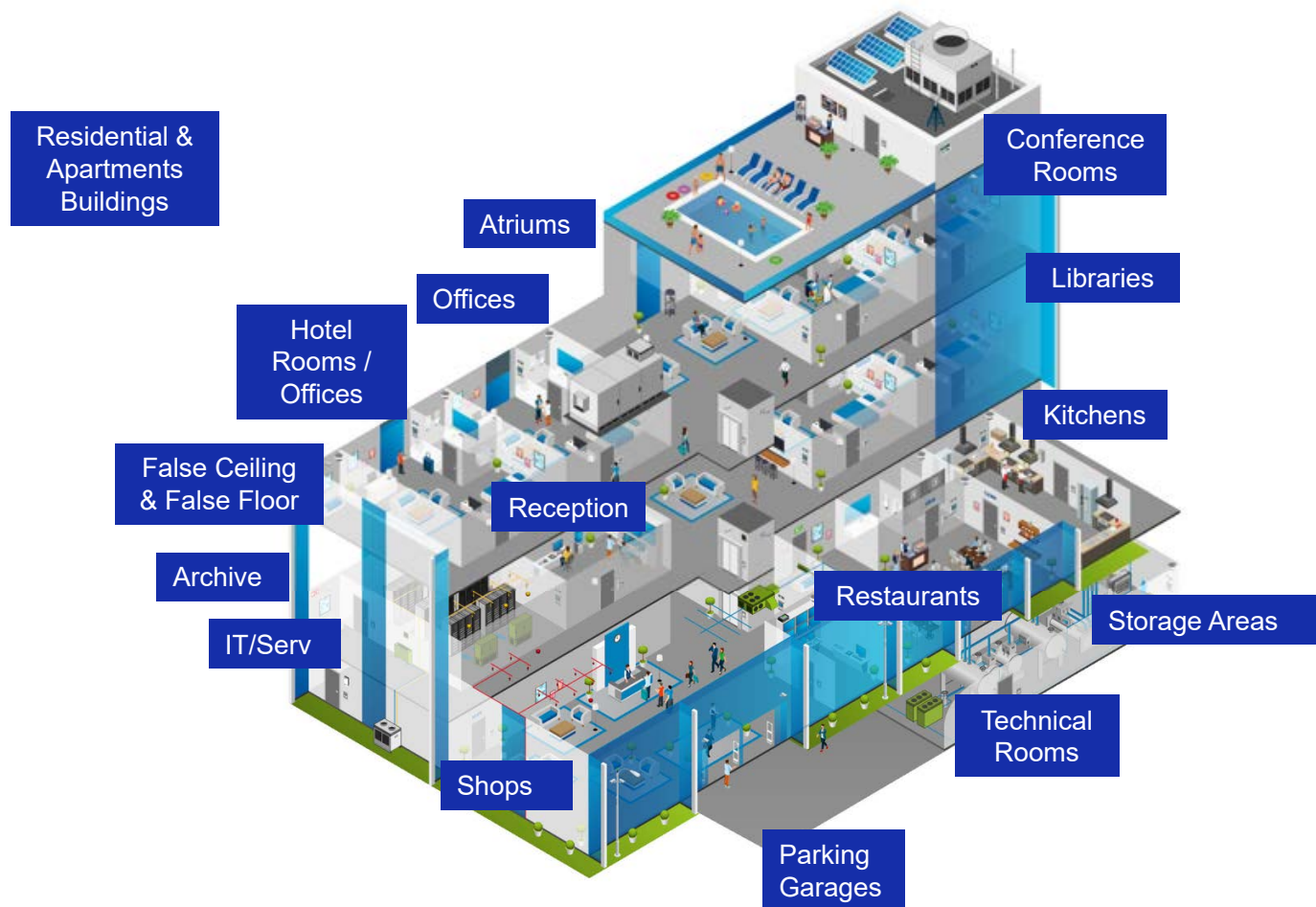
EN 17450 part 1-X: Requirements for watermist components such as nozzles, valves, filters/strainers, pumps



