Guidelines for earning IACET CEUs

1. Attendee must register/sign in with all required info.
2. Attendee must attend the entire online session (monitored by polling and the host)
3. Attendee must actively participate in classroom discussions via polling and chat
4. Attendee must achieve a passing score of 70% or higher on the final assessment (within 24 hrs.)
5. Successful completion will earn attendee 0.1 CEU

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Portfolio of Flagship Brands

Learning Records

If you need copies of your records from class or the learning record policy, please contact Talya Pacheco:

training@tycofp.com
401-781-8220 ex 0500
1467 Elmwood Avenue
Cranston, RI 02910
Introduction

Joshua McDonald, CFPS  
Technical Trainer  
JCI, Tyco

Cell +1 401 339 5089  
Tel +1 401 781 8220, ext. 0473  
1467 Elmwood Avenue  
Cranston, RI 02910  
Josh.mcdonald@jci.com

Started with Tyco: June 2016

Prior Experience: Property Risk Engineering, Volunteer Fire Service

Location: Cranston, Rhode Island

Education:  
BS in Fire Protection and Safety Engineering Technology, The Oklahoma State University (OSU)  
Currently studying for MS in Fire Safety and Explosion Protection, (OSU)

Objectives

- Explain the extinguishment characteristics of water mist
- Identify products in the JCI AquaMist product portfolio
  - AquaMist Ultra Low Flow (ULF)
  - AquaMist SONIC
- Summarize AquaMist applications
Water Mist Systems – How do they work?

Definition

- NFPA 750, Section 3.3.22: Water Mist is defined as a water spray for which the 99% of the flow-weighted cumulative volumetric distribution of water droplets, Dv0.99, is less than 1,000 microns.

- This value is found at the minimum design operating pressure and is measured in a plane 1m from the nozzle.

Sprinklers
- >1000 µm
- 100-200 µm
- 10 µm

AquaMist
- >1000 µm
- 100-200 µm
- 50 µm
- 10 µm

*FOG is not typically used in the US/Canada Markets.

*Sold through Ansul
Water Mist – How does it work?

- 3 Main Effects:
  1. Inerting
  2. Cooling
  3. Fuel Wetting

- Different fires require different amounts of each effect.
- All Water Mist systems provide all three effects.
- Droplet size impacts the relative presence of each effect on the fire.

Types of Water Mist Systems
Definition of Water Mist Systems and Design, Installation Standards and ITM

- **NFPA 750 - Standard on Water Mist Fire Protection Systems**
  - Definition of Water Mist Fire Protection Systems:
    - **High Pressure System** - 500 PSI (34.5 bar) or Greater
    - **Intermediate Pressure System** - Greater than 175 PSI (12.1 bar) but less than 500 PSI (34.5 bar)
    - **Low Pressure System** - 175 PSI (12.1 bar) or less.
  - **Twin-Fluid System**. A water mist system in which water and an atomizing medium are supplied to the water mist nozzle utilizing a separate piping system for each medium or a single piping system for both.
    - AquaMist SONIC (FM 5560) – Keeps the oxygen level above 16% within the space (Ansul ONLY)

- **NFPA 25 - Inspection, Testing and Maintenance of Water-Based Fire Protection Systems**
  - Chapter 12: Water Mist Systems
    - 12.1.1.2 Summary of Water Mist System Inspection, Testing and Maintenance
  - For Design and Installation Standards refer to NFPA 750, as well as, in the future you should also refer to NFPA 770: Standard on Hybrid (Water and Inert Gas) Fire Extinguishing Systems
  - In addition, if the project is Factory Mutual (FM) insured, then refer to FM Data Sheet 4-2.
    - NFPA 770 – Standard on Hybrid (Water and Inert Gas) Fire Extinguishing Systems. (This is a forthcoming standard)
      - AquaMist SONIC (FM 5580) - Reduces the oxygen level below 16% within the space (Ansul ONLY)

- **FM Global 2-81: Fire Protection System Inspection, Testing and Maintenance**
  - 2.11.2 for Inspection, Testing and Maintenance

Water Mist: High Pressure vs. Low Pressure

- **High Pressure**
  - Distribution system piping is exposed to pressures of 500 PSI or greater.
  - Can use pumps or cylinders

- **Low Pressure**
  - Distribution system piping is exposed of 175 PSI or less.
  - Typically uses a positive displacement pump or pumps
**Fuel Types**

Fuel Types (NFPA 750)

- **Class A**
  - Examples: wood or paper
- **Low Flashpoint Class B**
  - Example: gasoline
- **High Flashpoint Class B**
  - Example: diesel
- **Class C**
  - Example: cables
- **Class K**
  - Example: cooking oil
Applicable Hazards

- Total flooding & Local Application of Spaces (Class A and B fires) – Open Nozzles
  - Combustible turbines
  - Generator enclosures
  - Hydraulic pump rooms
  - Machinery spaces
  - Flammable liquid storage spaces (maximum (2) 55-gallon drums)
  - Transformers – in an enclosed spaces
  - Processing Equipment

