How does watermist fight fires and how can it be applied in real life

IWMA Seminar
15th January 2013
Dubai, UAE

By Alex Palle, CEO VID Fire-Kill, Denmark
Agenda:

1) Introduction to VID Fire-Kill.
2) What is Watermist and how does it fight fires.
3) How can we apply Watermist in projects.
   a) Applications.
   b) Watermist System to be provided.
   c) Approval/testing of system.
   d) Product Manuals and watermist design standards.
4) Real Life Project examples.
1. VID Fire-Kill

- Production and testing
- Low Pressure, low flow
- Danish Design
- Environmentally friendly
- Covering all applications
- Global Player and Sales
- Tested and Approved

Low Pressure, low flow Danish Design

Environmentally friendly

Covering all applications

Global Player and Sales

Tested and Approved
2. What is **Watermist** and how does it fight fires?

Air: 21% O₂ + 78,8% N₂ + ?

Fuels: Carbon + Hydrogen + ?

Energy to fuel

Pyrolysis process
Fuel => Pyrolysis gasses
CH₄ => pyrolysis gas

Energy to Pyrolysis gas atmosphere

Fire example:
CH₄ + 2O₂
=> 2H₂O + CO₂ + E

Fire ignition

1kg O₂ => 13.000.000 joule
Focus on pyrolysis process

Blow away pyrolysis gasses => blow fire out

Focus on oxidation process

Cooling oxidation process => slow down process

Cooling fuel => reducing the pyrolysis gas production

Reduce oxygen concentration => reduce heat output
Fire control

Accelerating fire  Fire suppression

Energy production  Energy consumption
3) How can we apply watermist in projects?

The main problems:
- Watermist is a new technology = Lack of knowledge => Lack of trust.
- Design, installation and maintenance criteria not found in a standard as for sprinklers (e.g. EN12845: Office area = OH1 => 72m², 60min, 5 l/min/m² water density).

The solution is to:
A) Define the application – the challenge.
B) Define the system which fit the application best.
C) Define the Approval/Documentation which can be accepted by AHJ.
D) Follow manufacturer Product Manuals, and existing watermist design standards (e.g. NFPA 750, CEN/TS14972)
3a) The Application.

Defining the applications?
Example: Object protection, Hole building, Area, etc.

What type areas are often found in such?
Example: Large open volumes, concealed spaces, rooms.

Fuel types?
Example: Class A fuels, Class B fuels, Class F fuels, etc.

Environment?
Example: Open well ventilated areas, Cold areas, hot areas, enclosed areas.

Other things to encounter?
Examples: water damage, aesthetic looks, detection of fire, etc.
3b) Watermist system to be Provided.

**Standard watermist system:**
- Existing system.
- Common knowledge on usage and performance.
- Approved.

Is best when:
- Limitations in approval fits application.
- Limitations to technical performance fits application.
- Project time is scarce.

**Special watermist system:**
- Not available yet – to be developed.
- To be tested/approved.

Is best when:
- Something special is needed because of application.
- When there is time to do R&D, testing etc.
3b) Watermist system to be Provided.

Standard watermist system:

Special watermist system:

- Tunnel system

- For horizontal long throw
  Without wetting walls

- For long concealed spaces
3b) Watermist system to be Provided.

Combining the application specifics with product solutions gives us:

**Decision matrix example**

<table>
<thead>
<tr>
<th></th>
<th>Sprinkler</th>
<th>Internal Gas Systems</th>
<th>Watermist standard products</th>
<th>Watermist special products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Volume size</td>
<td>GOOD</td>
<td>BAD</td>
<td>BAD</td>
<td>GOOD</td>
</tr>
<tr>
<td>High height</td>
<td>GOOD</td>
<td>BAD</td>
<td>BAD</td>
<td>GOOD</td>
</tr>
<tr>
<td>Fuel protection</td>
<td>GOOD</td>
<td>GOOD</td>
<td>GOOD</td>
<td>GOOD</td>
</tr>
<tr>
<td>Fire spread risk to other rooms</td>
<td>GOOD</td>
<td>BAD</td>
<td>GOOD</td>
<td>GOOD</td>
</tr>
<tr>
<td>Limitations due to artifacts/water damage</td>
<td>BAD</td>
<td>GOOD</td>
<td>GOOD</td>
<td>GOOD</td>
</tr>
<tr>
<td>Water limitation</td>
<td>BAD</td>
<td>GOOD</td>
<td>GOOD</td>
<td>GOOD</td>
</tr>
<tr>
<td>System space requirements/Visability</td>
<td>BAD</td>
<td>BAD</td>
<td>GOOD</td>
<td>GOOD</td>
</tr>
<tr>
<td>Project time limitations</td>
<td>GOOD</td>
<td>GOOD</td>
<td>GOOD</td>
<td>BAD</td>
</tr>
<tr>
<td>Approval needed</td>
<td>GOOD</td>
<td>GOOD</td>
<td>GOOD</td>
<td>BAD</td>
</tr>
</tbody>
</table>

