

INTERNATIONAL WATER MIST ASSOCIATION

**IWMA SEMINARS ON WATER MIST TECHNOLOGY
DUBAI INTERNATIONAL CONVENTION AND EXHIBITION CENTRE**

Water mist fire protection:
The most innovative fire fighting technology available
today - introduction & general description,
international standardization, testing & approvals



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THE INTERNATIONAL WATER MIST ASSOCIATION

- **IWMA**, the International Water Mist Association is dedicated exclusively to water mist fire fighting and related technology. **IWMA** was founded April 4th, 1998, and began maintaining a permanent office at the beginning of 2000. From the **IWMA's** international headquarters in Hamburg, Germany, it will support the continued development, research and applications engineering of water mist.
- Most of the Companies and Professional Engineers dealing with Water Mist Technology are **IWMA** Members
- The Association Web site www.iwma.net is a valuable source of information regarding water mist technology



PART 1 – AN INTRODUCTION



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Fire hazards



• **Fire Hazards are generally categorized by classes**

- The most common fire classes are the **class A**, representing solid combustibles, and the **class B** representing flammable liquid fires
- Class **A** fires are smoldering for a while, are then slow or moderate fast growing, often developing deep seated combustion
- Class **B** fires flash rapidly into the volume.

Class A



Class B



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Fire hazards and suitable fire fighting systems



- **Fire fighting systems are selected based on the hazard class**
- It is consolidated, in the fire protection technology, to protect class A fires (typically represented by storage or manufacturing of combustible materials) by the use of water based systems.
- Class B fires cannot traditionally be fought with water; therefore water foam systems as well as powder systems or gaseous systems have been developed.



class A



class B

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Water Mist breaks into the scene



- In the '90, mainly after the Halon decommissioning decision, following the protocol on Ozone Layer protection, a new fire protection technology breaks into the scene.
- It is known as water mist and it is based on the use of water, in small droplets, to combat both class A as well as class B fires
- Water mist technology developed rapidly with many applications in various fields.
- Water mist fire protection systems are based on the use of pure water for both class A and class B fire hazards



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PART 2

Water Mist - What is ?



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What is Water Mist?

Basic principle



Creating water mist

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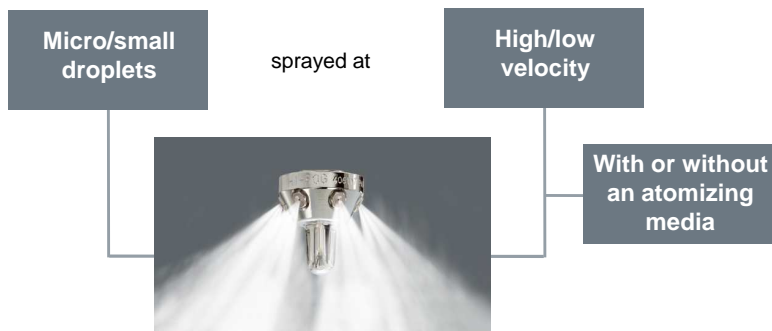
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What is Water Mist?

Basic principle

water mist is composed of

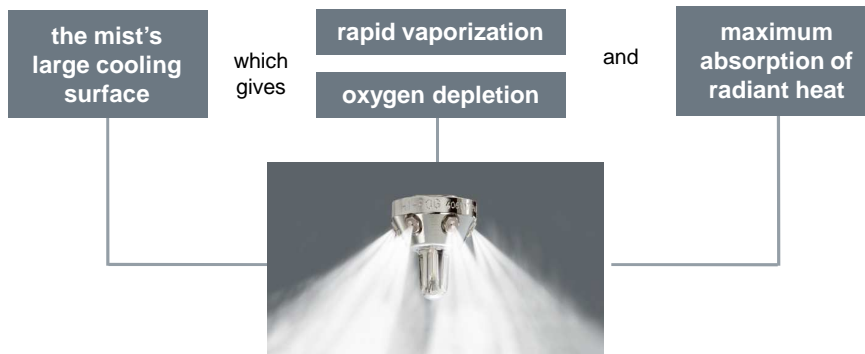


To reach the seat of the fire


What is Water Mist?