- Sprinkler System Alternatives (Class A, B and C fires) – Closed Nozzles
  - Chemical Fume Hoods (Class B)
  - Light and Ordinary Hazard Spaces, with limitations to the size of the Ordinary Hazard area (Class A and C).
    - Data Centers
    - Hospitals
    - Hotels
    - Office buildings
    - Residential buildings, classified as Light Hazard per NFPA 13
      - Not applicable for NFPA 13R or 13D residential systems

Polling Question 1

Please complete the poll that pops up on your screen.
There must be participation to receive Continuing Education Units (CEUs).
Johnson Controls — AquaMist Overview

Low Pressure Water Mist Systems or AquaMist ULF

AquaMist Ultra Low Flow (ULF)

- Operating pressures less than 500 PSI.
  - Commercially available systems are all less than 300 PSI.
  - Low to Intermediate pressures = 250 psi maximum.
- Typically many components are taken from “conventional” sprinkler and water spray technology.
- Fewer components, extensive historical data on components ensures higher dependability.
- Offered in the market by Johnson Controls as the brand of AquaMist utilizing the products of Tyco.
AquaMist Ultra Low Flow (ULF)

- Single Fluid (water), low/intermediate pressure per NFPA 750 (98 – 250 PSI)
- Mist Control Center or MCC pump unit available for pressures up to 240 PSI, built by MLH and sold through Tyco.
- Uses standard Tyco valves.

- Uses potable water, which is considered any municipal water supply or fire storage tank supply, however, a pond or lake is not considered potable water nor should it be used.
- Less restrictive piping requirements than traditional sprinkler systems.
  - Minimum pipe diameter is 3/4”, whereas, traditional sprinkler systems require a minimum of 1” diameter piping.
  - Nonferrous piping shall be used for all water mist systems.
- Nozzle based systems, similar to traditional sprinkler system.
- Available in open or closed-type nozzles.
### AquaMist ULF Nozzles – Closed Type

<table>
<thead>
<tr>
<th>Nozzle Type</th>
<th>AM27</th>
<th>AM29</th>
<th>AM30</th>
<th>AM24</th>
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<td><img src="image" alt="AM27 Photo" /></td>
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<td><img src="image" alt="AM29 Solution" /></td>
<td><img src="image" alt="AM30 Solution" /></td>
<td><img src="image" alt="AM24 Solution" /></td>
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<tr>
<td>Orientation/Type</td>
<td>Pendent</td>
<td>Pendent</td>
<td>Upright</td>
<td>Pendent</td>
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<tr>
<td>Finish</td>
<td>Natural Brass/Chrome Plated/White Coated</td>
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<td>K-Factor</td>
<td>$K = 0.81 \text{ GPM/psi}^{0.5}$ \newline $K = 11.7 \text{ LPM/bar}^{0.5}$</td>
<td>$K = 0.59 \text{ GPM/psi}^{0.5}$ \newline $K = 8.5 \text{ LPM/bar}^{0.5}$</td>
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<td>UL Certified</td>
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### AquaMist ULF Nozzles – Open Type

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<tr>
<th>Nozzle Type</th>
<th>AM4</th>
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<th>AM15</th>
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<td><img src="image" alt="AM10 Photo" /></td>
<td><img src="image" alt="AM15 Photo" /></td>
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<td><img src="image" alt="AM15 Solution" /></td>
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<tr>
<td>K-Factor</td>
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<td>$K = 0.24 \text{ GPM/psi}^{0.5}$ \newline $K = 3.5 \text{ LPM/bar}^{0.5}$</td>
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<td>Approvals</td>
<td>FM Approved and UL Listed</td>
<td>UL Listed</td>
<td>UL Certified</td>
</tr>
</tbody>
</table>
Light Hazard Applications

- Light Hazard applications – Light Hazard is defined by NFPA 13
  - Light hazard occupancies shall be defined as occupancies or portions of other occupancies where the quantity and/ or combustibility of contents is low and fires with relatively low rates of heat release are expected.
  - **Key Note:** This excludes libraries, storage in any amount or arrangement, theaters and auditoriums.
- Examples of Light Hazard Occupancies or applications:
  - Hotels
  - Museum exhibit areas
  - Historic buildings
  - Schools
  - Doctor Offices
  - Urgent Care Offices
  - Office buildings
  - Data Centers
  - Mixed-use residential, when the residential is classified as Light Hazard.
    - AquaMist does not have an approval for residential applications i.e. Single-family dwellings, townhouses or residential builds that are classified as an NFPA 13R or 13D system.

- Meeting Rooms
- Restaurant seating areas
- Universities
Light Hazard Applications

- Factory Mutual Insured Properties (FM):
  - TFP2230– Ultra Low Flow AQUAMIST System for Protecting Non-Storage, Hazard Category 1 (HC-1) Occupancies: FM Approval Criteria
  - Hazard Category 1 (HC-1) Occupancies is FM’s designation for Light Hazard areas - ONLY.
Light Hazard Applications

- Basic overview of key items to note on the data sheet TFP2230:
  - System Type: Wet Pipe – ONLY
  - System Size: Maximum water mist zone = 52,000 ft²
  - Water Source: Potable water or a source of natural sea water.
  - Minimum water supply duration = 60 minutes or longer if deemed necessary by the AHJ
  - Note: If the water supply is taken from a municipal water main then the supply is continuous.
  - Ceiling Construction: Ceilings are to be of smooth, combustible or non-combustible construction, construction with a maximum slope of 5° (1/12).