Building Protection areas according to EN14972



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

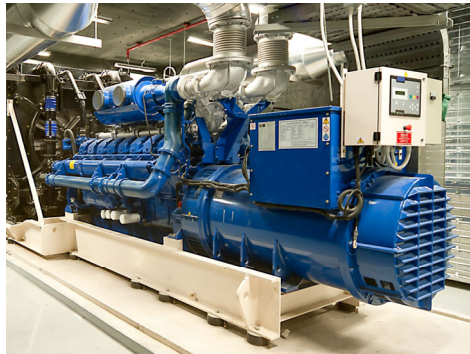


Industrial Applications according to EN14972

Machinery Spaces & Combustion Turbines



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



DRUPS Generator & MS Rooms



Combustion Turbines



Transformer Rooms



Engine Test Cells

 AquaMist

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

AquaMist.



EN14972-12
EN14972-16



Industrial Applications according to EN14972

Cable Tunnels

 AquaMist.



EN14972-11



Industrial Applications according to EN14972 Wet Benches

AquaMist.



prEN14972-13



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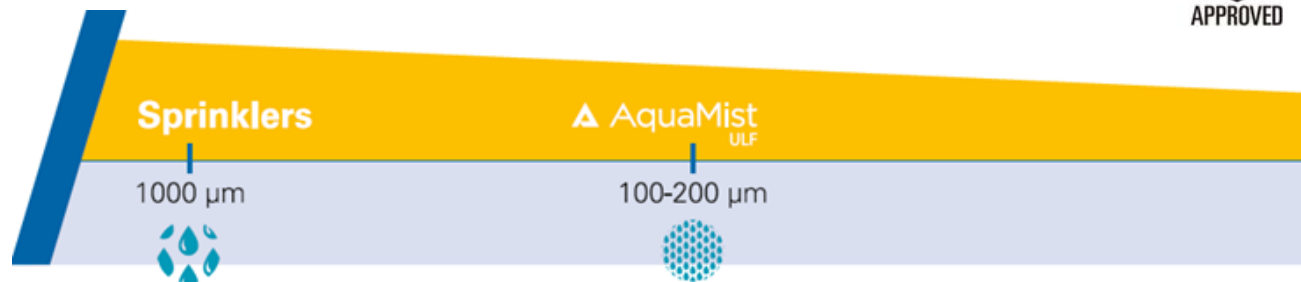
JCI AquaMist / Water Mist Systems



▲ AquaMist

AquaMist ULF (Low Pressure System)

- Reliable & Cost-Effective Solution
- Broad Range of Applications
- As Effective as High Pressure
 - Reduced Power Requirements
 - Low Pressure Components
- Droplet Size 100 – 200 microns



AquaMist FOG (High Pressure System)

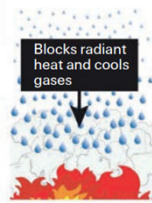
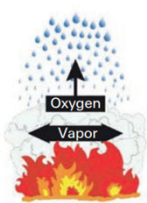
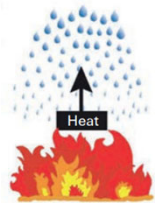
- Flexible Solution
 - Standalone Cylinder Based
- Light & Ordinary Hazard Applications
- Industrial & Process Equipment
- Smallest Diameter Piping Available
- Droplet Size around 50 microns



Advantages of using AquaMist, Low Pressure Watermist

- Water Mist works in three ways:

- Heat absorption
- Oxygen Displacement
- Radiant heat blocking



- Reduction in Fire Damage
 - Up to ~80% less than compared to sprinklers
- Reduction in Temperatures
 - Up to ~80% less than compared to sprinklers
- Requires less water
 - Up to ~60% less than compared to sprinklers
 - Reduction in pipe diameters
 - Reduction in tank capacity & overall storage space



Water Mist Applications

- Building Protection
- DataCentres
- Industrial Applications



Applications / Third Party Approvals

Focused approach where third party protocol and certification exist and are accepted

