

SprinklerScene

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NFPA Issues NFPA 750 on Water Mist Systems

The National Fire Protection Association has officially issued the first edition of standard 750 – *Water Mist Fire Protection Systems*. The standard contains a broad definition of water mist, so as to include devices and systems capable of producing coarse mists as well as those producing fine mists. An appendix section categorizes three classes of mist, which can be used for system specification purposes as additional test information becomes available. While the standard addresses a variety of requirements aimed at ensuring adequate system performance and reliability, it does not specifically address mist application rates or similar design criteria. A key statement is made within the scope section of the document to explain:

This standard does not provide definitive fire performance criteria nor does it offer specific guidance on how to design a system to control, suppress, or extinguish a fire. Reliance is placed on the procurement and installation of “listed” water mist equipment or systems which have demonstrated performance in fire tests as part of a listing process.

As used within NFPA standards, “listed” is defined as “Equipment or materials included in a list published by an organization acceptable to the authority having jurisdiction and concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.”

In North America, authorities having jurisdiction ranging from governmental authorities to insurance authorities generally acknowledge Underwriters Laboratories (UL) and Factory Mutual Research (FM) as acceptable listing organizations. Both of these organizations meet the NFPA definition, including compliance with the inspection requirement by means of periodic visits to manufacturing facilities. Both of these organizations participated in the development of the water mist system test protocols of the International Maritime Organization (IMO), which has been effectively serving as the lead agency in water mist system test requirements. As a result, it is expected that their listing requirements will to a large extent track the IMO criteria.

Underwriters Laboratories Update

Underwriters Laboratories has created a category (ZDPA) for listing of water mist nozzles. To date, the only listing has been for a nonautomatic (open) nozzle, the Grinnell Aquamist AM10. The UL description of the AM10 listing is as follows:

“These nozzles are intended for use in pre-engineered total compartment application water mist systems which have been designed to protect machinery space compartments not exceeding 17,657 ft³ (500 m³) in volume or 16.4 ft (5 m) in height.

Fire risks in machinery spaces include Class B flammable or combustible liquids which represent a hazard no more severe than heptane and incidental Class A combustibles.”

The nozzles are required to be installed in the pendent position as part of a deluge system in accordance with the manufacturer’s design and installation instructions.



The AM10 nozzle is a stainless steel nozzle with a metric K-factor of 3.5 (0.24 in English units). Each nozzle has a protection volume of 2m X 2m X 5m high, and nozzles are to be a maximum 1 m from walls. Nozzle operating pressure range is 11.7-17.2 bar (170-250 psi).

The nozzle is intended for use as part of a total compartment water mist deluge system with natural ventilation openings limited to 4 m², or forced ventilation limited to 20 total air changes per hour. The nozzle is intended to be used in systems sized with Hazen-Williams hydraulic calculation methods, with velocities limited to 7.6 m/s (25 ft/2). The new NFPA 750 permits the Hazen-Williams method to be used only for low-pressure systems, defined as those using pressures up to 12.1 bar (175 psi). For intermediate and high pressure systems, NFPA 750 requires calculations using the Darcy-Weisbach formula. The listing requires the use of corrosion-resistant pipe, which can be brass, copper, or stainless steel.

UL has tentatively identified ten categories for listing of water mist equipment: pre-engineered (self-contained) systems, nozzles, guards and shields, valves, gauges, piping, pumping components, strainers and filters, storage containers, and operating devices. The basic standard which UL will be using to investigate products in this category is the proposed Standard for Water Mist Nozzles for Fire Protection Service, UL2167. With its draft standard UL2167, and working with the International Standards Organization's working group on sprinkler and water spray equipment, UL is moving toward recognition of five separate listing categories for water mist nozzles: shipboard machinery spaces, shipboard passenger cabins, shipboard public spaces, low hazard areas, and standard hazard areas.

Factory Mutual Research Corporation Update

Factory Mutual has also listed only one mist manufacturer to date. The original approval, given to Securiplex of Canada in 1995, is for a system with overhead and side nozzles capable of protecting gas turbines in enclosures up to 80 m³, with a height not exceeding 4 m. The Securiplex system is a twin fluid system, using low pressure nitrogen to shear low pressure water, producing a mist discharging in the range of 3 to 5 bar (44-73 psi).