The "best" solution
3c) Approval/Testing of System.

Standard watermist system
Example of available approvals standards:

- FM5560: US light Hazard (EU OH1), machinery rooms/tubines,
- UL2167: Residential areas, LH, OH1.
- VDS: Hotels, Offices, car parks, cable tunnels,
- LPS1283: Hotel, offices.

Advantages:
- Has been tested and approved to work in fires.
- Easy accepted.

Disadvantages:
- Limitations to dimensions.
- Limitations to application type.
- Limitation to technical performance.
- Limitation to water spray damage.
3c) Approval/Testing of System.

**Standard watermist system**

**Example of test method**

**FM5560 Light Hazard:**

- Apartments
- Atriums
- Churches
- Concealed spaces
- Gymnasiums
- Hospitals and hospital laboratories
- Hotel rooms
- Institutions
- Kitchens
- Libraries
- Meeting rooms in convention centers and hotels
- Metalworking shops with nonhydraulic cutting operations
- Mineral processing such as: glass, cement, ore treating, gypsum processing, etc.
- Museums
- Nursing or convalescent homes
- Offices
- Restaurant seating areas
- Schools and universities classrooms
- Unused attics

**LIMITS:**

- 5m ceiling height.
- Pendent automatic nozzle
- Sidewall only for small compartments.
3c) Approval/Testing of System.

Standard watermist system
Example of final proof – a certificate
3c) Approval/Testing of System.

Special watermist system:
Example of available approvals standards:

- CEN/TS 14972 Appendix B.
- Fire test demonstrations.

Advantages:
- Can test special products.
- Can provide specific required data for the exact project.

Disadvantages:
- Limitations to “strength” of approval.
- Cost and time requiring to do.
3c) Approval/Testing of System.

Special watermist system
Example of test method CEN/TS14972

Figure B.1 — Process of developing a fire test procedure
3c) Approval/Testing of System.

Standard watermist system

Example of final proof – a test report and witness letter.
3d) Product Manuals and watermist design standards

The Product Manual.
All design parameters and any other system constraints crucial to the operation shall be specified in the manufacturer's Design and Installation manual.

The available general watermist design manuals.
All general minimum requirements for design, installation, maintenance and service can be found in these standards.
3d) Product Manuals and watermist design standards
3d) Product Manuals and watermist design standards

Example: NFPA750:2010
4) Project Examples.

Wooden Church, Norway:
- Large and high open space with low fuel loads (sofas, benches) placed at floor. Fire spread risk high due to all wood.
- Heated and unheated areas with natural ventilation.
- Ceiling painting not to be destroyed by installation or water spray
- Authority was fire brigade.
System choosen: SPECIAL WATERMIST SYSTEM.

School, UK:
- Ceiling heights up to 5m with relative low fuel loads (furniture) placed at floor. Fire spread low due to new building.
- Heated areas with natural ventilation.
System choosen: STANDARD WATERMIST SYSTEM.
4) Project Examples.

Wooden Church:
System: MODEL APS

Length (L):
Height (H):
Width (2xD) Type A
  Type B
  Type C
Nozzle wall height (B):
  unlimited
  unlimited
  max. 16m
  max. 20m
  max. 26m
  3.5m – 7m
4) Project Examples.

Test scenarios from test method designed in accordance to CEN/TS 14972 Annex B.
4) Project Examples.
4) Project Examples.
4) Project Examples.
4) Project Examples.
4) Project Examples.

School:
System: MODEL OH-OS

Videos link
4) Project Examples.
Thank you for your attention.

The full presentation including videos can be requested on sales@vidaps.dk