- FM5560
 - Fire Performance Testing
 - Component Testing
 - DIOM check
- LPCB (BS)
 - Fire Performance Testing
 - Component Testing
 - DIOM check
- VdS
 - Fire Performance Testing
 - **Reference Tested Against Conventional Sprinklers**
 - Component Testing
 - DIOM check



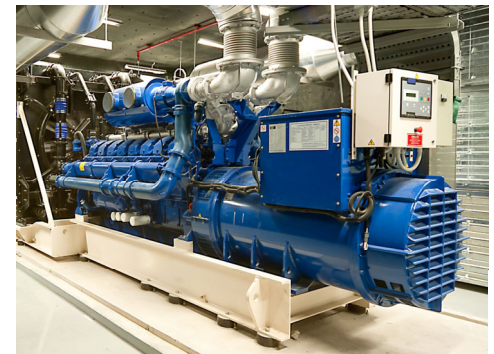
Building Protection (all)



Data Centres



Industrial Fryers



Machinery Spaces

Building Protection (incl. Residential / Domestic)

Fire Characteristics

- Ordinary Combustibles
- Low Heat Release Rates

System Type

- Automatic / “Wet” System

Objective

- Control

Alternative to

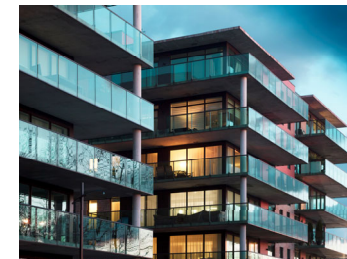
- Conventional Sprinklers

Advantages

- Up to >60% Reduction in Water Demand
- Reduced Water Supply Infrastructure
- Reduced Pipe Sizes
- Limited Consequential Damage
- Better environmental footprint (reduced materials)



