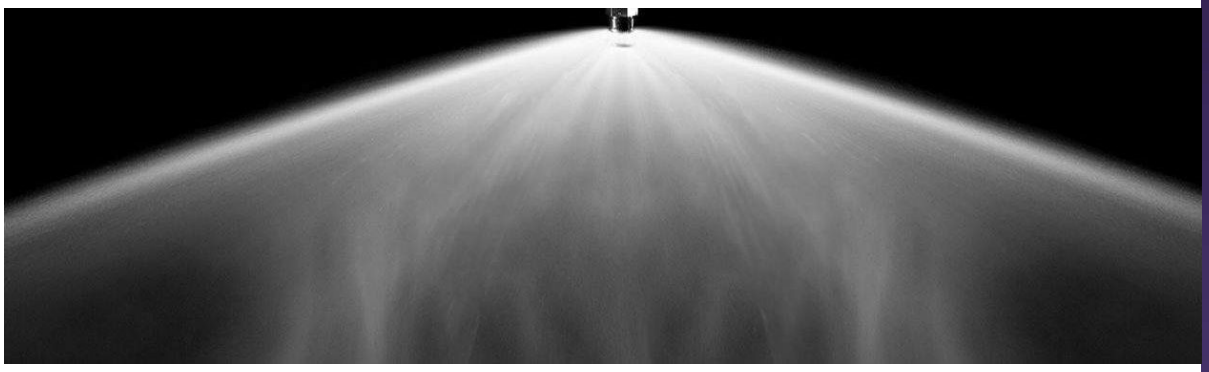
# MISTCONCEPTIONS ON WATER MIST



V.0.3. 10.9.2025

## *Imprint*

*Title:*
“Mistconseptions” on water mist

*Version:*
0.3 dated 10.9.2025

*Published by:*
International Water Mist Association (IWMA), Hamburg, Germany, 2025

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# 1 Purpose and scope of this document

This document addresses widespread misconceptions about water mist systems, referred to here as “mistconceptions.” These misconceptions often arise because water mist shares certain visible similarities with traditional sprinkler systems, yet differs in its design principles, performance basis and application methods.

Misinformation can spread in the fire protection industry for various reasons. In some cases, it results from limited knowledge or experience with well-designed and approved water mist systems. In others, it is due to a lack of formal training or the influence of competing commercial and technical interests. Whatever the cause, these misunderstandings can lead to incorrect assumptions about the capability, reliability, or suitability of water mist technology.

The purpose of this document is to provide clear, fact-based responses to common questions and claims that give rise to these “mistconceptions.” It is part of a new 2025 initiative to improve awareness and understanding of water mist technology among professionals, regulators, and decision-makers.

Water mist has been commercially applied for more than 30 years and has secured a strong position in the fire protection market. Its design principles and mechanisms are different from conventional sprinkler systems and are described in detail in the Water Mist Guide published by the International Water Mist Association (IWMA).

Despite its long-standing track record and proven performance in a wide range of applications, water mist is still subject to repeated myths and incorrect assumptions. This document tries to answer in simplified way to typical claims made.

# 2 Common “mistconceptions”

## 2.1 "Water mist is a new and unproven technology"

Although sometimes mistakenly regarded as a recent innovation, water mist fire suppression systems have been commercially available and widely deployed since the early 1990s. The technology’s origins lie in earlier fire protection research, and its development accelerated in response to growing demand for alternatives to halon and conventional sprinkler systems, particularly in applications where water damage, toxicity, or space limitations were key concerns.

Today, water mist is far from experimental. It is a mature, well-established technology with a proven performance record across a wide range of sectors, including marine vessels, power generation facilities, data centres, hospitals, cultural heritage buildings, road and rail tunnels, buses, trains, and energy storage installations. These systems are routinely installed in both new-build and retrofit projects worldwide.

The technology has been extensively validated through large-scale fire testing, independent research, and third-party approvals. Leading certification bodies such as VdS, UL, FM Approvals, DNV, and LPCB have approved numerous water mist systems for specific hazards and applications. In many cases, systems are tested under more demanding conditions than those used for conventional sprinkler systems, which may still be based on test criteria developed decades ago.

In summary, water mist is not only well-established but also one of the most rigorously tested and technically refined fire suppression technologies available today. Its reputation as “new” is largely a result of limited familiarity rather than a lack of history or evidence.

## 2.2 "There are no standards for water mist systems"

This is not correct. In reality, water mist systems are regulated by a well-established and growing set of international, regional, and national standards. Unlike traditional sprinklers, water mist relies on performance-based standards that require full-scale fire testing under realistic conditions.

