



WATER MIST

Application Bulletin



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Water Mist Fire Suppression —

Machinery Spaces

Machinery spaces are defined for the purposes of this bulletin to be enclosures housing equipment that involves the use of gases and/or Class B flammable liquids or combustible liquids. They may also include a limited amount of Class A combustibles. Expected fires could involve gas leaks under pressure, liquid fuel or lubricant spray under pressure, or pool fires of flammable/combustible liquids.

A Water Mist discharge provides cooling and, as the mist is turned to steam, inerting, which together with dilution of flammable vapors, combines to effectively control large fires with a minimum of water use.

Examples of **Machinery Spaces** where water mist can afford the desired protection include engine rooms, pump rooms, hydraulic equipment areas, drives, gear boxes, filtration equipment, lubrication equipment and similar hazards. (For a discussion of Water Mist protection of Gas Turbines, see Power Generation Bulletin #0060.)

The use of Water Mist reduces the need for a tightly enclosed space, even though the protection is provided by total flooding. In the design of the protection system it is necessary to provide for the closing of doors and louvers, and the shut down of ventilation fans and pressurizing pumps. The systems are designed to deal with hazards where gas fueling the fire is limited to that leaking into the protected space after shut down as the gas lines are depressurized, and where pressurization of a flammable liquid can be stopped, leaving only a pool fire. However, when protection is required for a pressurized combustible liquid hazard and it is imperative for the oil pressure to be maintained for some time (an example would be a bearing lube oil system), a Water Mist system should still be able to afford suppression of a spray fire as long as the discharge continues until the oil system can be depressurized. Consult Chemetron for help with designing such a system.

Equipment that can be shut down electrically should be shut down upon fire detection.

Whereas Water Mist suppression works best when the protected hazard can be well covered by overhead nozzles, partially shielded portions of the hazard may be capable of protection by the basic flooding system. Hazards may present specific design challenges and Chemetron Fire Systems' Applications Engineering expertise is available as a resource to deal with these.

Another benefit of Water Mist is its ability to scrub products of combustion from the air in the protected hazard during the discharge.

NFPA Standard No. 750 requires that Water Mist systems be designed and installed in accordance with their listing for the specific hazards and protection objectives specified in the listing.

Chemetron's Water Mist system for the protection of machinery spaces up to a maximum volume of 9,175 cubic feet (260 cubic meters) has been successfully tested at Factory Mutual Research Corporation.

The basis of protection is that Water Mist be applied intermittently for as long a time period as the conditions causing the fire exist, with a minimum protection period of 10 minutes. The application of the mist may be continuous, within the capacity of the system provided and with the design developed in consultation with Chemetron Applications Engineering.

The attached drawing illustrates a Chemetron Water Mist system protecting a Fuel Preparation and Lube Oil Skid.

Determining the system requirements involves evaluating the enclosure to be protected, nozzle location, spacing, obstructions and piping network, as well as the agent supply. Concerns involving the enclosure are described above.

All machinery space nozzles are designed for mounting at the ceiling. The Chemetron machinery space nozzle (called the FS - fine spray - nozzle) is rated for a maximum coverage of 64 ft² (5.95 m²) for a single nozzle, with the longest side of the area covered being 8 feet (2.44 meters). Maximum nozzle height is 16 feet (4.88 meters). Nozzles shall be

located such to avoid being blocked by building structure, equipment interferences, lighting fixtures and duct work. Consult Chemetron for assistance when dealing with obstructions.

The FS nozzle is engineered to deliver 1.68 gallons per minute (6.36 liters per minute) at a pressure of 350 psi (24.13 BAR). This is classified in the NFPA Water Mist System Standard (#750) as an Intermediate Pressure System.

System tank capacity can be designed for single shot, double shot, or even multiple shot protection.

Fire detection is an important aspect of the system design. A fire risk evaluation should be done to determine the type, number and location of the detectors needed.