Office Buildings



Hotels / Apartments



Hospitals



Care Homes/Residential



Libraries / Archives



Sales areas

Data Centres

Fire Characteristics

- Mixed Combustibles
- Medium Heat Release Rates

System Type

- Automatic / “Pre Action” System

Objective

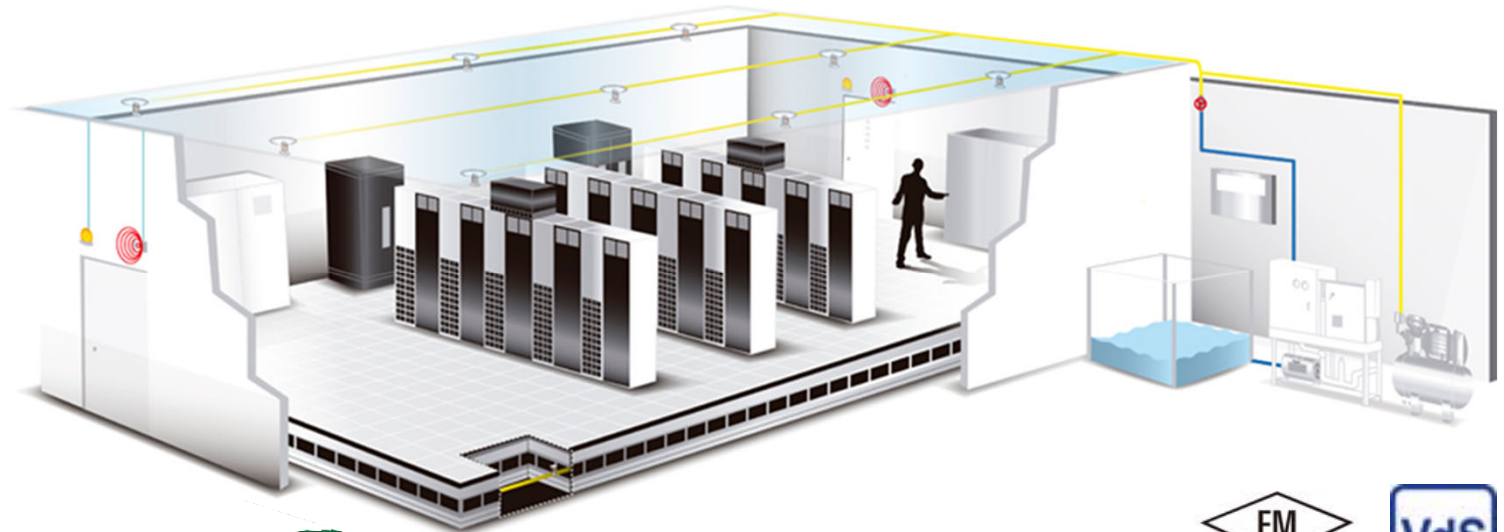
- Suppression / Control

Alternative to

- Gaseous Suppression
- Conventional Sprinklers

Advantages

- Application Specific, Proven Performance
- Protection of the Entire Facility
- Reduction in Water Demand



- Reduced Water Supply Infrastructure
- Reduced Pipe Sizes
- Limited Consequential Damage

Machinery Spaces

Fire Characteristics

- Liquid, Hydrocarbon Fuels
- High Heat Release Rates

System Type

- Deluge / “Open” System

Objective

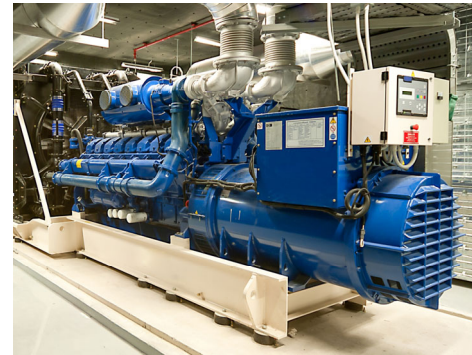
- Extinguishing

Alternative to

- Gaseous Suppression
- Conventional Sprinklers
- Foam
- Water Spray

Advantages

- Enclosure Integrity Not Critical
- Safe For Occupied Spaces
- Limited Consequential Damage



