Protection of Data Center Application with High-Pressure Water Mist Systems

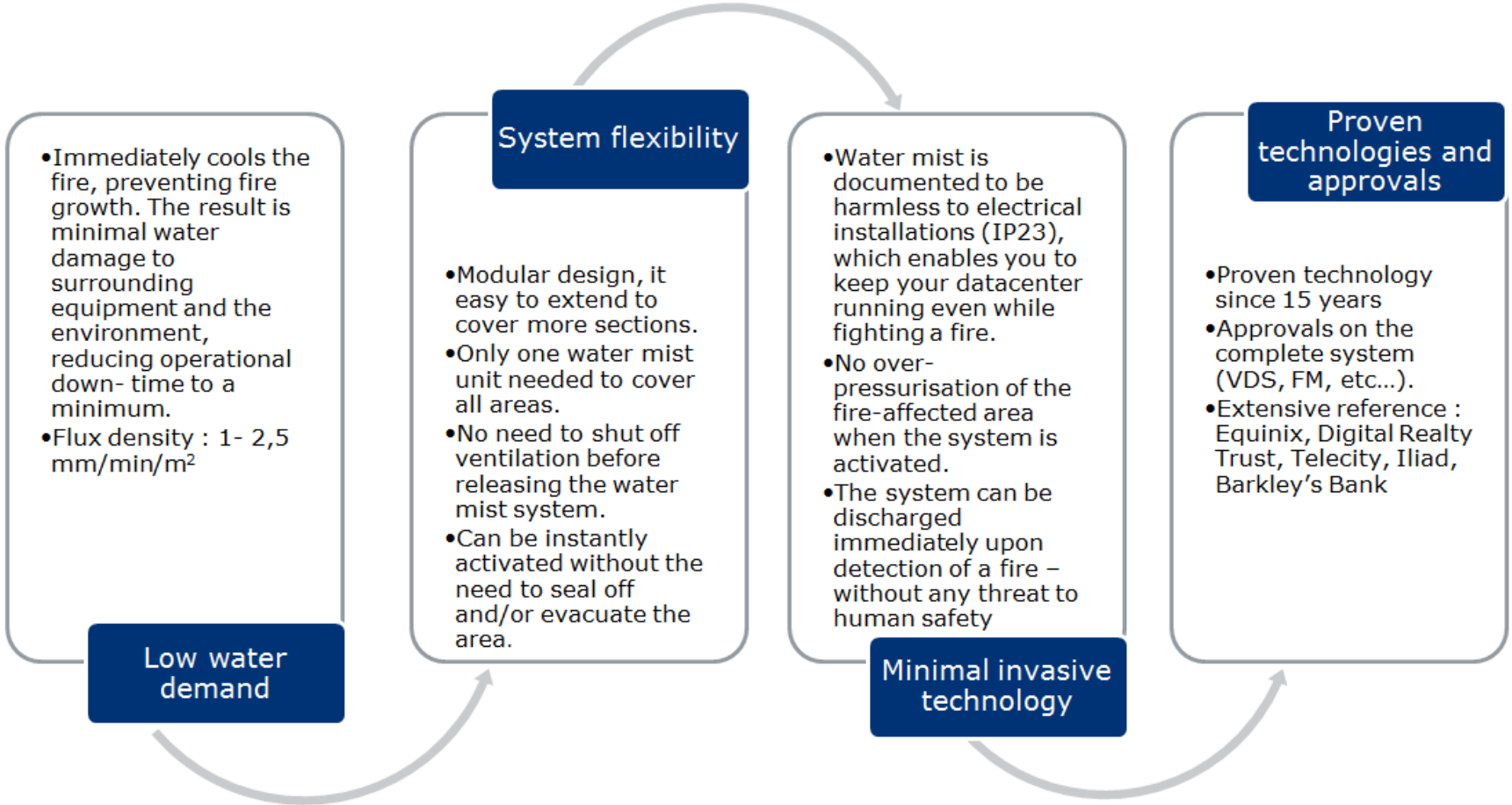
Summary

1. Common technologies used for this application
2. Choosing HWPM system
3. Objectives of the HPWM system
4. Designing the system
5. Project examples
6. Full scale fire test