- Material for System Pipe (Tube) and Fittings:
  - Stainless Steel Pipe
    - With threaded fittings or
    - With welded fittings or
    - ProPress stainless steel fittings, providing the fittings are rated for the pressure of the system.
    - When using stainless steel piping, the minimum size piping shall be 3/4 in.
  - CPVC
    - With solvent cement-jointed CPVC pipe and fittings
    - When using CPVC piping, the minimum size piping shall be 3/4 in.
  - Copper Pipe
    - Threaded regular wall seamless copper pipe per ASTM B42 with Class 125 or Class 250 cast bronze threaded fittings.
    - When using copper piping, the minimum size piping shall be 3/4 in.
  - Copper Tubing
    - Seamless Type K, L, or M copper water tube per ASTM B88 with cast copper alloy soldered joint fittings
    - When using copper tubing, the minimum size piping shall be 1 in.
Light Hazard Applications – FM Insured

- Primary Nozzle/ Sprinkler Types allowed on TFP2230:
  - **AM27 = Pendent – Closed Nozzle**
    - Compartment Protection Area = 1024 ft²
    - Exception: Maximum compartment size does not apply to corridors that are being protected by one row of nozzles.
    - Maximum Ceiling Height = 8 ft. 0 in.
    - Spacing = 16 ft x 16 ft, with a maximum distance of 8 ft from walls.
    - Minimum spacing is 6 ft.
    - K=0.81 gpm/psi²
    - Nozzle Pressure = 140 psi to 250 psi.
    - At 140 psi the flow = 9.58 gpm
    - Water Demand Requirements: Water supply shall be sized based on supplying the most remote 1,024 ft², for 60 minutes.
    - For non-recessed applications, the diffuser to ceiling distance must be 1 to 4 inches.
    - Important Note: Every AquaMist nozzle shall be installed into a tee-fitting and cannot be installed into an elbow or reducing elbow fitting.
    - For more information refer to up nozzle data sheet TFP2227

- Primary Nozzle/ Sprinkler Types allowed on TFP2230:
  - **AM29 = Pendent – Closed Nozzle**
    - Compartment Protection Area = Unlimited or 52,000 ft²
    - Maximum Ceiling Height = 16 ft. 5 in.
    - Spacing = 12 ft x 12 ft, with a maximum distance of 6 ft from walls.
    - Minimum spacing is 6 ft.
    - K=0.59 gpm/psi²
    - Nozzle Pressure = 110 psi to 250 psi.
    - At 110 psi the flow = 6.19 gpm
    - Water Demand Requirements: Water supply shall be sized based on supplying the most remote 1,500 ft², for 60 minutes.
    - For non-recessed applications, the diffuser to ceiling distance must be 1.5 to 4 inches.
    - Important Note: Every AquaMist nozzle shall be installed into a tee-fitting and cannot be installed into an elbow or reducing elbow fitting.
    - For more information refer to particular nozzle data sheet TFP2229.
Light Hazard Applications

- **PBD: Insured Properties:**
  - TFP2231 – Ultra Low Flow AQUAMIST System for Protecting Light and Ordinary Hazard Occupancies:
    - Performance-Based Design
      - Performance-Based Design systems are allowed by NFPA 750, the standard for water mist, and is supported by internal tests, third party (FM) test reports, evaluation reports, etc.
      - Performance-Based Design puts the liability onto the Engineer of Record and contractor installing it, however, it’s recognized as common practice throughout the industry.

NFPA 13 states:
- “…Nothing in this standard is intended to restrict new technologies or alternate arrangements, provided the level of safety prescribed by this standard is not lowered…”

NFPA 750 (1.5) states:
- “Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.”
- “Technical documents shall be submitted to the authority having jurisdiction to demonstrate equivalency.”
- “The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.”
Light Hazard Applications – PBD

• Basic overview of key items to note on the data sheet TFP2231:
  • System Type: Wet Pipe – ONLY
  • System Size: Per standard or Nozzle Type – But maximum water mist zone = 52,000 ft²
  • Water Source: Potable water or a source of natural sea water.
  • Minimum water supply duration (if a tank is used) = 30 minutes or longer if deemed necessary by the AHJ
    • Note: If the water supply is taken from a municipal water main then the supply is continuous.
  • Ceiling Construction: Ceilings are to be of smooth, combustible or non-combustible construction, construction with a maximum slope of 5° (1:12).

• Material for System Pipe (Tube) and Fittings:
  • Stainless Steel Pipe
    • With threaded fittings or
    • With welded fittings or
    • ProPress stainless steel fittings, providing the fittings are rated for the pressure of the system.
    • When using stainless steel piping, the minimum size piping shall be 3/4 in.
  • CPVC
    • With solvent cement-joined CPVC pipe and fittings
    • When using CPVC piping, the minimum size piping shall be 3/4 in.