Basic principle

Fire is suppressed or extinguished by




What is Water Mist?




Basic principle
(up to .90% less than conventional sprinkler systems)

using water efficiently allows water consumption to be minimized and water damage to be reduced




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How does it work?



Oxygen



Heat Fuel

UNBREAKABLE CHAIN REACTION

Water mist extinguishment mechanisms:

- Cooling
- Radiant heat absorption
- Oxygen depletion (local inerting)

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Cooling



- Ultra fine droplets create extensive cooling surface area;
- Air entrainment into fire plume assists penetration of droplets to fire
- Water vaporization enhances the cooling of the hot burning gases

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Radiant heat absorption



- High mist density (large quantity of small droplets)
- Absorbs & scatters heat radiation - prevents fire spread
- Assists fire fighting and rescue activity

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Oxygen depletion (local inerting)



- Small droplets turn to vapour faster than bigger droplets
- Water expands 1760 x when turning to vapour (>100°C)
- Vaporisation 'blocks' oxygen locally from fire source

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PART 3

- **Basic water mist system characteristics**



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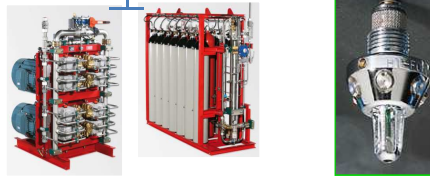
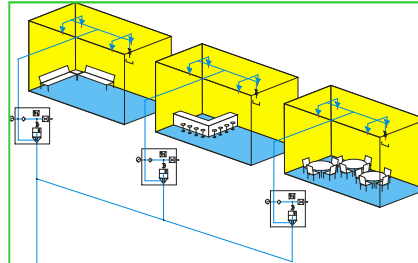
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Water Mist Sprinkler Systems



- **Water Mist System with activation based on individual nozzles that operates when it reaches a specified temperature causing the glass bulb to break and water to flow.**
- **There are:**
 - **Wet pipe systems, with water filling the all pipe network**
 - **Dry pipe systems, with air inside the pipe network, for use in cold spaces**
 - **Preaction systems, activated by detection.**



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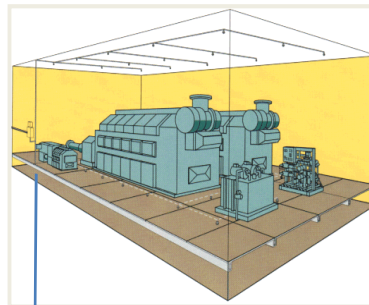
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Water Mist Deluge Systems



- **Water Mist System with activation based on the simultaneous discharge from all the predetermined nozzles included in one system, operating when a detection system actuate the deluge system control valve.**
- **There are:**
 - **Local application systems**
 - **Volume protection system operating as total compartment discharge**
 - **Volume protection system operating in zones**



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PART 4

• Basic system components



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Basic water mist system components: Nozzles



X.Flow
sprinkler



HI-FOG® 1000-series
sprinkler



HI-FOG® 2000-series
sprinkler



HI-FOG® 1000-series
spray head



Model K-6 FM
spray head

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Basic components



Special gas and water piping



Distribution Blocks



Stainless steel pipe



Fittings

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Basic components



Valves

Different kinds for different applications



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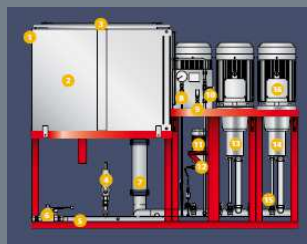
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Basic components



Electric pump unit

- For marine applications
- For land applications



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Basic components



Diesel pump unit

High-capacity option when the system is required to be independent of mains electricity



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Basic components



Pre-engineered Cylinder Units

Self-contained - no need for external water or power supply

- There are simple self contained units
- There are also sophisticated units In containers for oil and gas fields.