Key standards include CEN-14972 for land-based systems, ISO 6182-9 for nozzle testing and IMO regulations for marine applications. In North America, NFPA 750 provides design guidance and refers to system-specific approvals by third-party bodies such as FM Approvals, UL, VdS and DNV.

Many of these frameworks have parallels to sprinkler standards. For example, NFPA 750 plays a role similar to NFPA 13, while EN 14972 corresponds in function to EN 12845 for sprinklers but with a difference: water mist requires application-specific fire testing for approval.

To help navigate this landscape, the IWMA has published a standard matrix outlining all relevant land standards and approval schemes. This is a valuable resource for designers, authorities, and end users.

Water mist is therefore one of the most thoroughly tested and standardised suppression technologies in use today. For this fire testing of water mist systems well established standards like FM5560, VdS3188, UL2167, LPCB1283, EN14972 Parts 2-xx or the IMO (Marine) fire test standards must be followed and passed, means any water mist system needs to proof their performance accordingly.

## 2.3 "Water mist prevents the visibility"

In practice, there is no significant difference between water mist and other water-based fire suppression technologies in terms of visibility impairment.

While fine mist droplets can reduce visibility to some extent, this effect is often offset by the lower water flow rates typically used in mist systems compared to conventional sprinklers. It is difficult to quantify which system performs better or worse in this regard, and the perception of visibility is also subjective.

Some individuals may find an activated nozzle alarming, while others view it as a reassuring sign of safety. There is currently no definitive data on how these perceptions influence egress behaviour.

In certain scenarios, water mist can even improve visibility by binding soot and other airborne particles. In occupied spaces, nozzles are generally designed to avoid producing the smallest droplet fractions, achieving a balance between suppression performance and environmental comfort.It is also important to recognise that all fire suppression systems trade visibility for survivability. Mist particles or sprinkler sprays may reduce visibility, while smoke dispersion from the hot gas layer may impair it even more. However, the key objective is to maintain tenable conditions for escape: cooling the fire, reducing fire propragation/extinguishment, reducing toxic gases and extending available egress time. There is little value in having clear visibility in a room that is otherwise unsurvivable. Fire engineers account for these trade-offs when designing escape routes, and in all cases water-based systems improve overall survivability for occupants.

## 2.4 "Water mist can only be used for specific applications"

This is a common misunderstanding of the technology. In reality, water mist is a highly versatile fire protection technology that can be applied across a wide variety of scenarios beyond its well-known use in the marine sector, transportation, industrial and residential sectors.

Depending on the system configuration and mist characteristics, such as droplet size, discharge pressure, and spray dynamics, water mist can be used effectively on fires involving flammable liquids, including Class B fires and grease fires in commercial kitchens. These are applications where conventional water-based systems are typically not suitable. In many cases, water mist serves as an efficient and environmentally responsible alternative to foam systems.

Water mist has also proven capable of replacing gaseous fire suppression systems in enclosed or sensitive environments. It provides effective cooling, oxygen displacement and fire suppression without the toxicity, health risk or environmental impact often associated with gas-based agents.

In addition, water mist can be used in many conventional fire protection applications where sprinklers have traditionally been employed. This includes office buildings, hospitals, heritage properties, hotels, tunnels, and industrial sites. Its fast response, low water demand, and ability to reduce water damage make it particularly well suited for environments where protecting critical infrastructure or valuable assets is a priority.

For all these applications, established fire test standards exist and are consolidated in the IWMA Standards Matrix (published by IWMA). These standards ensure that only systems with demonstrated and verified performance are approved for use.Rather than being restricted to a narrow range of use cases, water mist has become a proven and flexible fire safety solution with growing relevance across multiple sectors.

## 2.5 "Water mist systems are unreliable"

This is a common misconception. In practice, water mist systems that are properly designed, installed, and maintained are highly reliable and meet stringent international performance requirements. Like other fixed fire protection systems, they undergo extensive third-party testing and certification before being approved for use.

Water mist systems are actively controlling and extinguishing fires in real-world environments every day. Although detailed fire incident data is not always publicly available, the technology has been used for decades in critical sectors where reliability is essential. One notable example is the marine industry, particularly on cruise ships, where thousands of passengers and crew rely on dependable fire suppression systems while at sea with limited evacuation options. This long-standing use reflects the trust placed in water mist by both regulators and operators in high-risk environments.