Light Hazard Applications – PBD

• Primary Nozzle/ Sprinkler Types allowed on TFP2231:
  • AM27 = Pendent – Closed Nozzle
    • Compartment Protection Area = 1024 ft²
    • Exception: Maximum compartment size does not apply to corridors that are being protected by one row of nozzles.
    • Maximum Ceiling Height = 9 ft. 10 in.
    • Spacing = 16 ft x 16 ft, with a maximum distance of 8 ft from walls.
    • Minimum spacing is 6 ft
    • K=0.81 gpm/psi⁰⁵
    • Nozzle Pressure = 140 psi to 250 psi.
    • At 140 psi the flow = 9.58 gpm
  • Water Demand Requirements: Water supply shall be sized based on supplying the most remote 5 nozzles or 900 ft²
  • For non-recessed applications, the diffuser to ceiling distance must be 1 to 4 inches.
  • Important Note: Every AquaMist nozzle shall be installed into a tee-fitting and cannot be installed into an elbow or reducing elbow fittings.
  • For more information refer to particular nozzle data sheet TFP2227.
Light Hazard Applications – PBD

- Primary Nozzle/ Sprinkler Types allowed on TFP2231:
  - **AM29** = Pendent – Closed Nozzle
    - Compartment Protection Area = Unlimited or 52,000 ft²
    - Maximum Ceiling Height = 16 ft 5 in.
    - Spacing = 12 ft x 12 ft, with a maximum distance of 6 ft from walls.
      - Minimum spacing is 6 ft.
    - K=0.59 gpm/psi
    - Nozzle Pressure = 110 psi to 250 psi.
      - At 110 psi the flow = 6.19 gpm
    - Water Demand Requirements: Water supply shall be sized based on supplying the most remote 5 nozzles or
      - 900 ft² for maximum ceilings heights of 9 ft 10 in.
      - 975 ft² for maximum ceiling heights of 13 ft 1 inch.
      - 1044 ft² for maximum ceiling heights of 16 ft 5 in.
    - For non-recessed applications, the diffuser to ceiling distance must be 1 to 4 inches.
    - Important Note: Every AquaMist nozzle shall be installed into a tee-fitting and cannot be installed into an elbow or reducing elbow fitting.
    - For more information refer to particular nozzle data sheet TFP2229.
Light Hazard Applications – PBD

- Primary Nozzle/ Sprinkler Types allowed on TFP2231:
  - AM30 = Upright – Closed Nozzle
    - Compartment Protection Area = Unlimited or 52,000 ft²
    - Maximum Conveyed Space or Raised Floor Area Height = 12 in. to 31.5 in.
    - Spacing = 13 ft x 13 ft., with a maximum distance of 6 ft from walls.
    - Minimum spacing = 6 ft.
    - K=0.59 gpm/psi
    - Nozzle Pressure = 75 psi to 250 psi.
    - At 75 psi the flow = 5.11 gpm
    - Water Demand Requirements: Water supply shall be sized based on supplying the most remote 5 nozzles or
      - For Light Hazard Areas: 904 ft²
      - For Ordinary Hazard, Group 1, Areas = 775 ft²
    - For non-recessed applications, the diffuser to deck distance must be 1 to 3 inches.
    - Important note: Every AquaMist nozzle shall be installed into a tee-fitting and cannot be installed into an elbow or reducing elbow fitting.
    - For more information refer to particular nozzle data sheet TFP2201.

- AM34 = Horizontal Sidewall – Closed Nozzle
  - The AM34 is not approved for use in the United States because it only has a VdS approval.
  - If a contractor or distributor asks about this nozzle, then refer to them data sheet TFP2205, August 2018, which states under Approvals that it only meets VdS test protocol.
  - For Ordinary Hazard spaces, such as Mechanical Rooms, Janitor Closets and other areas not classified as Light Hazard, then the contractor is required to use a TY-FRB sprinkler, providing the following criteria is met:
    1. The water mist portion is no greater than 30% of the protected zone.
Light Hazard Applications – PBD

- Primary Nozzle/ Sprinkler Types allowed on TFP2231:
  - **TY-FRB = Pendent – Closed Sprinkler**
    - Compartment Protection Area = Unlimited or 52,000 ft²
    - Maximum Ceiling Height = 20 ft. 0 in.
    - Spacing = 130 ft², with a maximum distance of 7.5 ft from walls.
      - Minimum spacing is 6 ft.
    - K=2.8 gpm/psi²
    - Nozzle Pressure = whatever pressure the rest of the system requires, i.e. 110 psi or higher
    - Water Demand Requirements: Water supply shall be sized based on supplying the most remote 5 nozzles or
      - 900 ft² for maximum ceilings heights of 10 ft. 0 in.
      - 1013 ft² for maximum ceiling heights of 15 ft. 0 in.
      - 1125 ft² for maximum ceiling heights of 20 ft. 0 in.
    - For more information refer to particular sprinkler data sheet TFP171.

