Hybrid Water Mist Systems

Dr T R Nichols CPhys FIFireE
Sales Director Engineered Systems & Water Mist EU&AF
Tyco Fire Protection Products

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Our Product Portfolio

LOW PRESSURE WATER MIST

HYBRID WATER MIST

HIGH PRESSURE WATER MIST
Approval Standard for Hybrid Systems

**FM5580** Approval Standard for Hybrid (Water and Inert Gas) Fire Extinguishing Systems water and nitrogen.

**Approval for Class B Fuel Risks ONLY** Minimum discharge time 10 minutes

**DESIGNED TO EXTINGUISH A FIRE**

**NOT APPROVED** for CLASS A risks
• INERT concentration must be to EN15004

**NOT APPROVED** for use in COMPUTER ROOMS
Applications

- Machinery Spaces
  - Volatiles less than or equal to Diesel fuel
- Special Hazard Machinery Spaces
  - Volatiles less than or equal to Heptane
- Flammable Liquids Storage
  - Limited to two 55 gal drums only!
  - Not listed for palletized or rack storage.
- Combustion Turbines
  - Spin down time must be less than 10 minutes to ensure proper flammable liquids shut down
Applications

- Oil Pumps & Tanks
- Combustion Turbines
- Fuel Filters
- Internal Combustion Engines
- Generators
- Hydraulic Power Packs
- Transformer Vaults
- Turbine Enclosures

- Diesel Driven Generators
- Paint Booths
- Gear Boxes
- Engine Test Cells
- Drive Shafts
- Solvent Handling Cells
- Lubrication Skids
- Flammable Liquid Store Rooms
Applications

Limitations

Water-atomizing systems **shall not be used** for direct application to materials that react with water to produce:

- violent reactions
- significant amounts of hazardous products.
## Applications

<table>
<thead>
<tr>
<th>APPLICATION</th>
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<tr>
<td>HOTELS</td>
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<td>INDUSTRIAL FRYER PROTECTION</td>
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FM Approvals – Machinery Space ONLY!
How it works?

**Twin-fluid technology**; water and nitrogen. Requires separate sources of water and nitrogen/compressed air

**Utilize a compressed gas** to atomize water into tiny droplets

**Safer for people**, environmentally-friendly and inexpensive to recharge

**Low pressure required**, 4 - 7 bar nitrogen/air and water of 2 – 4 bar

**With nitrogen effectively an Inerting System with Water Mist**
Oxygen Levels

This sheet calculates the remaining oxygen level inside a hazard after a discharge of an AquaMist Sonic system. This calculation does not consider any hazard leakage. It is based on minimum number of atomizer required.

<table>
<thead>
<tr>
<th>Cyl Qty.</th>
<th>Nitrogen</th>
<th>Hazard Vol.</th>
<th>Flood. Fac.</th>
<th>DC</th>
<th>Oxygen Conc.</th>
<th>&lt;NOAEL</th>
<th>&lt;LOAEL</th>
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<td>48.00 m³</td>
<td>20.00 m³</td>
<td>2.400</td>
<td>90.93%</td>
<td>1.91%</td>
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<td>3</td>
<td>48.00 m³</td>
<td>25.00 m³</td>
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<td>85.34%</td>
<td>3.08%</td>
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<td>3</td>
<td>48.00 m³</td>
<td>30.00 m³</td>
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<tr>
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<td>35.00 m³</td>
<td>1.371</td>
<td>74.61%</td>
<td>5.33%</td>
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<td>3</td>
<td>48.00 m³</td>
<td>40.00 m³</td>
<td>1.200</td>
<td>69.88%</td>
<td>6.33%</td>
<td>!</td>
<td>!</td>
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<td>48.00 m³</td>
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<td>1.067</td>
<td>65.60%</td>
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<td>48.00 m³</td>
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<td>0.960</td>
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<td>55.00 m³</td>
<td>0.873</td>
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<td>!</td>
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<td>48.00 m³</td>
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<td>0.800</td>
<td>55.07%</td>
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<td>!</td>
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<td>75.00 m³</td>
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<td>80.00 m³</td>
<td>0.600</td>
<td>45.12%</td>
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<td>41.32%</td>
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<td>12.67%</td>
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<td>48.00 m³</td>
<td>100.00 m³</td>
<td>0.480</td>
<td>38.12%</td>
<td>12.99%</td>
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<tr>
<td>3</td>
<td>48.00 m³</td>
<td>105.00 m³</td>
<td>0.457</td>
<td>36.68%</td>
<td>13.30%</td>
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<td>!</td>
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<tr>
<td>3</td>
<td>48.00 m³</td>
<td>110.00 m³</td>
<td>0.436</td>
<td>35.34%</td>
<td>13.58%</td>
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<td>!</td>
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<tr>
<td>3</td>
<td>48.00 m³</td>
<td>115.00 m³</td>
<td>0.417</td>
<td>34.10%</td>
<td>13.84%</td>
<td>!</td>
<td>!</td>
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<tr>
<td>3</td>
<td>48.00 m³</td>
<td>120.00 m³</td>
<td>0.400</td>
<td>32.97%</td>
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<td>!</td>
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<tr>
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<td>125.00 m³</td>
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<td>14.30%</td>
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<td>48.00 m³</td>
<td>130.00 m³</td>
<td>0.369</td>
<td>30.86%</td>
<td>14.52%</td>
<td>!</td>
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Limits