Government data released in some countries has shown that water mist systems perform similarly to conventional sprinkler systems in real-life fire incidents. Both technologies have achieved high levels of fire control and extinguishment when used as intended. The determining factor for successful operation is not the choice between mist or sprinklers, but whether the system has been properly designed, installed, and maintained.

The IWMA continued reliability through clear technical guidelines, training programmes, and collaboration with industry stakeholders. Water mist is not only a proven and reliable technology, but also a modern and adaptable solution for a wide range of fire protection challenges.

## 2.6 "Water mist systems are always more expensive"

This is a common misunderstanding, water mist systems can actually be cheaper. Water mist systems use significantly less water than conventional sprinklers. This enables the use of smaller-diameter piping, more compact water storage, and lower pumping requirements, all of which can reduce installation and infrastructure costs, especially in retrofit projects or buildings with space and weight constraints. The simplified integration into building services also minimises structural modifications and shortens installation times.

Most water mist systems are constructed from high-grade materials such as stainless steel, offering excellent corrosion resistance and an extended service life with minimal deterioration. This durability translates into lower maintenance needs and reduced lifecycle costs, a major advantage for modern buildings where long-term reliability is essential.

In the event of a fire, the reduced discharge volume of water mist systems dramatically lowers the risk of water damage, speeding clean-up and minimising operational downtime. This is especially valuable in facilities with high-value assets, such as data centres, hospitals, museums, and critical infrastructure, where preserving business continuity can mean substantial savings.

In some cases, the adoption of water mist can also unlock secondary cost benefits. These may include reductions in fire-resistance requirements, simpler ventilation systems, and even lower insurance premiums, depending on approval from local authorities or insurers

While the initial capital cost of a water mist system may sometimes be higher than that of a traditional sprinkler system, true cost-effectiveness should be evaluated over the entire lifecycle of the system. When factoring in installation, maintenance, service life, and the cost of potential fire-related damage, water mist often delivers clear financial advantages. Decision-makers should therefore look beyond upfront cost and adopt a long-term perspective. Lower maintenance needs, savings in structural requirements, reduced material use (with an associated lower $CO_2$ footprint) and better protection of assets all contribute to water mist being a modern, efficient and sustainable fire protection solution that delivers superior long-term value compared with traditional alternatives.

## 2.7 "There is no reliability data for water mist systems"

While there is less centralised and publicly available statistical data for water mist systems compared to sprinklers, this does not mean reliability is unknown or inherently lower.

In many sectors including marine, offshore oil and gas, transportation, and industrial facilities, water mist systems have been in continuous service for decades. Manufacturers often maintain extensive operational and maintenance records, although these are not always aggregated into public databases in the same way as sprinkler statistics. The absence of a unified database is therefore a documentation gap and not an indicator of lower reliability.

Independent evidence supports this. Analysis of UK fire incident data from recent years shows that water mist systems perform at a level comparable to sprinklers in terms of both fire control and extinguishment.

In residential applications, both systems achieve similarly high success rates, demonstrating that their effectiveness in real-world conditions is closely aligned.

Both technologies also show very low fault rates, with most failures linked to fires starting outside the protected area or to pre-existing system issues. Systems installed in the fire's room of origin were significantly more effective, underlining the importance of correct design and full coverage.

Reliability in water mist systems, as with sprinklers, is assured through rigorous component and system testing, compliance with recognised standards such as NFPA 750, EN 14972 , and IMO resolutions, and third-party certifications from FM Approvals, UL, VdS, LPCB, and DNV. Proper design, competent installation, and regular maintenance remain critical to long-term performance.

Ongoing IWMA initiatives, including updated guidelines and targeted training, aim to further strengthen reliability through improved installation and maintenance practices.

## 2.8 "Ventilation systems will remove the mist before it works"

Today's established fire test protocols consider air velocity and ventilation as part of the test scenarios. While ventilation can influence the movement of water droplets, properly engineered and tested systems account for this during both the design phase and performance testing. Certified water mist systems undergo full-scale fire testing under realistic ventilation and airflow conditions to ensure reliable performance in real-world environments.

Approved systems are specifically developed to operate effectively even in spaces with mechanical ventilation. This includes tunnels, industrial buildings, and data centres, where air movement is a constant factor. The mist characteristics, including droplet size, spray pattern, and discharge velocity, are carefully tailored to the expected ventilation conditions to ensure that sufficient mist reaches the fire area and achieves the intended suppression effect.