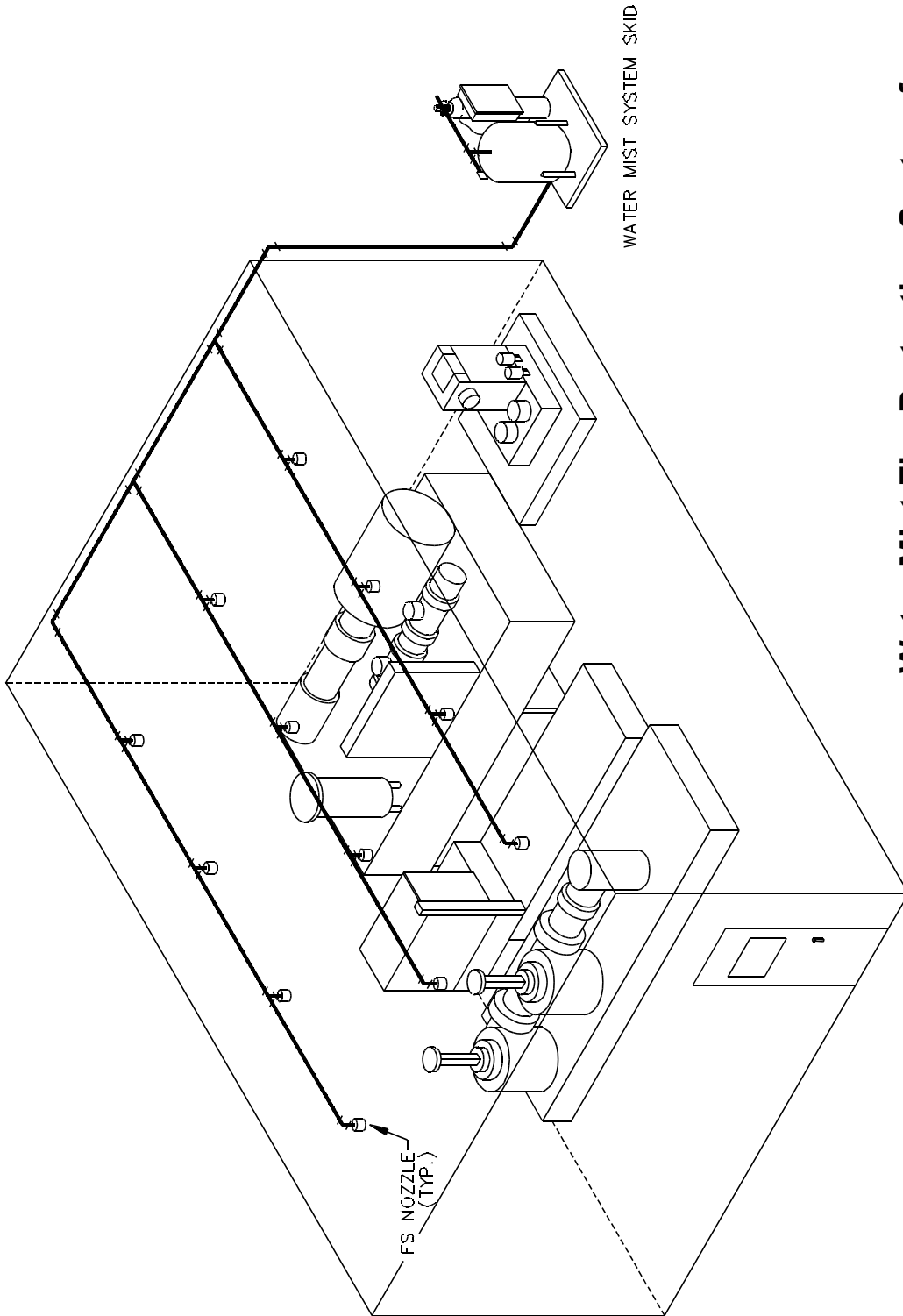
Provisions need to be made to deal with the run-off of process liquids and water from the condensed fine water spray in accordance with the requirements of environmental agencies.

Safety concerns involving the use of Water Mist include ensuring that

- ▶ clearances from uninsulated and/or unshielded energized electrical components are maintained in accordance with NFPA #70 - National Electrical Code, and NFPA Standard #750.
- ▶ personnel are not exposed to the direct impingement of the water mist discharge with its high pressure and discharge velocity.

Personnel evacuation should take place upon system actuation. Training, the preparation of an evacuation plan, and fire drills are all recommended.

For specific design information, refer to the Chemetron Water Mist Fire Protection Systems manual, or contact our sales representative in your area or the Matteson, Illinois headquarters office.



**Water Mist Fire Protection System for
a Fuel Preparation and Lube Oil Skid**