DRUPS Generator Rooms



Transformers



Combustion Turbines



Engine Test Cells

Industrial Fryers

Fire Characteristics

- Liquid, Hydrocarbon Fuels
- High Heat Release Rates

System Type

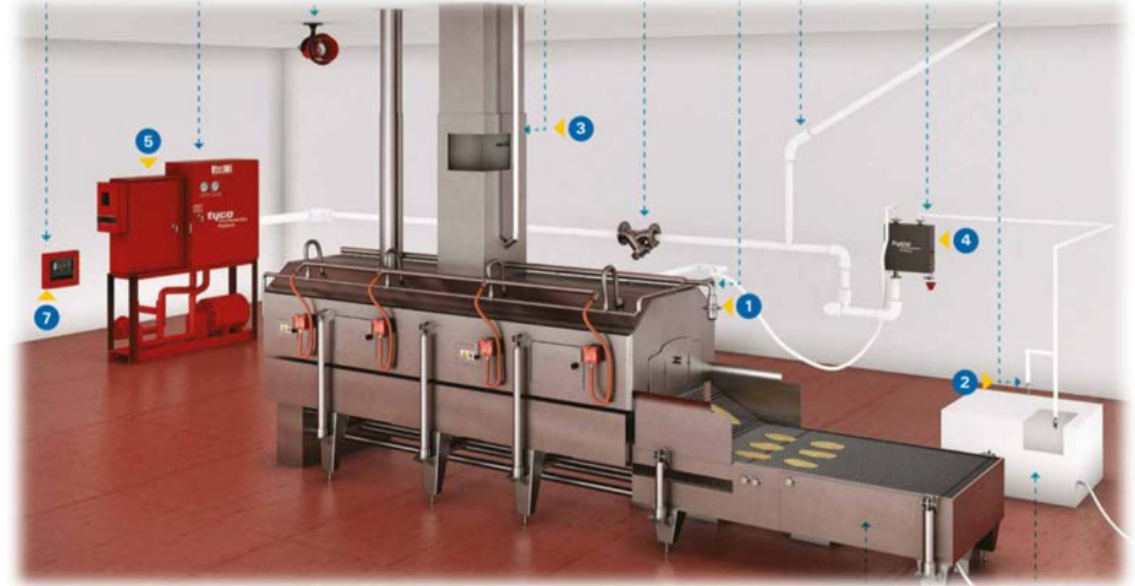
- Deluge / “Open” System

Objective

- Extinguishing
- **Alternative to**
 - Gaseous Suppression
 - Conventional Sprinklers
 - Water Spray
 - Wet Chemical Systems

Advantages

- Application Specific, Proven Performance
- Cooling of Oil and Equipment (Preventing Re-Ignition)
- Limited Consequential Damage



- Rapid Re-Instatement of Protection
- Reduction in Water Demand
- Reduced Water Supply Infrastructure



Water Mist System Key Components



Key Components – Water Supply



- Low Pressure Output ~16bar
- Centrifugal Pumps
- Dual Pressure Switch started
- Duty Only Configuration
- Option for Duty & Standby Configuration / Diesel Option
- Supplied by a Tank



- Low Pressure Discharge ~16bar
- 200 bar – Stored Pressure
- Flexible Water Storage
- Regulated Pressure Output (~16 bar)
- Electrically Actuated via 24 V DC Solenoid
- Deluge Configuration Only



- High Pressure Discharge
- 200 bar – Stored Pressure
- 80 litre Cylinders
- Decaying Pressure Output
- Electrically Actuated
- Deluge Configuration Only

Key Components – AquaMist ULF Alarm Valves



Wet

- Wet Alarm Valve
- Provides flow indication for zoned wet pipe installations
- Isolate and test function



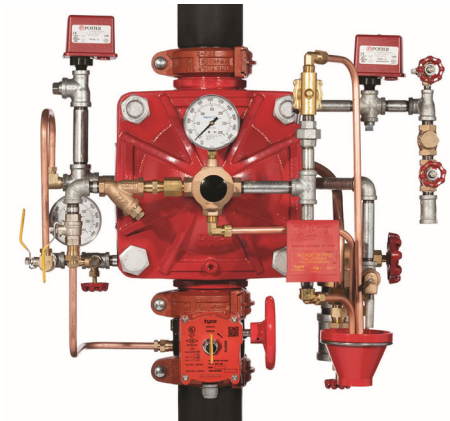
Deluge

- Open pipe installation
- Normally closed valve opens on electrical input from detection system
- Provides flow indication on operation



Pre-Action

- Dry pipe installation
- Single Interlock
- Normally closed valve opens on electrical input from detection system



Key Components – Pipework

- Corrosion resistant
- Fit-for purpose
 - Test pressure
 - Working pressure
 - Environmental conditions
- Supported in line with standard requirements
- Cleaned and flushed during installation
- Third party approval



Key Components – Nozzles



AquaMist FOG

- Deluge
- Pendent
- Stainless Steel

AquaMist ULF

- Deluge
- Automatic (Bulb-Type)
- Pendent
- Horizontal Sidewall
- Upright

AquaMist ULF Nozzles: Full range of approved solutions



AM4



MS/IFP/CT

12,8 bar

12,5 lpm



AM28



OH1/R

7 bar

31 lpm



AM30 (Up)



OH1/HC2/R

7 bar

24 lpm



AM34 (SW)