It is essential to understand that water mist systems are application-specific. Unlike many traditional sprinkler systems, which primarily focus on application rate and coverage area, water mist systems place greater emphasis on the behaviour of droplets and their interaction with the fire and the environment. For example, a water mist system designed for use in enclosed IT rooms would not be suitable for an environment such as a road tunnel. If such a system were incorrectly applied in a tunnel, the concern about ventilation removing the mist would indeed be valid. However, tunnel-specific systems are designed accordingly and tested under high-ventilation conditions that reflect actual fire scenarios.

Rather than being a weakness, ventilation can in some cases enhance the performance of a well-designed water mist system. Controlled airflow may help distribute the mist more effectively and improve cooling in certain applications. The key requirement is that the system is designed for the specific conditions and verified through appropriate test protocols in line with recognised international standards.

In summary, ventilation does not prevent water mist systems from working. When correctly designed, installed, and tested, modern water mist systems are fully capable of achieving fire suppression or control even in environments with significant ventilation.

## 2.9 "Water mist cannot achieve the same heat release rate (HRR) reduction as sprinklers"

This is not supported by evidence. While the most widely known HRR reduction formulas were developed using sprinkler test data at relatively high water densities, water mist operates differently and cannot be directly assessed with the same calculation methods. Full-scale testing across a range of hazards, from machinery spaces to residential rooms, has shown that water mist can achieve equal or greater HRR reduction compared to sprinklers.

Water mist achieves HRR reduction through multiple mechanisms including rapid flame knock-down, gas-phase cooling, surface cooling, and radiant heat attenuation. The blocking of radiant heat is particularly effective in reducing secondary ignition risk and slowing fire spread, especially in confined or shielded spaces.

Although there is currently no universally accepted mathematical HRR model specific to water mist, this does not indicate lower performance. Instead, it highlights the need for application-specific, full scale fire testing and data collection that captures the unique performance characteristics of water mist systems rather than relying on sprinkler-based assumptions.

## 2.10 "Water mist systems cannot be used with smoke control systems"

This argument overlooks the fact that both sprinklers and water mist require coordinated design when integrated with mechanical ventilation. Ventilation can affect droplet movement, but modern, approved water mist systems intended for ventilated spaces are tested under realistic airflow conditions. Nozzle selection, droplet momentum, discharge pattern, and system pressure are all tailored to counteract ventilation effects and ensure mist reaches the fire zone.

Application-specific testing has proven water mist to be effective in road tunnels, industrial facilities, and large open spaces with active smoke control. In some cases, controlled airflow can even improve mist distribution and cooling efficiency.

The interaction between suppression and ventilation must be assessed for any system type, as poorly coordinated designs can reduce performance, also conventional sprinkler systems. The key is that water mist should be selected from an approval that covers ventilated conditions for the intended hazard. When this is done, ventilation does not prevent water mist from achieving its intended suppression and tenability objectives.

## 2.11 "Only sprinklers have been proven to extend travel distances"

While most published modelling and empirical data on extended travel distances has focused on sprinklers, laboratory and full-scale testing have shown that approved water mist systems can also improve tenability and extend Available Safe Escape Time (ASET) in a manner comparable to sprinklers.

Water mist achieves this through fast activation, rapid control of flames, significant temperature reduction, smoke cooling, and the binding of particulates, which can also improve visibility. These mechanisms directly support extended safe egress in many scenarios.

Although formal inclusion in regulatory allowances will require specific modelling and data collection similar to that undertaken for sprinklers, the underlying physical performance principles are the same. In practice, there is no inherent reason water mist could not be applied for extended travel distance benefits once equivalent evidence is documented and accepted by the relevant decision-making bodies.

## 2.12 "Water mist systems are just small sprinklers"

This is a common oversimplification driven by gaps in detailed knowledge in this technology. While automatic water mist nozzles may resemble sprinklers in appearance and activation method, the two technologies differ in their design basis and in the way they achieve fire suppression.

Water mist systems operate through a combination of surface cooling, oxygen displacement, and radiant heat attenuation, rather than relying primarily on high water volume and surface cooling. The formal definition of water mist is based on a droplet size threshold (Dv90) of 1000 micrometres. A nozzle producing droplets of 999 micrometres is classified as mist, while one producing droplets of 1001

micrometres is classified as a sprinkler, This illustrates that the definition is somewhat arbitrary and not necessarily a reflection of operational capability.

Mechanically, water mist and sprinkler systems share similar components. Both may use thermally activated nozzles or open nozzles and both employ pipes, valves, pumps, and water supplies. If the term "small sprinklers" is meant to refer only to lower water flow rates, then there is some truth to the comparison. However, the critical distinction lies in the design philosophy. Sprinkler systems are most often designed according to prescriptive standards, whereas water mist systems are performance based and engineered specifically for the fire scenarios and environmental conditions of the protected space.