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PART 5

System design - fire testing and approvals



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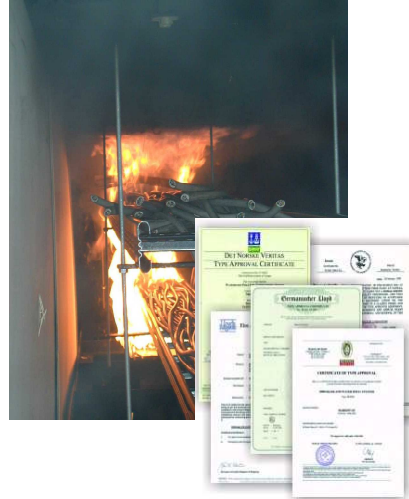
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System Design



- Currently there is no prescriptive design standard for water mist systems.
- This is mainly because of the complexity of the interaction between mist and fire
- The conclusion is that all design parameters must be based on successfully passed full scale fire test, certified by 3rd party approval body.



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Performance based approach



WATER MIST IS NOT A UNIVERSAL EXTINGUISHANT !
water mist of manufacturer A
is not the same as
water mist of manufacturer B

ALL critical water mist system design and installation parameters are defined in full-scale fire tests

- Nozzle type
- Spacing
- Installation height
- Volume
- Operating pressure
- Flow rate



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How Can we select a system



- We have to decide according to the “documents” that the manufacturer of the system can provide.
- They are mainly the approval of the system, based on the actual fire tests that have been passed
- Or may be specifically agreed fire tests for special application not yet covered by approval procedures
- The Fire Test is in any case the basis for any kind of system that cannot even be conceived if there is no fire test behind.

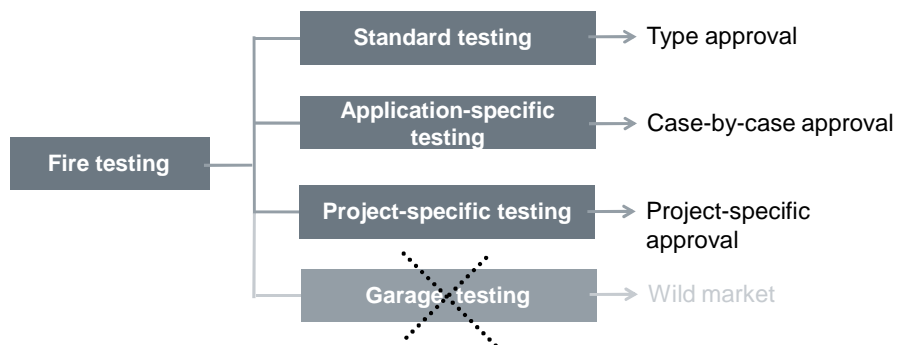


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History of fire testing = history of standard development



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DESIGN STANDARDS


- NFPA 750 is the first published standard for water mist system design and installation.
- It states at:
 - 8.1.1 Listing. *Water mist protection systems shall be designed and installed in accordance with their listing for the specific hazards and protection*
 - 8.2* Listing Evaluations.
 - 8.2.1 Scope. *Listing of water mist fire protection systems shall be based on a comprehensive evaluation designed to include **fire test protocols**, system components, and the contents of the manufacturer's design and installation manual. n objectives specified in the listing.*



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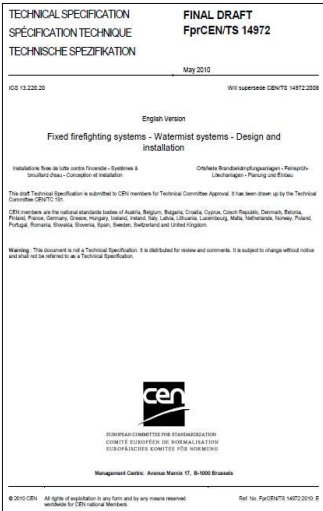
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Design Standards

- Europe is developing its own water mist design and installation standard, known as CEN/TS 14972.
- It also states at:
 - 6.1 General
 - *Water mist fire protection systems shall be designed for the specific hazard and/or occupancy as defined in their **listing** or in the relevant **fire test reports***
 - 6.3 System Performances
 - *The performances of the water mist system under consideration shall be in accordance with the performance demonstrated in the **successful fire test**. The most widely used performance objectives for water mist systems are extinguishment, suppression and control, as defined here below.*



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Questions?



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