OH1/R

7 bar

71 lpm



AM35



OH2/OH3

7 bar

41 lpm



AM29



HC1/HC2/R

7.6 bar

24 lpm



AM27



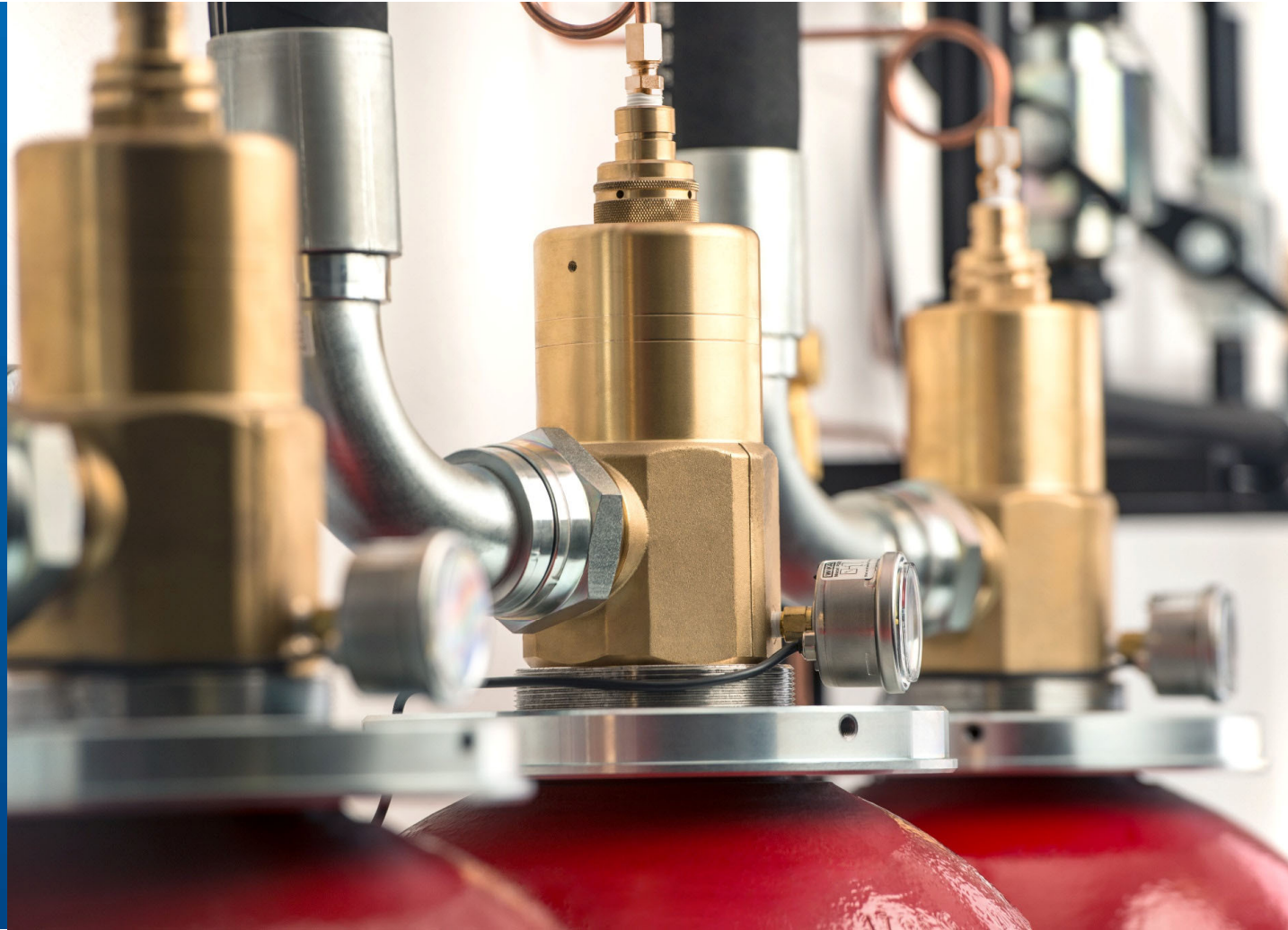
HC1/R

9,7 bar

36,4 lpm

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Comparison with Other Technologies



Comparison with Other Technologies

General Benefits

- Fire Performance Testing
 - Application Specific
- Protection of Multiple Hazards
- Can Be Integrated With Conventional Sprinklers
- G-Press 10-Year 1,000,000 Euro Warranty