In essence, water mist is not simply a scaled-down sprinkler. It is a distinct fire suppression technology with its own operational principles, design requirements, and performance characteristics.

## 2.13 "All water mist systems are the same"

This iargument overlooks the technical diversity within water mist technology. In reality, water mist systems can vary significantly depending on several key parameters, including system pressure, droplet size, discharge characteristics, and method of application. These differences affect not only how the system performs but also where and how it can be used.

Water mist systems are generally categorised by pressure: low pressure, intermediate pressure, and high pressure. Each category uses a different range of operating pressures, which influences the size and velocity of the droplets produced.

Beyond pressure, the droplet size, spray pattern, and nozzle design all contribute to how a system suppresses or controls fire. Some systems are designed for local application, targeting specific hazards such as flammable liquid pools or equipment surfaces. Others are configured for total compartment protection, relying on full room coverage and enclosure integrity.

Importantly, water mist systems are not interchangeable. Each system must be tested and approved for the specific fire scenarios and environments (applications) for which it is intended. Full-scale fire testing is a core requirement for certification under recognised international standards. A system approved for protecting a data centre, for example, cannot be assumed to work effectively in a tunnel or turbine enclosure without dedicated testing. This application-specific nature is a strength of water mist technology, allowing systems to be tailored precisely to the fire risk. The purpose and method of protection of a water mist system, as well as the fire testing that has validated it, is described in the manufacturer's DIOM manual.

In summary, water mist is not a single, uniform product. It is a flexible and diverse technology platform composed of many different system types, each with specific capabilities and limitations. Proper understanding of this diversity is essential for safe design and correct of technology.

## 2.14 "Water mist systems are too complicated to operate or maintain"

Although water mist systems may involve more specialised design considerations, they are engineered for reliability, ease of operation, and straightforward maintenance. In practice, modern water mist systems are no more complex to operate or maintain than conventional sprinkler systems.

Water mist systems are composed of many of the same basic components found in traditional sprinkler systems, such as nozzles, piping, valves, sockets, pumps, and water tanks. While these components may look different and are often more compact, the overall system architecture is familiar to fire protection professionals. This structural similarity also means that maintenance tasks and operational procedures are generally well understood within the industry.

What may create a different impression is the greater plurality of nozzle designs in water mist systems, each tailored to specific applications. This variation, which does not exist to the same extent in sprinklers,

can suggest added complexity when in fact it is simply application-driven engineering. By contrast, sprinklers may appear more uniform, e.g. an ESFR sprinkler head may look similar to a domestic head, but they function very differently. This illustrates that perceived simplicity in sprinklers can be misleading, just as perceived complexity in water mist can be.

Once installed, water mist systems function automatically and typically require no user intervention. Routine maintenance consists of standard procedures such as inspections, pump tests, nozzle checks, and control panel verification. These tasks are comparable in scope and frequency to those required for sprinkler or gas-based systems and are typically performed by qualified service providers.

In many cases, water mist systems offer operational benefits. Because they use clean water and low discharge volumes, clean-up after activation is faster and less disruptive. The compact size of the components can also simplify installation and maintenance, particularly in space-constrained or sensitive environments.

Manufacturers and system providers offer clear documentation, service guidance, and technical support to ensure ease of use and long-term system reliability. As with any fire protection system, proper installation and regular servicing are essential, but there is nothing inherently more difficult about managing a water mist system.

In conclusion, water mist systems are not too complex. They are built on familiar principles using similar components and are fully manageable with standard industry practices.

## 2.15 "Water mist is not suitable for retrofitting"

. Inreality, water mist systems are often ideal for retrofit projects because of their compact pipework, lower water demand, and reduced need for major structural alterations.

Traditional sprinkler systems often require large-diameter pipework, extensive ceiling space, and significant water supply infrastructure, which can be challenging to integrate into existing buildings. By contrast, water mist systems use much smaller pipe diameters, lighter materials (often stainless steel), and lower overall water flow rates. This makes it easier to route piping through confined spaces without compromising the aesthetics or structure of the building.

In many retrofit scenarios, the reduced water demand means that the system can operate from small on-site tanks or cylinder-based supplies, avoiding the need for a dedicated fire pump room or costly upgrades to mains water connections. This is particularly valuable in heritage properties, high-rise buildings, or facilities with limited access to water.

