A mist-attend conference

The International Water Mist Conference 2009 enjoyed the highest attendance so far recorded by the IWMA, and there are clear signs of a growing interest in inland applications, reports Jose Sanchez de Muniain.

IWMA Chairman Ragnar Wighus breaks the ice at the conference by singing the rousing Watermist Hymn, invented a few hours previously in his hotel room, with a tune borrowed from a song used to support his local football team.

Understanding the mechanisms for successful water mist fire protection systems – Louise Jackman and Kelvin Annable, BRE

Louise Jackman presented on a three-year project partly funded by the BRE Trust and principally motivated by building control officials and insurers in the UK, where the normal approach for accepting water suppression systems is to use a recognised standard to pick up approved products. When officials are presented with watermist, however, explained Jackman, they find the safety cushion of standards does not exist. Additionally, existing data is largely experimental and the people reading it are not necessarily well versed at interpreting it. A willingness to investigate watermist applications for different areas such as commercial offices does exist, nevertheless, said Jackman.

The BRE began its project with the new European watermist standard, CEN 14972, which included a test protocol. The programme also researched papers from the IWMA, fire scenario surveys, and typical fire engineering designs: "We also carried out a survey at Canary Wharf examining office layouts in high rise buildings." The general feeling was that from an approvals perspective there was not much information on solid combustible fires in open plan spaces. "And looking at CEN, we felt it was a good approach but that it could be improved."

A series of experiments carried out at BRE's facilities with varying factors (reduced waterflow, shielding, ceiling height, nozzle spacing, etc) were then described by BRE's Kelvin Annable. A key factor of the experiments was found to be ventilation, which negatively impacted on the effectiveness of the watermist system, by having a highly disruptive effect on discharge from the nozzle. Using a higher pressure system did not improve effectiveness either.

It was also discovered that sealed compartment conditions had a highly beneficial effect on watermist performance.

After a series of experiments, BRE developed an office scenario for submission to the British Standards Institute.

Within the BRE proposed standard, tests are carried out in an open ceiling at 5m in height, with approved 12m^2 spacing, and a coverage of 5mm per minute. BRE demonstrated its test with low pressure watermist nozzle heads, at 13 bar, which were described by Annable as "doing a very good job at suppressing fire spread".

High pressure systems, however, were less effective. "In one test on 9m^2 spacing, at 100 bar, the fire was not suppressed – although there was evidence of reduction in temperature and fire control. Having witnessed a few of these, our feeling is that the high pressure systems don't deal with hot intense fires as well as low pressure systems, in some cases where droplet size is an important factor," noted Annable: "They can be overpowered by fire and driven off and they don't have the same penetrating effect through a hot fire to get to the fuel and wet it."

High pressure water mist system; alternative solutions for critical civil applications – Marco Pesaola, Eusebi Impianti

Marco Pesaola concentrated his presentation on the many civil applications that exist for watermist systems. He echoed Jackman's comments on the lack of watermist protocols for civil applications, outlining how in the past these had often been adapted from test protocols for marine applications. The latest CEN standard changed everything, however: "This is very important because we can now present and design a system, and have it approved." He went on to describe the results of a series of tests comparing watermist with sprinkler systems, carried out in accordance to the new CEN standard. In these tests, the watermist systems almost immediately controlled the fire, as opposed to sprinklers which took nearly three minutes to suppress the fire. Both systems nevertheless extinguished the fires in the 30 minutes required by CEN.

The benefits of watermist systems in high rise buildings were emphasised, and Pesaola added that a working group in the CEN standard was working towards a test for ordinary hazards 3, meaning that watermist could be used to protect libraries, shopping centres and communications rooms. "To conclude, the technical standard for watermist is good news for the design and approval of systems by authorities. And our tests demonstrate that watermist can be used in these applications with high performance, and while using less water."

A member of the audience (a specifier and advisor to the UK government), pointed out the disparity between the results of the watermist vs sprinkler experiments carried out by BRE (according to their proposal for a new fire source), and those of Eusebi (consistent to the actual CEN standard). "I'm hearing two different stories about testing in premises – where does that leave us?"

Pesaola clarified that various parameters could lead to different conclusions (eg how the fuel package was constructed/ignition source). Ragnar Wighus, President of the IWMA, added that although not every single fire test was represented within CEN specification, nevertheless the watermist standard provided a scheme on how to identify a fire hazard; how to create an appropriate watermist test procedure to represent it; and to come up with some sort of result that was more comprehensive than test procedures elsewhere.

