# Bright future

Not only is water-mist technology continuing to find new applications but work is about to begin on a new EN standard. Jose Sanchez de Muniain reports from the International Water Mist Conference in Vienna, Austria.

Work on an EN standard for water mist is beginning shortly as a result of industry realisation that the current Technical Standard causes confusion in a market where separate national standards exist in parallel.

Joachim Böke from Minimax provided an update on European standardisation work for water mist, explaining how the Technical Standard had been initially published eight years ago in order to introduce the concept of water mist into the market. Historically, a technical Specification (TS) document exists for standards that cannot yet obtain the required support as a full EN European standard, which has an obligation for implementation by EU member states.

The first water-mist task group was established in 1998 and it wasn't until 2008 that TS 14972 was published. The technical committee is now working towards converting the TS into an EN standard, and to this end, it has been re-designated as a working group as opposed to a task group, which according to Böke should speed up the process.

As part of the conversion process, the TS is being restructured and new test protocols added, many of which are identical to those published by FM and VDS.

A draft, expected next year, will then be reviewed by the national bodies.

## Applications – automatic fire suppression system for modern architecture

Water mist as a fire safety solution that supports the modern architectural trend for wide open spaces in exposed glass and steel was highlighted by a project involving the construction of the new €196.4-million (US$200-million) Thermenregion Baden Hospital in Lower Austria.

Delegates heard how water-mist systems support architectural trends for wide open spaces and exposed steel and glass.

The 450-bed hospital, which is due for completion next year, consists of a high-ceilinged central hall that provides open access to three separate buildings, each three-floors high. The hall, which includes waiting/meeting areas and a café, connects with the three buildings via large glass facades with no fire partitions. The client was looking for an automatic fire-fighting system and, although this could have taken the form of a conventional sprinkler system, Rüdiger Kopp of Fogtec Fire Protection explained that water mist was favoured because of its high cooling ability. "Fire resistant cladding could have been used but it would have increased cost."

The resulting fire protection concept consists of a wet, high-pressure water mist system for the hall and all three buildings areas adjacent to the entrance hall, which include three floors of each neighbouring building. The system design is based on OH1 risk classification with 60 minutes of operation for a 72m$^2$ area. The main challenge for the project, however, was the 12m-high ceiling of the entrance hall, which led to a requirement for relevant fire tests.

As part of the system testing and acceptance process, a full-scale scenario was developed based on CEN TS 14972 and carried out at CNPP. Fire tests took place under a single nozzle and between four nozzles, all with glass bulb activation.

The fire load used was the same as per the IMO A800 fire test package, consisting of two sets of four sofas.

Evaluation criteria were; temperature reduction at the ceiling and vicinity of the fire (to ensure safe evacuation), reduction of heat radiation (to evaluate the effectiveness of water mist as a shield for exposed glass and steel); and fire control and suppression (to avoid fire propagation to the target sofa set).

All the relevant nozzles activated within 2 minutes and 50 seconds, with the discharge leading to rapid temperature and heat radiation reduction. The fire was controlled with no propagation to target sofas.

Based on the success of the fire test results a wet system for the 5m-high ceilings of all the rooms adjacent to the entrance hall has been developed. For the perimeter of the glass facades, the distance between nozzles has been reduced

Left to right: Dr Tim Nichols of Tyco Fire Protection Products and Joachim Böke of Minimax.

The water mist system is controlled by a central pump unit in the building basement, which contains five high-pressure pumps – including a redundant pump – with a capacity of 120 lpm at 120 bar; and two 2,000-litre break tanks with main water supply intake. The system has the capability to operate for 60 minutes feeding nozzles along 26m of the glass facades in the entrance hall, as well as nozzles in the neighbouring areas in the adjacent buildings. A central alarm valve and ten zone valves indicate where the system has been activated.

Summarising, Kopp emphasised how water mist's cooling properties are enabling architecturally pleasant solutions for open buildings, through compensating for missing fire separations.

## Buyer beware

The incorrect implementation of marine-certified water mist systems in land-based local applications was the subject of a thought-provoking presentation by Dr Tim Nichols of Tyco Fire Protection Products.