Because water mist discharges significantly less water during operation, the risk of collateral water damage is also reduced. This can be critical for sensitive retrofit environments such as museums, data centres, high-end homes, or historic landmarks where preservation of finishes and contents is a priority.

Numerous case studies demonstrate the suitability of water mist for retrofits, from upgrading old sprinkler-protected buildings to converting unprotected spaces without disrupting ongoing operations. When combined with careful design and certified equipment, retrofitting with water mist can be both technically feasible and cost-effective.

## 2.16 "You need a large water supply for mist systems"

This is the opposite of the truth. One of the primary advantages of water mist technology is its dramatically lower water demand compared to traditional sprinkler systems. Many water mist designs use for certain applications as little as 10–20% of the water flow required by conventional systems to achieve equal or even superior fire suppression results.

The reduced flow rate allows for smaller pipe sizes, more compact pumps, and significantly smaller water storage tanks. In some cases, particularly with pre-engineered or modular systems, the entire water supply can be contained within pressurised cylinders, eliminating the need for a tank or pump altogether. This approach is also common in transportation applications, such as buses and trains, where space and weight are critical factors.

This advantage is especially relevant in retrofits, remote sites, ships, or buildings where space is at a premium or water is scarce. It also reduces the load on building drainage systems and simplifies post-fire clean-up. Lower water requirements can have further design benefits, such as avoiding costly upgrades to the building's mains connection or allowing for reduced structural reinforcement due to lighter water-filled pipework.

In many cases changes in building use for example, converting residential buildings into assisted living facilities, create challenges in providing the large water supply or tank capacity required for traditional sprinklers. Water mist systems can often be installed without such upgrades, offering an effective, space-efficient, and code-compliant alternative. By needing less water yet delivering highly efficient fire suppression, water mist overcomes one of the longest-standing limitations of traditional water-based systems.

## 2.17 "Fire service don't understand or trust water mist systems"

This argument undermines the competence of the fire service. Water mist technology has been in use for over 30 years and is increasingly recognised by fire services and other Authorities Having Jurisdiction (AHJs). Unfortunately, differences in approaches between some water mist companies (not certified / validate products) have caused confusion in certain countries.

In general, fire services, especially in Europe but also in other continents, are aware of water mist technology, and awareness, understanding and acceptance continue to grow steadily worldwide. Fire protection as a field is, however, traditionally conservative.

Acceptance is also linked to the application. In key sectors such as road tunnels, buses, trains, ships, data centres and industrial hazards there is no real debate about understanding water mist systems. In some other applications, discussions remain, but these are usually related to a lack of information or practical experience.

As more documented case studies are shared, and as fire brigades gain firsthand experience with the benefits of water mist, the perception gap continues to close. Today, in many regions, water mist is not only understood but also trusted as a reliable and effective tool within the broader fire safety strategy.

## 2.18 "Water mist systems are not approved by insurers or authorities"

This is an outdated misconception. Today, most major insurers and regulatory authorities recognise and approve water mist systems, provided they are tested and certified for the specific hazard in accordance with recognised standards, or at least they should.

Third-party certifications from organisations such as FM Approvals, UL, VdS, LPCB and DNV are widely accepted as proof of system performance. These certifications are based on rigorous full-scale fire testing under realistic conditions, ensuring that approved systems meet or exceed established safety benchmarks. Many insurers regard these approvals as equivalent to, and in some cases more demanding than, traditional sprinkler standards.

Insurers will, over time, increasingly offer reduced premiums for properties protected by water mist systems, recognising the significantly lower water damage risk and the technology's ability to limit business interruption after a fire. This is particularly important in facilities with high-value assets, sensitive equipment or critical infrastructure, where avoiding prolonged downtime or collateral damage

can be as important as extinguishing the fire itself. In many cases insurers have to cover higher costs for collateral water damage than for the fire damage itself.

Authorities Having Jurisdiction in many countries have incorporated water mist into their codes, guidelines and approval processes. For example, EN 14972 is now a formal European standard for the design, installation, inspection and maintenance of water mist systems, and NFPA 750 in North America provides a framework for system design and performance verification. Marine applications are regulated by the International Maritime Organization (IMO), which has decades of operational experience with water mist on ships.

The International Water Mist Association maintains an up-to-date standards and approvals matrix to assist designers, owners and regulators in navigating the applicable frameworks. With the correct approvals and documentation, system acceptance by both insurers and authorities is usually straightforward.

## 2.19 "Water mist systems require high maintenance costs"

This is a misconception based on assumptions rather than actual operational experience. In practice, the maintenance requirements for water mist systems are comparable to those of sprinkler or gas suppression systems, and in some cases the overall lifecycle costs are lower.