Polling Question 2

Please complete the poll that pops up on your screen. The must be participation to receive Continuing Education Units (CEUs).
Machinery Spaces & Combustion Turbine Enclosures

- If a contractor or distributor approaches you with an application that falls into the classification of Machinery Spaces & Combustion Turbine Enclosures then ask them if they are trying to protect one of the following areas:
  - Acceptable hazards to protect:
    - Internal Combustion Engines
    - Excludes engine test cells
    - Oil Pumps
    - Oil Tanks
    - Fuel Filters
    - Diesel engine-driven generators
    - Enclosures with not more than (2) 55-gallon drums of flammable liquid. Such as day tanks in generator rooms.
    - Generators
    - Transformer Vaults
    - Gear boxes
    - Drive shafts
    - Lubrication skids
    - Other similar equipment using liquid hydrocarbon fuel and or hydraulic, heat transfer, and lubrications fluids.

- If what the contractor is trying to protect is listed above, then provide them the design guidelines stated on TFP2234
Basic overview of key items to note on the data sheet TFP2234:

- System Type: Deluge – ONLY
- Maximum compartment size (in volume) = UL: 56,500 ft³ or FM: 45,203 ft³
- Minimum number of nozzles per compartment = 2
- Maximum Ceiling Height = 26 ft 2 in.
- Water Source: Potable water or a source of natural sea water.
- Minimum water supply duration:

<table>
<thead>
<tr>
<th>Compartment Volume</th>
<th>Minimum Water Supply Duration in minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 28,230 ft³</td>
<td>UL: 30 / FM: 40</td>
</tr>
<tr>
<td>&gt;28,230 ft³ to 45,203 ft³</td>
<td>UL: 45 / FM: 50</td>
</tr>
<tr>
<td>&gt;45,203 ft³ to 56,500 ft³</td>
<td>UL: 60 / FM: N/A</td>
</tr>
</tbody>
</table>
Machinery Spaces & Combustion Turbine Enclosures

- Basic overview of key items to note on the data sheet TFP2234:
  - Material for System Pipe (Tube) and Fittings:
    - Stainless Steel Pipe
      - With threaded fittings or
        - With welded fittings
    - Copper Pipe
      - Threaded regular wall seamless copper pipe per ASTM B42 with Class 250 cast bronze threaded fittings.
      - When using copper piping, the minimum size piping shall be 3/4 in.
    - Copper Tubing
      - Seamless Type K, L, or M copper water tube per ASTM B88 with cast copper alloy soldered joint fittings
      - When using copper tubing, the minimum size piping shall be 1 in.

- AM4 = Pendent – Open Nozzle
  - Spacing = 13 ft. 1 in. x 13 ft. 1 in., with a maximum distance of 6 ft. 7 in. from walls.
  - No maximum spacing.
  - K=0.24 gpm/psi^0.5
  - Nozzle Pressure = 185 psi to 250 psi.
  - K x 185 psi = flow = 3.3 gpm
  - Important Note: Every AquaMist nozzle shall be installed into a tee-fitting and cannot be installed into an elbow or reducing elbow fitting.
  - Diffuser to ceiling distance must be 7.9 to 47.2 inches.
  - For more information refer to particular nozzle data sheet TFP2204, August 2018.
Cable Tunnels

- **TFP2235**
- Cable tunnels are underground tunnels that are only used to run cabling from one building to another and are **NOT** transportation tunnels.

Basic overview of key items to note on the data sheet TFP2235:

- **System Type:** Deluge – **ONLY**
- **Maximum tunnel width, height or diameter:** 10.2 ft, and a maximum cross-sectional area = 81.7 ft²
- **For larger tunnels,** consult the JCI’s Tyco Technical Services Department.
- **Water Source:** Potable water or a source of natural sea water.
- **Minimum water supply duration:** 30 minutes.
- Since this is a tunnel, there are obstruction rules so make sure the contractor or distributor that you’re working with follows the guidelines provided in TFP2235.
Cable Tunnels

- Basic overview of key items to note on the data sheet TFP2235:
  - **AM4 = Pendent – Open Nozzle**
    - Spacing: Maximum spacing is 4.9 ft. apart and from walls.
    - No minimum spacing.
    - $K = 0.24$ gpm/psig
    - Nozzle Pressure: 185 psig to 250 psig.
    - At 185 psig, flow = 3.3 gpm
    - Important Note: Every AquaMist nozzle shall be installed into a tee-fitting and cannot be installed into an elbow or reducing elbow fitting.
    - Diffuser to ceiling distance must be 2 to 8 inches.
  - For more information refer to particular nozzle data sheet TFP2204, August 2018.
Data Centers, Data Processing Rooms & Halls

- If a contractor or distributor approaches you with an application for a Data Center, then ask them a simple question – is the project FM insured?
- Depending on their answer, then refer them to ONE of the following design guidelines for our ULF system:

  Factory Mutual Insured Properties (FM):
  - TFP2233, August 2018 – Ultra Low Flow AQUAMIST System for the Protection of Data Processing Equipment Rooms/Halls
  - Factory Mutual or FM allows water mist to be used to protect the cables inside of the data center, equipment rooms and related facilities to a data center.
Data Center Applications – FM Insured

- Basic overview of key items to note on the data sheet TFP2233:
  - System Type: Wet or Single-Interlock Preaction – with a minimum 30 second water delivery.
  - System Size: Maximum water mist zone = 52,000 ft²
  - Water Source: Potable water.
  - Minimum water supply duration = 60 minutes or longer if deemed necessary by the AHJ
    - Note: If the water supply is taken from a municipal water main then the supply is continuous.
  - Ceilings are to be of smooth, combustible or non-combustible construction, construction with a maximum slope of 5° (1/12).