The delegate continued that specifiers in the UK were desperate for a recognisable standard. Louise Jackman added that the

principal question was hard to answer. "We felt the EN test was a good starting point but it had some flaws. For example when you turned off the ignition source after five the fire below the table diminished. We also felt it necessary to have a fire that could gradually spread. All I can say is that there is always variability."

Water mist systems for the protection of production and storage areas of flammable liquids – Ruediger Kopp, FOGTEC

Kopp began by explaining that FOGTEC has been developing high pressure watermist technology for over 10 years.

Jointly with VdS (the Germany-based testing and certification institution for fire prevention and safety technology) FOGTEC has developed a fire test scenario to cover wide applications in the paint and chemical industry, where flammable liquids are processed and stored. "The test protocol we developed included both open and hidden pool and flowing fires, using different flammable liquids at surfaces of 2m^2 and 4m^2."

Watermist was used in conjunction with an AFFF agent, at a concentration of 3%, to ensure that volatile flammable liquids and alcohols could be extinguished safely. "The design parameters were set up following standards such as those of IMO and CEN, where extinguishment has to be in the first 15 minutes, with the additional target that the surface temperatures must be limited to 50 ^{0}C, to avoid fire spread and explosions." The protocol has been approved up to ceiling heights of 5m.

Based on the positive test results, a number of installations have already been carried out, including a watermist deluge system and early flame and smoke detection, in a factory with volatile liquids.

The development of the UK watermist standard – Bob Whiteley, Tyco

Chairman of the BSI (British Standards Institute) Watermist Working Group, Whiteley's presentation covered the UK's current position as regards the preparation of BSI drafts for watermist codes of practice. "The first question everyone asks is why a UK standard for watermist? Two years ago we had no idea when or if we would get a CEN standard. And there were concerns that the work programme for CEN did not address some issues and needs that the UK industry thought were important. So for that reason it was felt the UK would work on its own standard."

A draft (not a full standard) for development was agreed upon, allowing a two-year life after which it would be reviewed, either to scrap it or turn it into a standard. Three working groups were created, one in support to CEN, another to prepare a domestic and residential standard, and a third group to prepare a commercial and industrial standard – all reflecting the areas where watermist was felt to have the most relevant applications. "We cover frangible bulb heads with wet pipe systems filled with water, dry pipe systems charged with air, and pre-action systems where the release of water is determined by a separate system."

After outlining the pass or fail requirements for the residential and domestic standard, Whitely talked about the industrial and commercial aspects of the standard, which is in several parts. Part 1 is the code of practice for design and installation, part two will be the requirement for component testing (which is yet to be completed), and part three is a general template for the testing of all watermist systems. "We have test protocols for local applications – industrial cookers, turbines, hotel rooms etc – and in all these we are aiming to provide maximum and minimum heights, maximum nozzle spacing, distances form walls, obstruction, maximum pressure flows, and additives if used."

As to discharge duration, Whiteley said it was split into two parts in recognition that some systems are designed for extinguishing and others are for fire suppression. "For extinguishing systems the criteria is that the water supply discharge duration shall be twice that needed to extinguish and prevent reignition."

For suppression systems the requirement is a min. water supply of 30 minutes, and for extinguishing the capacity is twice the time required with the maximum number of nozzles in the test. "So if in the test six nozzles were used, the water supply must be capable of supplying 12, thus providing 100 percent and twice the duration." After some further details, Whiteley confirmed that both domestic/residential and commercial/industrial drafts were at the final draft stages, and that they would be delivered to BSI in the next two months. "We believe these standards will be on the street end of this year (2009) or early 2010. As soon as they are out of the door we will start on part two for component testing, and working group three will address fire test protocols for offices."

Interest rises in land-based 'mist

Diep Ngoc Phan and Alis Sutter of Novenco Fire Fighting A/S shared their experiences with the increasing popularity of low pressure watermist systems in land-based applications. "We are seeing many companies talk about the benefits of these systems over traditional sprinklers, including a recent project carried out in an office building in Copenhagen," said Diep.

Sutter continued: "Watermist is new but we are finding that due to the smaller pipes we can install watermist systems in half the time of traditional sprinklers. This results in the use of less of our equipment, and hence a decrease in our prices." Delegates were invited to talk to Sutter in person about the installation of such a system in an office building of 32,000m^2. "Watermist piping's smaller diameter also creates space for other installations to be added in the ceiling. The system also requires less water than conventional sprinklers systems. This results in smaller sprinkler rooms due to smaller tank," said Sutter, who concluded by saying that the Danish institute of fire and Security technology's standard guidelines for watermist systems were pending, and would be published in the first quarter of 2010.

Inside BRE's test hall, where a watermist experiment was demonstrated using an office scenario developed in-house.