Many water mist systems use stainless steel piping and components, which are highly resistant to corrosion and scaling. This reduces the likelihood of leaks, blockages, or premature component replacement. The lower standing water volume in the system also means reduced risk of microbial growth or sediment accumulation, which can be issues in conventional wet-pipe sprinkler systems.

Routine maintenance activities typically include visual inspections, functional testing of pumps or cylinders, valve operation checks, and verification of control and alarm systems. For cylinder-based systems, periodic weighing or pressure checks are straightforward and often quicker than servicing large pump-and-tank systems. Because the system architecture is familiar to fire protection professionals, most maintenance can be performed by qualified service providers without specialised equipment.

The reduced water demand and compact component sizes can also simplify maintenance access, particularly in congested plant rooms or ceiling voids. In addition, because water mist discharges less water during operation, post-activation clean-up is significantly easier and less costly.

When system design follows recognised standards, and when maintenance schedules provided by the manufacturer are followed, there is no inherent cost penalty for choosing water mist. On the contrary, the combination of durable materials, low corrosion potential, and reduced clean-up needs often leads to lower total ownership costs over the system's lifespan.

## 2.20 "Mist doesn't cool surfaces effectively"

This arises from a misunderstanding of how water mist interacts with heat and fire. In fact, water mist is recognised for its superior cooling performance, achieved through the use of very fine droplets. Compared with conventional sprinkler systems, water mist is often more effective at cooling hot surfaces because the finer droplets provide a much higher surface area-to-water volume ratio. They not only cool the surfaces directly but also reduce radiant and convective heat transfer before the heat reaches those surfaces.

When water mist droplets are discharged into a fire zone, several heat control mechanisms occur simultaneously:

- Evaporative cooling: The fine droplets absorb heat energy very efficiently and evaporate rapidly, removing large amounts of heat from the combustion zone. This reduces flame temperature and slows fire growth.

- Surface cooling: Droplets that reach heated structural or fuel surfaces absorb heat directly by conduction and convection. The greater the droplet surface area in contact with the material, the more efficient the cooling.
- Radiant heat attenuation: One of the main strengths of water mist is its ability to block and absorb radiant heat. The suspended droplets form a semi-transparent “curtain” that interrupts the transfer of heat radiation from the fire to surrounding objects. This greatly reduces the risk of secondary ignition and protects building occupants, firefighters, and adjacent structures from heat exposure.

Because water mist droplets are smaller and more numerous than sprinkler droplets, they can cool a larger proportion of hot surfaces, including areas shielded from direct flames. This distributed cooling effect limits fire spread, reduces re-ignition risk, and helps preserve the structural integrity of building elements. By selecting appropriate spray characteristics and distribution, water mist systems can be tailored for both gas-phase interaction and surface wetting.Full-scale fire tests in tunnels, turbine enclosures and commercial buildings have consistently demonstrated the rapid reduction of both gas and surface temperatures achieved with water mist. The simultaneous blocking of radiant heat is particularly valuable in confined or high-hazard environments, where limiting heat transfer can be as critical as extinguishing the flames.

## 2.21 "Water mist cannot suppress deep-seated fires"

This is often based on outdated or limited testing. While certain fine-droplet systems are optimised for rapid flame knock-down rather than deep penetration, many modern water mist designs are capable of suppressing deep-seated fires effectively.

System performance depends on factors such as droplet momentum, spray pattern, discharge duration, and nozzle placement. To suppress Class A fires (solid fuels), droplets must not only have sufficient velocity to penetrate fuel beds and reach concealed smouldering materials, but also be able to pre-wet adjacent combustibles and provide prolonged cooling to prevent re-ignition.

Full-scale tests in tunnels, warehouse storage, commercial occupancies (hotels, hospitals, offices), residential buildings and train compartments have shown that properly engineered water mist systems can suppress, and in some cases fully extinguished, deep-seated Class A fires. In these applications, the combined effects of surface cooling, gas cooling, and, in some cases, oxygen displacement control both visible flames and hidden smouldering.

The key is to align the system type and configuration with the specific hazard. A system designed only for surface flame control may not be effective against deep-seated fires without dedicated approval testing. The strength of water mist lies in its flexibility: systems can be engineered with different spray characteristics and functions to address a wide range of fire scenarios.

## 2.22 "Water mist is ineffective against flammable liquid fires"

In reality, water mist is widely used and approved for flammable liquid hazards, including Class B pool and spill fires, as well as pressurised fuel spray scenarios. The fine droplets cool the fuel surface rapidly, displace oxygen at the flame interface, and reduce vapour release.

