

MicroDrop® High Pressure Water Mist

Clearing the fog around water mist

A white paper

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Interest in water mist based fire suppression systems continues to grow as the highly efficient use of water by these systems results in relatively small quantities being used in comparison to other types of water based systems. However, Andrew Shiner, Director of Strategic Products (Europe, Middle East and Africa) for Tyco Fire and Integrated Solutions argues that the scale of the contribution they can make to fire safety in a variety of industrial facilities, commercial premises and public spaces is not yet fully understood or appreciated.

This article looks at how high pressure water mist systems work. It also examines the issues affecting the use of conventional systems, and discusses how high pressure water mist systems overcome these.

How does high pressure water mist work?

High-pressure water mist systems convert water (at a pressure of 100bar) to a fine atomised mist. This mist evaporates very quickly creating a significant cooling effect, which is the primary fire extinguishing mechanism. As the water evaporates it expands in volume, helping to displace oxygen from the flame, further aiding fire extinguishing. This system combines some of the characteristics of conventional deluge or sprinkler water-based fire suppression systems (with added performance advantages) with some of the characteristics of gaseous fire suppression systems and is very effective at reducing the impact of radiant heat, which is beneficial in reducing fire damage. It is the obvious choice from an environmental point of view, as it contains nothing but pure water, therefore being 100 per cent safe for people, property and the environment.

The economic impacts of fire damage

One of the main advantages of high pressure water mist is the minimal amount of water discharged in the event of a fire. This ensures that the fire is rapidly controlled with very little consequential water or fire damage. These factors make it an ideal solution for the protection of electronic equipment, data processing centres, offices and hotels. High pressure water mist is also particularly applicable to the cultural heritage sector to protect irreplaceable archives, age old manuscripts and historic artefacts. Conclusive archive fire tests, conducted recently in association with Historic Scotland in the UK, showed that only those documents that were actually set alight for the purpose of the test were partially damaged. All other documents near the seat of the fire remained unscathed. Some of these documents were slightly damp as a result of the water discharge but dried out naturally within 30 minutes, testimony to the exceptional characteristics of high pressure water mist systems.

Tyco Fire & Integrated Solutions' recently launched MicroDrop high pressure water mist system, for example, typically uses 10 per cent of the water per square metre that traditional water based systems use. The fine water mist further limits fire damage by washing smoke particles out of the contaminated air. The typical 90 per cent decrease in water requirements, and increased protection of the buildings contents, have the secondary benefit of helping customers secure lower insurance premiums.

Where production downtime is a key issue for mission critical market sectors, high pressure water mist systems are very well suited. The downtime required to re-instate a high pressure water mist system is minimal compared with a gaseous fire suppression system or any traditional system that requires cylinders to be refilled or control valves to be reset. The intelligent use of water ensures that a high pressure water mist system is the ideal solution for many industrial applications including engine test cells, rolling roads, hydraulic pits, industrial ovens and paint spray booths. Also, because water mist cools cables and metal, less fire damage occurs and production can re-start sooner – further reducing the economic impact of a fire.

The challenges of fire fuelled by hazardous materials

It is well known that water should not be used to extinguish a fire that uses fat (e.g. cooking oil) as a fuel. This is because water applied in volume penetrates the hot oil or fat and the resulting rapid expansion can cause a fat ‘explosion’. The use of water mist avoids this by applying very fine droplets which do not penetrate the hot oil or fat and this has led to widespread adoption of high pressure water mist in the food production industry. The secondary benefit is that it lowers the temperature of the hot oil, reducing the possibility of the fire reigniting. Additionally, expensive clean-up operations are avoided. In a commercial environment where just-in-time deliveries are vital, this is invaluable in reducing the downtime of a food production line.

Similarly, one of the key challenges for managers of industrial areas is how to contain a fire fuelled by flammable liquids, with paint spray booths and paint drying ovens being typical examples. High pressure water mist lends itself well to this challenge, with traditional nozzles discharging water to cover the hazardous area itself, whilst a row of micro-nozzles mounted on a pipe create a curtain of water mist to cover any large openings to the area, improving compartmentalisation and reducing the amount of toxic fumes and gas that can escape into the surrounding area.

Unusual locations and limited space

There are many situations where conventional water based systems are not suitable, for example wind farms. The fast expanding use of wind turbines for power generation, coupled with their high capital cost, has put fire protection at the top of the agenda for wind farm operators. The very nature of their design and construction means high pressure water mist systems are an ideal solution for wind turbine protection. Should a fire occur it is likely to be high up in the turbine’s housing and the site itself will often be in a remote and difficult to access location.

Very low water supply requirements, small and lightweight pipe diameters, and a compact pump design ensure that a high pressure water mist system can be fully contained within the housing. The water tank on the pump contains a heating element to make the unit frost-proof, plus there is battery back-up in case of power failure.

The future of high pressure water mist

According to a report prepared in the UK in 2005 by the Building Research Establishment, there are “still a number of myths, misunderstandings and a lack of knowledge about water mist systems”. The key issues are a lack of understanding of both how water mist systems work, and the very appreciable difference between these and sprinkler systems. What is undeniable however is that water mist is an emerging and credible fire protection technology that is the obvious choice where little water is available and where the effects of discharge of the fire protection system are a major consideration.

With the growing concern for the environment and a strengthening desire to adopt sustainable solutions, high pressure water mist it is a fire-fighting technology that can rightly take its place alongside the other leading solutions. With these in mind, I believe that we will see an ever increasing take-up rate of high pressure water mist systems such as MicroDrop in many public spaces and key industries such as food production, the automotive sector and electrical equipment manufacture in the near future.