High Pressure Water Mist in High Rise Buildings
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Introduction

• Founded in 1988
• One of the 5 large sprinkler installation companies in France

We found high pressure water mist technology to be advantageous for certain applications.
Introduction

High Rise Buildings

• Buildings with floors higher than 22 m
• Long staircases and funnels of escalators, garbage and electricity
• Escape ways of 50 m per floor

Greater threat of smoke, heat and fire spread across levels
Legal Regulations

Installation of an automatic fire fighting system obligatory

- In France (Amendment of 2009)
  - High rise buildings > 200 m
- In Germany
  - High rise buildings > even 60 m
Fire Hazard Class

• Belong to group of fire hazards OH 1

• Usually have no fire fighting system or are equipped with Sprinkler System

• Characteristics of a Sprinkler System
  • High water consumption
  • Water damages
  • Compensation of pressure loss by additional pumps
High Pressure Water Mist Systems

Advantages for applications with OH-1 risks

• Reduced water discharge, thus water damage
• High cooling effect, thus protection of exposed glass and steel structures
• Easy retrofit with small bore pipework
• No or small water storage requirements
• Reduced hydraulic restrictions
• One central pump station
Standards & Guidelines

- NFPA 750 defines requirements for system components and general design procedures
- CEN TS 14972 defines specific fire tests scenarios for system acceptance
OH-1 Fire Tests

Fire test arrangement for OH-1 in accordance to CEN TS 14972

- Performance comparison tests to conventional sprinklers
- Aim is control and suppression of the fire
- Tests under one and between four nozzles
- Gas temperatures and fire damage to the fire load is compared for 30 minutes system operation
## OH-1 Fire Tests

### Fire Load

<table>
<thead>
<tr>
<th>Combustible material</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood</td>
<td>Table plates</td>
</tr>
<tr>
<td></td>
<td>Wall panel</td>
</tr>
<tr>
<td></td>
<td>Drawer</td>
</tr>
<tr>
<td></td>
<td>Chair (frame)</td>
</tr>
<tr>
<td>Paper</td>
<td>Filed paper</td>
</tr>
<tr>
<td></td>
<td>Books</td>
</tr>
<tr>
<td></td>
<td>Newspaper</td>
</tr>
<tr>
<td>Polyether foam</td>
<td>Chair (padding)</td>
</tr>
<tr>
<td></td>
<td>Simulated files</td>
</tr>
<tr>
<td>Electronics</td>
<td>Monitor and keyboard</td>
</tr>
</tbody>
</table>
OH-1 Fire Tests

Fuel package after sprinkler fire test

Fuel package after water mist fire test
OH-1 Fire Tests
Comparison of Pipe Dimensioning

Conventional OH-1 Sprinkler
- Nozzle flow rate is min. 60 l/min
- Permissible pipe pressure loss is < 5 bar

OH-1 Water Mist System
- Nozzle flow rate is 30 to 40 l/min
- Permissible pipe pressure loss is < 70 bar

Substantially larger pipe sizes and height limitations for sprinklers, thus installation restrictions
Case Study

Example for a High Rise Building

Study case of the Future “Phare” Tower in Paris

- > 300 m Height
- 71 floors

Comparison between Sprinkler and HPWM System
Case Study

Phare Tower Concept

Sprinkler system
- Every 45 m of building height
  - + Main riser pipe
  - + Pump unit & Redundant pump unit
  - + Section Valve

- For the project:
  - 2 x 10 diesel pumps = 98 m³/h at 11-34 bar
## Case Study

### Phare Tower Concept

<table>
<thead>
<tr>
<th>Type</th>
<th>Level</th>
<th>Amount of section pipes</th>
<th>Sprinkler</th>
<th>Water Mist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>Car Parking -5,-4,-3,-2</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-6 to 00</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 to +9</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 to 20</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Atrium</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>21 to 31</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32 to 42</td>
<td>7</td>
<td></td>
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<tr>
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<td>43 to 53</td>
<td>8</td>
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<td>2</td>
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<td>54 to 64</td>
<td>9</td>
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<tr>
<td></td>
<td>55 to 70</td>
<td>10</td>
<td></td>
<td></td>
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</table>
# Phare Tower Concept

<table>
<thead>
<tr>
<th></th>
<th>Sprinkler</th>
<th>Water Mist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>216 m²</td>
<td>216 m²</td>
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<tr>
<td>Nozzle</td>
<td>12</td>
<td>26</td>
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<tr>
<td>Flow Rate</td>
<td>5 l/min/m²</td>
<td>1,46 l/min/m²</td>
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<tr>
<td>Nozzle flow Rate</td>
<td>60 l/min</td>
<td>38 l/min</td>
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<tr>
<td>Total</td>
<td>1320 l/min</td>
<td>380 l/min</td>
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<tr>
<td>Pressure loss</td>
<td>&lt;5 bars</td>
<td>&lt;70 bars</td>
</tr>
<tr>
<td>Tanks</td>
<td>79200 l</td>
<td>22800 l</td>
</tr>
</tbody>
</table>

Case Study
Advantage of HPWM

- Installation less bulky
- Piping hideable by installation underneath floors
- Very good cooling effect
- Protection of glass and steel structure
- Lower flowrate, thus water storage and damages
- Lower maintenance costs

PRICE ADVANTAGE
Thank You for Your Attention