Water mist can be applied as a local application system over fuel processing equipment, turbines, transformers, or loading bays, or as total compartment protection in enclosed spaces such as machinery rooms. Some systems are specifically approved for cooking oil fires in commercial kitchens, providing a clean, water-based alternative to chemical agents or foam.

In many cases, water mist offers operational and environmental advantages over foam systems. It eliminates the need for foam concentrate storage, mixing, and disposal, avoiding the environmental concerns associated with PFAS-containing products.

The success of water mist in this area is demonstrated by long-term adoption in offshore platforms, ship engine rooms, and industrial facilities handling volatile liquids, where rapid and reliable suppression is critical.

## 2.23 "Water mist droplets are a health hazard and can enter the lungs"

This concern often arises from confusion with aerosols or ultra-fine mists. In reality, water mist droplets used in fire suppression are typically larger than the respirable size range (<10 microns) and do not remain suspended in the air for extended periods. Most approved systems produce droplets in the 50–400 micron range, which fall quickly and do not penetrate deep into the respiratory system.

Water mist is also widely applied in occupied spaces such as hospitals, trains, ships, and offices, with system design and approvals taking human exposure into account. There is no evidence of adverse health effects when systems are used as intended. Even potential biological risks such as Legionella are not considered relevant for water mist systems, as these operate under conditions that do not support bacterial growth or transmission.

## 2.24 "Water mist cannot be used in freezing environments (snow from nozzles)"

While freezing conditions can affect any water-based fire suppression system, there are well-established methods to ensure reliable water mist operation in cold climates.

Options include using dry-pipe or pre-action configurations, trace heating and insulating pipework, or circulating antifreeze solutions in sections of the system, subject to approval and material compatibility. In some cases, nitrogen-driven cylinder systems are used, with water stored in a heated or insulated space and discharged only when needed.

Water mist systems have been successfully installed in cold-storage warehouses, outdoor process plants and unheated transportation infrastructure in Nordic and alpine regions. Proper design, material selection and environmental protection ensure full functionality even at sub-zero temperatures.

Cold climates do not turn water mist droplets into snow, which is another unfounded claim sometimes made.

## 2.25 "Water mist systems are only for high-end or niche projects"

While water mist gained early visibility through high-value installations such as cruise ships, museums, and data centres, it is now applied in a broad range of everyday buildings. This includes offices, residential blocks and towers, schools, hospitals, car parks, and manufacturing facilities. Growing familiarity among designers, contractors, insurers, and authorities, along with competitive market pricing, has made water mist a viable choice for mainstream fire protection. In many cases, its performance, low water demand, and minimal collateral damage make it a cost-effective alternative to conventional sprinklers or gaseous systems, regardless of project scale.

# 3 Conclusions

This document has examined and corrected a range of persistent misconceptions about water mist technology. Many of these “mistconceptions” originate from assumptions based on traditional sprinkler systems, a lack of exposure to modern, approved water mist installations, or outdated information from the early years of the technology’s adoption.

The evidence presented demonstrates that water mist is:

- A mature and well-established fire suppression technology with over three decades of proven use in land-based, marine, transportation, industrial, and heritage applications
- Tested and approved through rigorous, hazard-specific performance protocols by recognised international certification bodies
- Technically versatile, capable of protecting a wide range of risks from residential flats to industrial process equipment and critical infrastructure
- Effective in controlling flames, cooling gases and surfaces, and reducing radiant heat — all while using a fraction of the water required by traditional sprinkler systems
- Able to integrate successfully with other building fire safety systems, such as smoke control, when designed and tested for the intended environment
- Well-suited to retrofits, space-constrained projects, and applications where water damage, environmental concerns, or rapid recovery are key considerations

The IWMA has published further detailed resources to support designers, authorities, insurers, and end users in understanding and applying water mist correctly:

- Water Mist Guide: A comprehensive reference on the principles, applications, and design considerations for water mist systems
- IWMA Standards and Approvals Matrix: An up-to-date summary of all relevant land-based and marine standards and third-party approval schemes worldwide

The continued adoption and correct application of water mist depends on informed decision-making based on verified performance data and recognised approvals. Stakeholders are encouraged to consult the IWMA resources, seek expert engineering support, and ensure that systems are designed, installed, and maintained by competent professionals.

With the right knowledge and practices in place, water mist offers a safe, efficient, and sustainable solution for modern fire protection needs.