- Material for System Pipe (Tube) and Fittings:
  - Stainless Steel Pipe (ONLY)
    - With threaded fittings or
    - With welded fittings or
    - ProPress stainless steel fittings, providing the fittings are rated for the pressure of the system.
    - When using stainless steel piping, the minimum size piping shall be 3/4 in.

- Primary Nozzle/ Sprinkler Types allowed on TFP2233:
  - AM29 = Pendent – Closed Nozzle
    - Compartment Protection Area = Unlimited or 52,000 ft²
    - Maximum Ceiling Height = 16.4 ft.
    - Spacing = 12 ft x 12 ft, with a maximum distance of 6 ft from walls.
    - Minimum pressure is 6 ft.
    - K=0.59 gpm/psi²
    - Nozzle Pressure = 110 psi to 250 psi.
    - At 110 psi the flow = 6.19 gpm
    - Water Demand Requirements: Water supply shall be sized based on supplying the most remote 18 nozzles for 60 minutes.
    - Important Note: Every AquaMist nozzle shall be installed into a tee-fitting and cannot be installed into an elbow or reducing elbow fitting.
    - For more information refer to particular nozzle data sheet TFP2229, August 2018.
Data Center Applications – FM Insured

- Primary Nozzle/ Sprinkler Types allowed on TFP2233:
  - **AM30 = Upright – Closed Nozzle**
    - Compartment Protection Area = Unlimited or 52,000 ft²
    - Maximum Raised Floor Area Height = 3.3 ft.
    - Spacing = 12 ft. x 12 ft., with a maximum distance of 6 ft from walls.
    - Minimum spacing is 6 ft. 6 in.
    - K=0.59 gpm/psig
    - Nozzle Pressure = 110 psi to 250 psi.
    - At 110 psi the flow = 6.19 gpm
  - Water Demand Requirements: Water supply shall be sized based on supplying the most remote 6 nozzles for 60 minutes.
  - For non-recessed applications, the diffuser to deck distance must be 3 inches.
  - Important Note: Every AquaMist nozzle shall be installed into a tee-fitting and cannot be installed into an elbow or reducing elbow fitting.
  - For more information refer to particular nozzle data sheet TFP2201.

Data Center Applications – PBD

- NON Factory Mutual Insured Properties:
  - TFP2236, February 2016 – Ultra Low Flow AQUAMIST System for the Protection of Data Processing Equipment Rooms/ Halls
  - Performance-Based Design systems are allowed by NFPA 750, the standard for water mist, and is supported by internal tests, third party (FM) test reports, evaluation reports, etc.
  - Performance-Based Design puts the liability onto the Engineer of Record and contractor installing it, however, it's recognized as common practice throughout the industry.
Data Center Applications – PBD

- Basic overview of key items to note on the data sheet TFP2236:
  - System Type: Wet, Single-Interlock Preaction or Double-Interlock Preaction – with a minimum 30 second water delivery.
  - System Size: Maximum water mist zone = 52,000 ft²
  - Water Source: Potable water or a source of natural sea water.
  - Minimum water supply duration = 60 minutes or longer if deemed necessary by the AHJ
    - Note: If the water supply is taken from a municipal water main then the supply is continuous.
  - Ceilings are to be of smooth, combustible or non-combustible construction, construction with a maximum slope of 5° (1/12).
  - Material for System Pipe (Tube) and Fittings:
    - Stainless Steel Pipe (ONLY)
    - With threaded fittings or
    - With welded fittings or
    - ProPress stainless steel fittings, providing the fittings are rated for the pressure of the system.
    - When using stainless steel piping, the minimum size piping shall be 3/4 in.

Data Center Applications – PBD

- Primary Nozzle/ Sprinkler Types allowed on TFP2236:
  - AM29 = Pendent – Closed Nozzle
    - Compartment Protection Area = Unlimited or 52,000 ft²
    - Maximum Ceiling Height = 16.4 ft.
    - Spacing = 12 ft x 12 ft, with a maximum distance of 6 ft from walls.
    - Minimum spacing is 6 ft.
    - K=0.59 gpm/psi
    - Nozzle Pressure = 110 psi to 250 psi.
    - At 110 psi the flow = 6.19 gpm
    - Water Demand Requirements: Water supply shall be sized based on supplying the most remote 15 nozzles for 60 minutes.
    - For non-recessed applications, the diffuser to ceiling distance must be 1.75 to 4 inches.
    - Important Note: Every AquaMist nozzle shall be installed into a tee-fitting and cannot be installed into an elbow or reducing elbow fitting.
    - For more information refer to particular nozzle data sheet TFP2229.
Data Center Applications – PBD