The Securiplex approval was issued under the terms of Factory Mutual's "Draft Performance Requirements for Fine Water Spray Systems for the Protection of Gas Turbines in Enclosures", which addresses systems for use in protecting gas turbines in enclosures up to 80 m³ (2825 ft³). The approval includes auxiliary turbine rooms (oil pumps, oil tanks, fuel filters, generators, gear boxes, drive shafts, and lubrication skids), diesel emergency rooms, and other similar machinery spaces with the same volume restriction. The expected minimum duration of protection for gas turbines is 20 minutes, but 10 minutes for all other hazards. The standard is based on the requirement that enclosure forced ventilation will be shut down upon detection of fire, and fuel delivery also stopped at that time. Enclosure doors must remain closed for an extended period, until hot surfaces cool beyond the possibility of autoignition of the fuel. To ensure these features, the protected turbine enclosure must be provided with automatic interlocks, unless demonstrated otherwise through additional testing by the manufacturer.

Securiplex is currently attempting to have their FM approval extended to turbine enclosures up to 260 m³. Just recently, FM extended the Securiplex listing to cover machinery spaces up to 260 m³ and "special hazard" machinery spaces up to 260 m³, both with a maximum height of 5 m and with protection limited to ceiling nozzles only.

FM defines machinery spaces as those with a hazard not exceeding the severity of diesel pool or spray fires, and "special hazard" machinery spaces as those with a hazard not exceeding the severity of heptane pool or spray fires.

In both categories, the listing permits protection of incidental storage, but no rack or flammable liquid storage. The machinery space listing also qualifies the mist system for protection of similar hazards such as transformer vault rooms and emergency diesel generator rooms. The "special hazard" machinery space listing also qualifies the system for use in protecting similar hazards such as engine test cells and paint spray booths.

FM reports that it is near to issuing a draft approval protocol and a subsequent product approval, for water mist system protection of wet benches in semiconductor clean rooms, as well as other clean room applications. FM is also in the process of developing approval criteria for general light hazard applications.

World Sprinkler News

- ◆ The British Institute of Plumbing has formed a Domestic Sprinkler System Group. The purpose of the new group is “to create a forum where members can meet for the exchange of knowledge, the pursuit of new ideas and presentation of technical papers by members of their profession or related professions.” The group includes representatives of the Chief and Assistant Chief Fire Officers Association, the Home Office Fire Inspectorate, and the Loss Prevention Certification Board, as well as training/education and industrial representatives. The Chairman is appointed by the Institute of Plumbing, with the Secretariat provided by the British Automatic Sprinkler Association (BASA).
- ◆ A Memorandum of Intent was signed by several of the world’s leading fire protection engineering associations in March of 1996 to form a new global alliance, the “International Fire Safety Engineering Institute.” Intended to provide a framework for international cooperation, the IFSEI will work toward mutual recognition of designated fire safety professionals, dissemination of technical and scientific information, and a greater awareness of the profession and its practitioners. The charter members are the Institute of Fire Safety (UK), the Society of Fire Safety (Australia) and the Society of Fire Protection Engineers (USA).
- ◆ Two new fire test facilities came on-line during the past few months. The British Research Establishment has opened its burn hall at Garston, England (UK), permitting experimental fires up to 10 MW in size, all featuring a 30 m X 15 m X 15 m high test hall. Underwriters Laboratories opened its new fire test facility in Northbrook, Illinois (USA). The 36.6 m X 36.6 m X 16.8 m high primary test hall features a 30 m X 30 m movable ceiling capable of adjustment from 2 m to 14.6 m in height, with adjustable sprinkler pipe spacings and configurations.
- ◆ The Canadian Mortgage and Housing Corporation (CMHC) recently began a study of the cost impact on municipalities of having all residential buildings sprinklered. The project, expected to be completed by the end of 1996, also involves the National Research Council’s Institute for Research in Construction, the Federation of Canadian Municipalities, the Ontario Fire Marshal’s Office, and the Ontario Ministry of Housing. Preliminary analysis indicates that the major costs of the municipal fire safety budget are fire department personnel and equipment, which could be impacted by complete residential sprinkler protection. Other costs being examined include water supplies, road widths and hydrant spacing. The Project Manager is Tom Kerwin (613-748-2073).
- ◆ Recent significant fires in mercantile occupancies in the United Kingdom, including one in which a firefighter was killed, have led the British Loss Prevention Council to call for mandatory sprinkler protection of all single-compartment buildings over 2000 m² (20,000 ft² in area).
- ◆ The National Fire Protection Association (USA) has issued an alert bulletin warning of the hazards posed by storage of swimming pool chemicals in retail facilities. These pool chemicals are oxidizers, which can increase the burning rates of adjacent combustibles. NFPA 430, which is referenced by NFPA 13, contains specific sprinkler system design criteria for the protection of stored oxidizers, with water application rates and design areas larger than those normally provided for protection of mercantile occupancies.