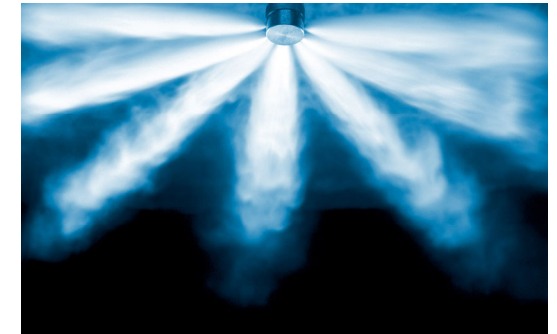
Vs. Gaseous Suppression

- Safe For Use In Occupied Spaces
- 100% Environmentally Friendly Extinguishing Agent
 - Zero GWP
 - Zero ODP
 - Zero PFA's
- No Harmful Decomposition Products
- Complete Building Protection
- No Room Integrity Testing
- No Pressure Relief Venting
- No Post Discharge Ventilation
- Reduced Lifetime Cost of the System
- Rapid Re-Instatement Following Discharge → **less business interruption**



Vs. Conventional Sprinklers

- Reduced Water Demands
 - Smaller Pumps
 - Smaller Water Storage Tank
 - Smaller Piping
- Minimised Water Damage



For a better understanding. Building protection

- Only the sprinklers/nozzles in wet pipe (automatic) systems which are activated by the fire will discharge water. So the water damage will be limited.



How to go along with a new water mist project?



A new project – planning / tender stage

- Start at planner/consultant - ask for the building risk report:
 - which fire suppression system is recommended? (sprinkler, water mist, gas, foam)
 - which hazards should be protected by an automatic fire suppression system?
 - definition of the **hazard class** should be given (i.e. for Office Buildings OH1, Residential Building, Machinery Space, Cable Tunnel etc.)
- **Define** which one of the relevant water mist design standards (i.e **EN14972ff** or **NFPA 750** or **BS xx** or a national standard) should be applied
Never mix standards (noting more than **one** standard)
- **EN14972 Part1 /NFPA 750 /BS xx / national standards set the boundaries for a water mist fire suppression systems**
- Can **sprinkler** design methods be applied for a water mist system (i.e. using the EN12845 or CEA 4001, i.e. OH1 hazard, apply 5mm water density?
No, water mist systems manufacturer's detailed designs are based on the **results of the fire testing**
– not on generic sprinkler measurements like “water density (i.e. 5mm or 10m²)”.

A new project – planning / tender stage

- In dependency of the hazard definition, check and define **which** EN 14972ff (VdS, FM, BS) **fire test protocol** can be applied - **Example a Residential Building**
Residential Building > EN 14972 Parts 3, 4, 6 ,7 and 17 can be applied
If the Residential Building has an additional Technical Room (technical floor) **EN 14972** Part 2 needs to be applied
If the Residential Building has an additional Machinery Room (i.e. lift room) **EN 14972** Parts 8 or 9 needs to be applied
- Develop the tender on basis of the above mentioned way forward!
- **Manufacturer specific** boundaries are given in the **DIOM**
(Design, Installation, Operation Maintenance Manual)
These are > i.e. min./max. nozzle spacing, max height, flow rate per nozzle, minimum nozzle pressure as an “**output/result information from the fire testing**”
- Is the **DIOM** therefore at **planning / tender stage** needed?

No, each supplier can use their system they have in their portfolio to protect a Residential Building (our example) and should be able to bid for the tender

A new project – validation proposals / bids

- Receiving now all quotes – how can the planner judge whether they are correct?

Best “assurance” is given if the supplier/contractor can demonstrate that they have a third-party approval in line with the relevant **fire test protocol** of the **EN14972 series** and have a **third-party approval** for the quoted **system components /the overall system** (i.e VdS, FM, LPCB).

- How to demonstrate this?

Via the relevant FM, VdS, LPCB **certificate. Ask for it!**

The DIOM is **not needed** for this, since the DIOM (version) is noted in the cert!