- Primary Nozzle/ Sprinkler Types allowed on TFP2236:
  - AM30 = Upright – Closed Nozzle
    - Compartment Protection Area = Unlimited or 52,000 ft²
    - Maximum Raised Floor Area Height = 3 ft.
    - Spacing = 12 ft x 12 ft, with a maximum distance of 6 ft from walls.
    - Minimum spacing is 6 ft 6 in.
    - K=0.59 gpm/psi
    - Nozzle Pressure = 110 psi to 250 psi.
    - At 110 psi the flow = 6.19 gpm
    - Water Demand Requirements: Water supply shall be sized based on supplying the most remote 6 nozzles for 60 minutes.
    - For non-recessed applications, the diffuser to deck distance must be 3 inches.
    - Important Note: Every AquaMist nozzle shall be installed into a tee-fitting and cannot be installed into an elbow or reducing elbow fitting.
    - For more information refer to particular nozzle data sheet TFP2201.

Tyco Pump Unit for ULF applications – Mist Control Center (MCC) Unit
Mist Control Center (MCC) Unit – Pump Unit for ULF

- Light Hazard, Machinery Spaces & Combustion Turbine Enclosures and Data Centers all require a pump to be used to supply pressure to the protected space.
- This can either be done by the contractor using the building’s fire pump, if it can supply the pressure and flow, or by using an AquaMist MCC (Mist Control Center) pump unit.

Each AquaMist MCC Unit may consist of:
- A pressure pump unit, support/frame and pipe work, gauges, etc.
- NFPA20 pump controller.
- Releasing Panel (if required for Deluge or Preaction).
- Red-E Cabinet with system controls (optional).
- Can supply the system with an unlimited amount of water when connected to a municipal water main.
- Only requires a power supply for the control cabinet and pump controller and a potable water supply piped to the inlet of the pump.
- Unit’s are factory plumbed, wired and pre-tested by the factory prior to shipping.
Mist Control Center (MCC) Unit – Pump Unit for ULF

- MCC Pumps are available in 6 different sizes:
  - MCC-1, MCC-2 and MCC-3 = 240 PSI discharge
  - MCC-A, MCC-B and MCC-C = 170 PSI discharge

- All MCC pumps are available with onboard Wet Pipe, Deluge Electric, Single Interlock Preaction; Double Interlock Preaction Electric-Electric* or Double Interlock Preaction Electric-Pneumatic*
  - "Non-FM Approved Configuration"
  - Also available with off-board valves – same as mentioned above.

- All MCC pumps are available with onboard controller.
  - Available with onboard transfer switches, to save space.
  - Also available with off-board controller with a transfer switch, if required.

Notes:
- Refer to Tyco Data Sheet TFP2270 for additional information.

---

Mist Control Center (MCC) Unit – Pump Unit for ULF

- MCC Pump Information:

<table>
<thead>
<tr>
<th>Discharge Connection</th>
<th>Capacity gpm</th>
<th>Frequency [Hz]</th>
<th>Pump Model</th>
<th>Motor Power hp</th>
<th>Pump inlet Connection Nominal GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>240 (16,5)</td>
<td>57 (216)</td>
<td>50</td>
<td>160-332 HD</td>
<td>25 (10)</td>
<td>2 (50)</td>
</tr>
<tr>
<td></td>
<td>56 (213)</td>
<td>60</td>
<td>80-440 HD</td>
<td>20 (15)</td>
<td>2 (50)</td>
</tr>
<tr>
<td></td>
<td>110 (415)</td>
<td>50</td>
<td>300-372 HD</td>
<td>40 (30)</td>
<td>3 (90)</td>
</tr>
<tr>
<td></td>
<td>108 (401)</td>
<td>60</td>
<td>160-338 HD</td>
<td>40 (30)</td>
<td>2 (50)</td>
</tr>
<tr>
<td></td>
<td>165 (628)</td>
<td>60</td>
<td>300-368 HD</td>
<td>60 (40)</td>
<td>3 (90)</td>
</tr>
<tr>
<td></td>
<td>165 (624)</td>
<td>60</td>
<td>330-388 HD</td>
<td>50 (37)</td>
<td>3 (90)</td>
</tr>
</tbody>
</table>

| 170 (11,7)           | 57 (216)     | 50             | 160-332 HD | 25 (10)       | 2 (50)                            |
|                      | 56 (213)     | 60             | 80-440 HD  | 20 (15)       | 2 (50)                            |
|                      | 110 (415)    | 50             | 300-372 HD | 40 (30)       | 3 (90)                            |
|                      | 108 (401)    | 60             | 160-338 HD | 40 (30)       | 2 (50)                            |
|                      | 165 (628)    | 60             | 300-368 HD | 60 (40)       | 3 (90)                            |
|                      | 165 (624)    | 60             | 330-388 HD | 50 (37)       | 3 (90)                            |

*Non-FM Approved Configuration*
Mist Control Center (MCC) Unit – Footprint

Nominal Dimensions (mm):