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<th>15.00%</th>
<th>12.00%</th>
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<tbody>
<tr>
<td>Limits</td>
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</tbody>
</table>
Atomizer (Nozzle)

- Generates a Mach 3 (speed) Atomization Zone
- Vaporizes a Low Pressure Stream of Water
- Forms Extremely Small, High Velocity Water Droplets
Atomizer Principle

Contraction: high velocity, low-pressure zone draws water into primary atomizing region

Water expelled as thin sheet

Characteristic conical Aquamist wave creates zone of extreme acceleration and high shear-rate, breaking the thin sheet of water into atomized droplets
Atomizer Principle : Animation
Water Droplet Size

Droplet Size to Surface Area

Surface Area (m²)

- High
- Low
- Hybrid

Droplet Size (microns)

- Sprinklers
- Aquifer ULF
- Aquifer HFA
- Solar
Extinguishing Mechanism

- Very small droplets – rapid evaporation
- Heat extraction as water vaporizes
- Water vapour displaces oxygen near fire
- Nitrogen inerts the atmosphere
- Dilution of fuel vapour with water mist/pour
- Cooling of fuel below vaporization temp
Approval Comparison – Machinery Space

Low Pressure

// Pool Fire
// 0.78 litres/min/m²
// 12 Bar
// Water density ~ 12% more than HP

High Pressure

// Pool Fire
// 0.69 litres/min/m²
// 100 Bar
// Water density ~ 12% less than LP

Hybrid

// Pool Fire
// 0.2 litres/min/m²
// 7 Bar
// Water density ~ 70% LESS than HP

Water Consumption 1MW Fire Extinguishment

- 2078 ltr.
- 160 ltr.
- 144 ltr.
- 42 ltr.
Performance Characteristics

• **Lower** Water Usage Than Conventional Water-Mist Systems

• **Fast** Extinguishment
  • Discharge quickly fills the protected space

• **Increased** Fluid Surface Area with Reduced Droplet Diameter
  • Water droplet is 20-50 times smaller than droplets produced by conventional systems

• **Reduction** of Thermal Shock as Water Vaporizes before contact
Installation Configuration

Sidewall & Pendent mounting of atomizer
Components
General System Setup
System configuration

- **130 Pre-Engineered Skid System**
  - Hazard volume $\leq 130 \text{ m}^3$
  - 1 atomizer

- **260 Pre-Engineered Skid System**
  - Hazard volume $> 130 \text{ m}^3$ and $\leq 260 \text{ m}^3$
  - 2 atomizers

- **1040 Engineered System**
  - Hazard volume $> 260 \text{ m}^3$ and $\leq 1040 \text{ m}^3$
  - Maximum rated volume per atomizer $= 104 \text{ m}^3$
Pre-Engineered 130 System

- **Control Panel**
- **High Flow Regulator**
- **Nitrogen Line Shutt-Off Valve**

**Components:**
- **Automan II-C**
- **3 Nitrogen Cylinders**
  - 200 bar with CV-98 Valve
  - Backpressure Operated
- **Water Tank 189 ltr.**
  - Stainless Steel
  - Pressurised to 8.3 bar
- **Water Line Shutt-Off Valve**
- **Detectors**
- **Atomizer**
- **130 Skid Assembly**

*Note: The diagram illustrates the connections and flow of the system.*
Engineered 1040 System

- Remote Manual Actuator (optional)
- Control Panel
- Water Pressure Regulator
- Nitrogen Discharge Regulator
- Nitrogen Line Shutt-Off Valve

- HF Electric Actuator and Booster Actuator
- >6 Nitrogen Cylinders 200 bar with CV-98 Valve Backpressure Operated
- Water Tanks 189 ltr. Stainless Steel Pressurised to 8.3 bar
- Water Line Shutt-Off Valve
- Detectors
- Atomizers
Water Atomizer

- Stainless steel
- Combines nitrogen & water
- #150 mesh stainless steel “Y” strainer filters out particles larger than 100 microns in size
- Mounting plate fits on std 15/8” UNISTRUT.
- Dust cap to keep foreign material out of the atomizer.
- 1” NPT union nitrogen inlet
- ½” NPT union water inlet
Pneumatic Selector Valves

- Used for …
  - two or more hazards protected by a single supply
  - main and reserve system
- Operated electrically or pneumatically
Our Product Portfolio

LOW PRESSURE WATER MIST

HYBRID WATER MIST

HIGH PRESSURE WATER MIST
Thank You