A local application system is one where a fixed supply of extinguishing media is discharged into a defined area that either has no surrounding enclosure or is only partially enclosed.

Examples of local applications include Class B fuel risks such as transformers, generators and industrial machinery. These solutions are popular because in large spaces it makes no sense to fill an entire body with extinguishing media and a local application is, therefore, more economical whilst also reducing collateral damage.

Dr Nichols explained that he had come across a number of occasions where the IMO marine standard for local applications had been incorrectly used on land, even though the differences between the two regulatory environments are significant.

In ships, IMO 1387 is applied on the premise that a secondary, total flooding system is in place. This is because in a ship carrying multiple engines it would be undesirable to flood the entire volume to extinguish a small spray fire. "But if that local application doesn't work, at least you've got back-up."

Dr Nichols reported coming across land-based installations equipped with marine-based solutions where the secondary total flooding system had been 'forgotten'. Furthermore, he suspected that the fact that the marine test protocol IMO 1387 only covered spray fires was sometimes not fully understood by the owner. "A correct bid [for a tender] should say it does not cover pool fires or concealed fires."

Comprehensive protocols for land-based local applications do already exist, in the form of FM 5560 Appendix I – also the basis for a recently published British Standard – and the French standard CNPP TD2.

FM 5560 Appendix I comprises 23 test configurations, including square pool fires, channel pool fires, combined spray and pool fires, and obstructed pool fires. Mandatory interlocks are also required by the protocol for fuel, electrical and lubrication shutdown. "If you are involved in a land-based proposal [using IMO 1387], as long as that is documented, and the client is aware of the limitations, fine. But I am concerned we have marine-based designs going to land-based applications and the client thinks that it's going to put out all sorts of fires. And that is where you have to be very careful. Having been in five-plus witness cases, you do not want to be the other side of a lawyer when things go wrong."

To show the important differences between the marine and land-based protocols, Dr Nichols shared the results of testing Tyco had carried out according to the land-based standard CNPP TD2, but using marine IMO 1387-certified nozzles. Both low and high-pressure nozzles approved to IMO 1387 were tested, in addition to a new nozzle.

Significantly, both IMO nozzles failed the land-based test, and the new nozzle was successful only after the deflector design and K-factor had been changed – and even then only after the inclusion of foam additive.

The implication that there may be a number of land-based installations already carrying IMO-certified systems that would not perform as expected in a fire, concluded Dr Nichols, should be a concern for the entire water mist industry.

## Aerosol turbines for mitigation of harmful emissions and firefighting

Francesco Fritz of Emi Controls took the audience through the testing programmes that culminated in the joint launch with vehicle manufacturer Magirus of a fire-fighting water-mist turbine called Aircore which can be either truck-mounted or used as a remote-controlled unmanned unit.

The gas-capturing capabilities of the turbine's water mist were first tested in open air and tunnel conditions at the Institut der Feuerwehr in the state of Sachsen-Anhalt, Germany, using trichlorosilane gas. The falling water mist was collected and the concentration of the gas absorbed in the water measured. Various settings were tested including turbine/water curtain techniques; droplet size; water rate; and air temperature.

Results showed how in the tunnel tests, the best gas mitigation rate of 75% was achieved using the turbine setting. "We also observed that smaller droplets improve the absorption efficiency since they create a bigger interface between the gas and the absorbing fluid."

Fire-fighting tests followed at the MOL refinery in Hungary using 160m² pool fires containing 2,400 litres of fuel, which resulted in heat release rates of up to 350MW. Again, tests were repeated using various application techniques; extinguishing fluids (water and 1% AFFF foam/only water); and rates of application: "We could knock down the flames to 5% of the initial heat release rate after 20 seconds compared to 65 seconds when using the traditional technique."

The turbine enables a gentle application of the water-foam mixture on the surface of the burning fluid; it was also found that the mixture surrounded small objects located in the stream and that use of the turbine reduced the use of water and foam.

"In all tests done, the aerosol turbine showed a higher efficiency both for gas absorption and for fire-fighting applications," concluded Fritz.