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCC-1</td>
<td>40</td>
<td>10</td>
<td>29</td>
<td>12</td>
<td>12.25 (260.6)</td>
</tr>
<tr>
<td>MCC-2</td>
<td>42</td>
<td>10</td>
<td>31</td>
<td>17</td>
<td>12.75 (323.8)</td>
</tr>
<tr>
<td>MCC-3</td>
<td>42</td>
<td>10</td>
<td>31</td>
<td>17</td>
<td>12.75 (323.8)</td>
</tr>
</tbody>
</table>

Mist Control Center (MCC) Unit – Part Numbers

P/N MCC-XXXXXX

<table>
<thead>
<tr>
<th>Model</th>
<th>Backup Power</th>
<th>Electrical</th>
<th>Actuation</th>
<th>Valve &amp; Trim Location</th>
<th>Release Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCC-1</td>
<td>No Transfer Switch</td>
<td>Frequency: 59, Voltage: 380</td>
<td>Deluge Electric</td>
<td>On-board</td>
<td>1</td>
</tr>
<tr>
<td>MCC-2</td>
<td>Web Transfer Switch</td>
<td>Frequency: 69, Voltage: 416</td>
<td>Double Interlock Pneumatic Electric-Electric</td>
<td>Off-board</td>
<td>2</td>
</tr>
<tr>
<td>MCC-3</td>
<td>59, Voltage: 208</td>
<td>Single Interlock Pneumatic</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCC-A</td>
<td>69, Voltage: 250</td>
<td>Double Interlock Pneumatic Electric-Pneumatic</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCC-B</td>
<td>69, Voltage: 460</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCC-C</td>
<td>69, Voltage: 575</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What if there's no power? Red-E Mist Supply Skid

- For total compartment (deluge) systems for Machinery Spaces and Combustion Turbine Enclosures, then use the Red-E Mist Supply Skid.

- TFP2272

- Outlet pressure 220 psi with a maximum flow rate of 14 gpm (600 gallons) to 28 gpm (1200 gallons)

- Carbon Steel tank with corrosive resistant epoxy coating

- Designed to fit through standard double doors

- Only for small AM4 systems – Maximum 8 AM4’s

- Both ASME and PED/CE marked

- Available with (1) 600-gallon water tank and (4) nitrogen cylinders or (2) 600-gallon water tanks and (8) nitrogen cylinders
AquaMist SONIC

- Twin Fluid Water Mist per NFPA 750.
- Hybrid Water Mist per NFPA 770 (forthcoming standard).
- Uses two separate pipes that are piped to each atomizer, one pipe for nitrogen which is the propellant and the other pipe for the water.
- Unit built by Ansul.
AquaMist SONIC – Cont’d

- Atomizer is patented.
- Uses less water and discharge points than a ULF nozzle system.
- Available in total flooding deluge applications.
- Stainless Steel piping system is recommended, but non-corrosive piping is acceptable too.

AquaMist SONIC - Components
AquaMist SONIC - Atomizer

<table>
<thead>
<tr>
<th>Nozzle Type</th>
<th>AquaMist SONIC Atomizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photo</td>
<td></td>
</tr>
<tr>
<td>Solution</td>
<td></td>
</tr>
<tr>
<td>Orientation/Type</td>
<td>Pendent or Sidewall</td>
</tr>
<tr>
<td>Finish</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

AquaMist SONIC

- Patented supersonic technology
- Vaporizes a low pressure stream of water
- Forms extremely small, high velocity water droplets
- 90% of volume is discharged as sub-10 micron droplets
AquaMist SONIC – Pre-Engineered 260 System

- Remote Manual Actuator (optional)
- Control Panel
- High Flow Regulator
- Nitrogen Line Shut-Off Valve
- Detectors
- Water Line Shut-Off Valve
- 3 Nitrogen Cylinders 2900 PSI (200 bar) with CV-98 Valve Backpressure Operated
- Water Tank 50-Gallons (190 Liters) Stainless Steel Pressurised to 120 PSI
- 260 Skid Assembly

AquaMist SONIC – Engineered 1040 System – HF Electrical

- Remote Manual Actuator (optional)
- Control Panel
- Water Pressure Regulator
- Nitrogen Discharge Regulator
- Nitrogen Line Shut-Off Valve
- Detectors
- Atomizers
- Water Line Shut-Off Valve (Typical)
- >6 Nitrogen Cylinders 2900 PSI (200 bar) with CV-98 Valve Backpressure Operated
- Water Tanks 50-Gallons (190 Liters) Stainless Steel Pressurised to 120 PSI
AquaMist SONIC – Key Benefit Summary

- Fast Extinguishment
  - Large quantity, small droplets, high velocity of water discharges quickly and fills protected space.
  - Greater water surface area which increases efficiency.
  - Nitrogen helps to lower the oxygen level in the space.

- Utilizes Less Water
  - 1/3rd the water compared to high pressure water mist systems.

- Lower Pressure
  - Less than 10% of the pressure requirements when compared to high pressure water mist systems.

- More Uniform droplet distribution

Polling Question 3

Please complete the poll question that pops up on your screen. There must be participation to receive Continuing Education Units (CEUs).
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Cell +1 401 339 5089
Josh.mcdonald@jci.com