

# IWMA: A GUIDE TO WATER MIST SYSTEMS

Rüdiger Kopp and Michael Bindreiter from IWMA answer some of the most common questions they are asked about water mist systems

Water mist systems use less water than traditional sprinkler systems. What are the benefits for customers?

**Rüdiger Kopp:** "Water mist systems have been around for more than 30 years. The success story of the technology is based on the efficiency in cooling and fire suppression, with substantially less water consumption of up to 85% compared to conventional water-based systems. In case of system activation, damages are minimised, thus downtimes are very limited. After a fire, only a minimal amount of contaminated water has to be disposed of and smoke pollution

is reduced. Business continuity is assured for hospitals, hotels and industrial production sites. Furthermore, the environmentally friendly and sustainable usage of the natural resource water fulfils today's ecological requirements which makes water mist such a great choice."

What does "smart system design" mean and what are the advantages?

**Rüdiger Kopp:** "We have a number of installations where the water mist has reduced the fire rating requirements for extended glass façades, thus allowing for more

design freedom for architects, leading to cost savings for the clients. Unlike sprinkler systems that rely on two-dimensional effects, water mist reaches shielded areas due to the room filling effect of the small droplets that stay suspended in the air for some time.

The performance-based design approach allows for innovative protection concepts instead of rigid prescriptive layout criteria. Our water mist systems protect large concert halls with a concept using floor mounted nozzles with very limited flow rates, this being an example of where customers could not find adequate protection with conventional systems. Customers

also benefit from the compact system equipment, resulting in small pump room sizes, smaller water storage tanks and small pipe sizes for easier integration into building structures, particularly in retrofit situations.

Many of our installations are for system retrofits into historical and heritage buildings where the expansive dimensions of conventional systems, particularly referring to pipe sizes and tank volumes, do not fit in. The higher hydraulic pressure loss allowance for high-pressure water mist systems allow for a single centralised pump unit for long

distance coverage areas, e.g. cable tunnels and high-rise buildings."

**Michael Bindreiter:** "Intelligent system design includes a compact and modular construction of the systems, this concerns especially the system components pump and water storage. Compared to sprinkler systems, our high-pressure system weighs significantly less, which allows for greater flexibility in piping as well as more individual solutions for the pump equipment. High-quality stainless-steel components make up the system. This enables us to meet the high hygiene standards required, for example, in hospitals, laboratories and the food industry very well. The systems are more durable and are also suitable for harsh environments."

How are high-pressure water mist systems designed? What are the design criteria and which standards and guidelines apply?

**Michael Bindreiter:** "Each system is individually developed and tested by the manufacturers. There are very clear standards and guidelines that define what requirements the system must meet. When a new application is successfully tested, the fire scenario is accurately recorded and included in the manufacturer's DIOM. Water mist manufacturers need to prepare system-specific manuals for the design, installation, operation and maintenance of the system, called DIOM manuals. These manuals contain all important system design details such as nozzle type, spacing, maximum installation heights, minimum pressures, discharge times and application limitations. The fire test protocols include the arrangement of the test spaces, fire loads, fire test scenarios, test conditions and acceptance criteria of the system"

**Rüdiger Kopp:** "Today, a number of water mist standards exist, the most important being the American NFPA750, the European prEN14972, as well as the German VdS3188 and the British BS8489. What they have in

common is that they are not - unlike sprinkler standards - prescriptive, but follow a performance-based approach. System designs have to be proven in application-related full-scale fire tests, often as comparison tests to conventional sprinkler systems. Standard fire tests protocols for various applications are published within approval standards like FM 5560 or VdS 3883. However, standards as prEN14972 provide guidance to develop fire test protocols for special applications. In the early days of water mist, it was often difficult to demonstrate the system's efficiency to consultants and authorities. Today, water mist systems are independently tested and approved for a wide range of applications of light and ordinary hazards in building protection, as well as hydrocarbon and cable fire hazards in different industrial applications based on existing fire test protocols. Besides the fire tests, all related components have to undergo thorough component tests to prove their robustness and reliability."

In what condition are systems after 10 to 15 years of operation?

**Rüdiger Kopp:** "It is key - as for any fire protection system - that water mist systems are maintained in regular intervals to ensure safe function and operability of all system components. Customers have to inspect the protected areas for structural changes and possible changes in fire risk to maintain the certification of the protected area by the fire authority or insurer. Maintenance requirements and intervals are specified in standards like NFPA25, prEN14972, VdS3188 and BS8489. These standards provide uniform maintenance procedures and intervals being very comparable to those of conventional sprinkler or gas extinguishing systems for cylinder-based systems. Water mist systems utilising stainless steel piping are still in a good condition even after 15 years and more, whereas pipework of conventional sprinkler systems, particularly pre-action and dry pipe systems usually come

across substantial corrosion issues. This also applies to industrial applications in harsh environments. As for our systems they are still fully functional after 25 years."

Michael Bindreiter: "We have been servicing our systems for the last 26 years and all systems are still fully functional. Neither corrosion nor pump failures have been reported and we put that down to the use of high-quality materials, customised high-quality designs and solutions."

**Which typical maintenance and service works have to be carried out after a successful system installation?**

Michael Bindreiter: "The test and inspection procedures are similar to those of conventional water-based systems and are part of NFPA25, prEN14972, VdS3188 and BS8489. Furthermore, we recommend the annual change of the stored water, which is a simple task. With cleverly designed water storage concepts, that can be implemented in a highly efficient manner, only the filter element needs to be changed. Depending on the drive and

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supply concept and the customer's wishes, specific requirements may also arise."

Rüdiger Kopp: "Typically, the system operator carries out all weekly and monthly maintenance work after thorough training. This includes visual inspections as well as pump unit test runs. Yearly and further maintenance work is carried out by the system manufacturer or a trained and authorised maintenance



company. Water mist systems often only have small break tanks, supplied by the public water mains. Annual drainage and cleaning of these tanks does not waste large water quantities and can be achieved in a short time frame. Since the water discharge from water mist nozzles is limited, system test discharges can be carried out in regular intervals without excessive clean-up measures and damages to the protected area. Our systems, being installed in tunnel applications, are regularly discharged and inspected by third parties confirming and reporting safe operability of the water mist system for authorities and the insurer."

**How does a typical project look, and what are the requirements for a successful project?**

Michael Bindreiter: "As a water mist system is always a customised system, we start with an analysis of the fire protection concept, and the official requirements and the local regulations. The results of this combined analysis form the basis for the design of the system. Additional project-specific requirements such as ambient conditions, active ventilation as well as obstacles of all kinds also need to be taken into consideration. To achieve the maximum performance, we work together with specialised and well-trained partners. With them, we are able to implement the standards in terms of quality, installation and reliability."

**What needs to be done after a system activation and what is the experience from systems in real use?**

Michael Bindreiter: "After the system has been activated, we verify all activated areas and all associated installations such as nozzles, pipes and brackets. If necessary, the components are replaced. In our experience, once the system has been successfully put into operation, service activities are only required as part of normal maintenance."

**What would be your elevator pitch for water mist systems?**

Michael Bindreiter: "Water mist systems are clean and efficient; they require minimal service and maintenance, and the technology allows perfect adaptation to the customer's specific fire protection system. The individual nozzle technology allows customised concepts depending on standard or specific applications, as well as smart integration into existing structures."

Rüdiger Kopp: "Water mist is the only fire protection technology where every system is full scale fire tested for the individual application. Water mist systems are installed and maintained by system manufacturers or trained and certified partner companies of the system manufacturer, assuring the highest performance reliability for customers."

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