Upcoming Seminars and Exhibitions of Interest

October 15-17, 1996 – Fire Safety Conference on Performance Based Concepts, Federal Institute of Technology, Zurich, Switzerland, Swiss Institute for the Promotion of Safety & Security (FAX 41-1-211-70-30) or NFPA (FAX 1-617-984-7777)

November 17-20, 1996 – Fall Meeting, National Fire Protection Association, Nashville, Tennessee, USA (FAX 1-617-984-7030)

March 3-7, 1997 – 5th International Symposium on Fire Safety Science, World Congress Centre Melbourne, Australia, International Association for Fire Safety Science, (FAX 61-3-9690-7155)

July 1-2, 1998 – 3rd International Fire Sprinkler Conference, Glasgow, Scotland (1-914-878-4215)

A Record Number of Sprinkler Manufacturers

As testimony to its growing worldwide influence, Factory Mutual now approves standard spray sprinklers produced by a record 23 different manufacturers. Who are they and where are they? The 1996 FMRC Approval Guide provides the following list:

Angus Fire Sprinklers, Oxfordshire, England
Atlas Fire Engineering Ltd., Swansea, Wales
Badger Fire Protection, Inc., Charlottesville, Virginia, USA
Central Sprinkler Corporation, Lansdale, Pennsylvania, USA
Fireguard Corporation, Miami, Florida, USA
Firematic Sprinkler Devices, Inc., Shrewsbury, Massachusetts, USA
GW Sprinkler A/S, Glamsbjerg, Denmark
Globe Fire Sprinkler Corporation, Standish, Michigan, USA
Gottschalk Feuerschutz, Germany
Grinnell Corporation, Exeter, New Hampshire, USA
Grinnell Mrg. (UK) Ltd., Stockport, England
Jomos Sprinklermaterial AG, Prattein, Switzerland
Minimax GmbH, Bad Oldesloe, Germany
Miyamoto Kogyosho Ltd., Toyko, Japan
Nohmi Bosai Ltd., Tokyo, Japan
OPPI, Marne la Vallee Cedex, France
Reliable Automatic Sprinkler Company Inc., Mt. Vernon, New York, USA
Rolland Arrosateurs Sprinklers, Mognard, France
Senju Sprinkler Company Ltd., Tokyo, Japan
Spraysafe Automatic Sprinklers Ltd., Lincolnshire, England
Sprinkler Viking SA, Differdange/Niedercorn, Luxembourg
Star Sprinkler Corporation, Milwaukee, Wisconsin, USA
The Viking Corporation, Hastings, Michigan, USA

By contrast, 1996 Fire Protection Equipment directory published by Underwriters Laboratories includes the names of 17 manufacturers of standard spray sprinklers. It is interesting that among the 17 are three that do not appear in the Factory Mutual guide:

Fike South East Asia PTE Ltd., Singapore
Total Walther Feuerschutz GmbH, Koln, Germany
Venus Fire Protection Ltd., Bromptonville, Quebec, Canada

Are there additional manufacturers beyond these 26? Most certainly, including a number in China. Among those whose existence has been reported, however, are the following:

ACE Turnkey Fire Protection, Bombay, India
Archer Enterprises, Forestville, NSW, Australia
CPF Industrials, Gussago, Italy
Dhoop Singh & Sons, New Delhi, India
Far East Sprinkler Company, Seoul, Korea
HD Fire Protection Company, Thane, India
I&M Industries, Moorabbin, Victoria, Australia
Isuzu Kogyo Company, Osaka, Japan
Republic Automatic Sprinkler Company, Pretoria, South Africa
Three H Taiwan Industries, Taipei, Taiwan

It is not known if these latter manufacturers have product approvals from any recognized testing or certification agency. Readers are invited to send information on manufacturers to the Editor.