The fire test report is as well **not needed (positive test passing is confirmed with the cert).**

A new project – AHJ Check

- What is needed when an **AHJ system check takes place** (after commissioning)
The AHJ needs to be informed under which “umbrella” (standard) the water mist system has been commissioned (only **one** standard!)
The AHJ **needs the manufacturer’s DIOM** for a proper check of the water mist system.
Further the AHJ needs all drawings, hydraulic calculations of the system.
If existing, mostly also the 3rd party cert is helpful for his/her validation.
Beside the DIOM the **documentation should be available via the building owner**.
- Can the AHJ check the water mist system without having the DIOM, but having the relevant standard in place (EN14972, NFPA750, BS xx, national standard)?
Simple answer: **No, the AHJ need both : Standard & DIOM!**
- **How** can the AHJ get the DIOM?
The AHJ should contact the system manufacturer.
Normally the system manufacturer provides the DIOM when before an NDA has been signed off.

Technical Support & Training



Partner Training (Mandatory)

Application Specific Training (required)

- Building Protection
- Data Centre Protection
- Protection of Machinery Spaces
- Industrial Fryer Protection
- Cable Tunnels
- GPress Installation



Water Mist - Technical Information

DIOM

(Design, Installation, Operation, Maintenance Manual)

>available only after a training or for AHJs under NDA

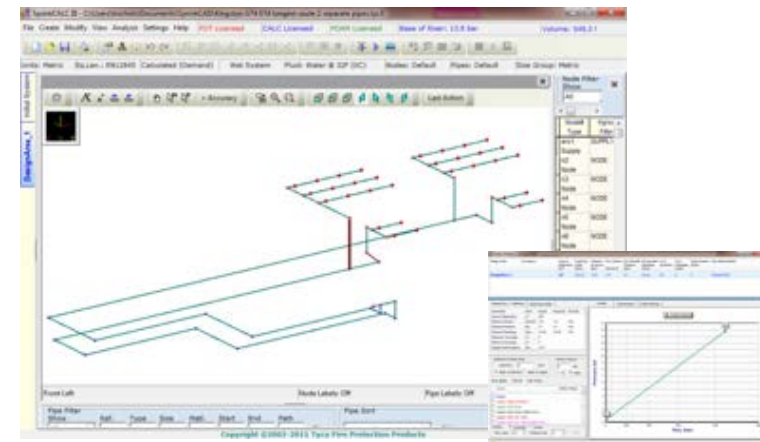
- Application (exact determination of utilization)
- Duration (tank size determination)
- Area of operation (to specify the pump & pipe dimensions)
- Limitations, obstruction criteria
- Component selection, min./max. spacing, max. height etc.

Component Data Sheets (available on webpage)

- Characteristics (material, K-factor, dimensions)
- Design criteria (hint to relevant DIOM is given)

Design Tools (hydraulic calculations, Isometric etc.)

- SprinkCALC & SprinkCAD for Revit
- Revit files



Marketing Brochures



<https://www.tycoaquamist.com/>



AquaMist Water Mist Fire Protection Solutions

When designing a fire protection system, the challenge is to select the right solution to match the risk. Tyco has the broadest range of fire protection products on the market, including sprinklers, clean agent systems, Water Mist and others.

A comprehensive range of solutions

The AquaMist product range includes globally approved Water Mist solutions backed by decades of expertise in fire protection. AquaMist offers a broad range of systems to offer the most suitable fire suppression solution for you to help protect people and property against a wide variety of fire risks. The fine water mist generated is designed to extinguish fires, or limit fire growth at an early stage, depending on the asset to be protected. AquaMist can help provide effective cooling and fire control on solid, deep-seated fires such as furniture, paper and cables (Class A).

About Us

AquaMist is part of the Johnson Controls portfolio of fire suppression products. At Johnson Controls, we transform the environments where people live, work, learn and play. From optimizing building performance to helping improve safety and enhance comfort, we drive the outcomes that matter most.



Thank You!

Dirk Laibach
Senior Global Product Manager
Water Mist & Special Hazard Systems

dirk.laibach@jci.com