1. Common technologies used for this application

Technology	Principle	Usage in data center
Inert Gas	• Extinguishes fires by a reduction of the oxygen concentration, stored in high-pressure cylinders in the form of compressed gas • Systems can be modular or centralized	commonly used
Chemical gas	• Extinguishes fires by flames inhibition • Hydro fluorocarbons (HFC) or fluorocarbon (FC), stored in high-pressure cylinders (pressurized with dry nitrogen)	commonly used
Sprinkler	• Fire control or fire suppression by cooling materials, • Water tank and pump station (electrical, diesel) • Flux density : 5 mm/min/m²	scarcely used
Low pressure water mist	• Fire control or fire suppression by cooling materials. • Water tank and pump station (electrical, diesel) • Flux density : 2 - 3 mm/min/m²	scarcely used
High pressure water mist	• Fire control or fire suppression by cooling materials • Water tank, pump station, cylinders systems (electrical, diesel) • Flux density : 1 – 2,5 mm/min/m² (floor void 0,5 mm/min/m²)	commonly used

2. Choosing HPWM system



3. Objectives of the HPWM system

Ordinary Hazard 1 areas (EN 12845):

- Data Rooms:
  - Electrical cables
  - Computers

- Critical Issues of Server Rooms:
  - Cold corridor
  - Hot corridor.

- Technical Rooms (UPS, Battery, Switchgear rooms, etc.):
  - Electrical cables
  - Solid materials

- Floor void:
  - Electrical cables

3. Objectives of the HPWM system

Ordinary Hazard 3 area (EN 12845):

- Storage rooms (typical class A fire):
  - Electronic equipment, tape storage

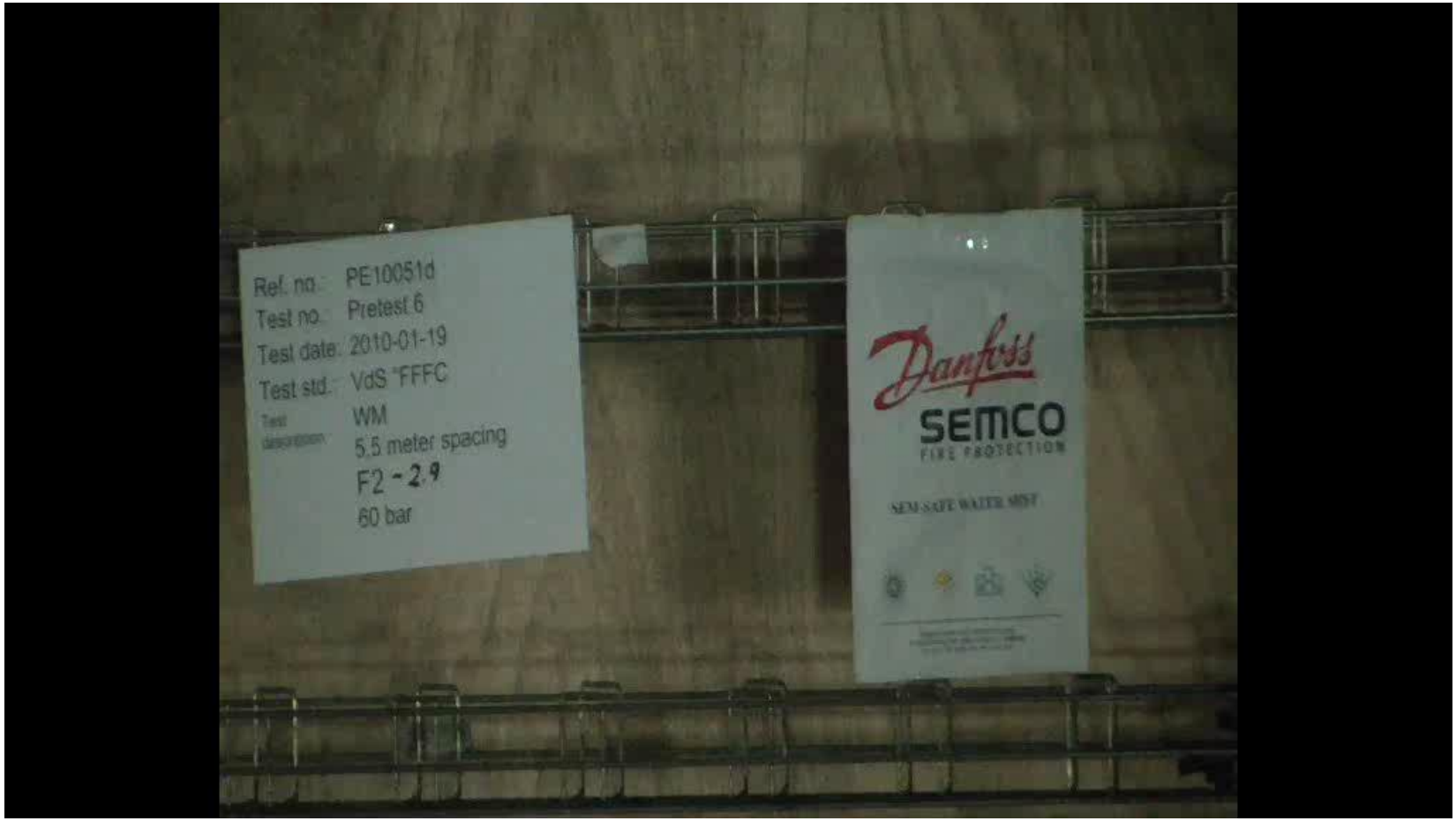
Special hazard:

- Generator, diesel engine, transformers:
  - Typical class B fire
  - Hydraulic oil
  - Diesel fuel

3. Objectives of the HPWM system

- Data Rooms, Technical Rooms, Floor void, Storage rooms :
  - Suppress and control the fire
  - Minimum autonomy of the system 60 minutes

- Generator, diesel engine, transformers :
  - Extinguish or suppress the fire
  - Minimum autonomy of the system 30 minutes


Ref. no. PE10051d
Test no. Pretest 6
Test date. 2010-01-19
Test std. VdS °FFFC
Test description WM
5.5 meter spacing
F2 - 2.9
60 bar
Danfoss
SEMCO
FIRE PROTECTION

4. Designing the system

Water Mist Standards:

- NFPA 750
- ANSI FM 5560
- CEN TS 14972
- BSI DD 8458 / DD 8489

- Do not provide system design parameters as sprinkler or gas fire extinguishing system standards
- Parameters are generated via application related full scale fire tests

4. Designing the system

LH/OH areas :

- European example according to EN12845 :

Table 3 — Design criteria for LH, OH and HHP

Hazard Class	Design Density mm/min	Area of Operation m²	
		Wet or pre-action	Dry or alternate
LH	2,25	84	Not allowed Use OH1
OH1	5,0	72	90
OH2	5,0	144	180
OH3	5,0	216	270
OH4	5,0	360	Not allowed Use HHP1
HHP1	7,5	260	325
HHP2	10,0	260	325
HHP3	12,5	260	325
HHP4	deluge (see NOTE)		

NOTE Needs special consideration. Deluge systems are not covered by this standard.

Question : Where is the double interlock system?

4. Designing the system

Ordinary Hazard 1:

Pre action system :

- Area of operation : 72 m²
- Approved OH1 nozzle : according to CEN TS14972 :
- Flux density : 1,5 to 2,5 mm/min/m²
- Maximum flow : 180 lpm
- Storage tank for 60 minutes : 10,8 m³

4. Designing the system

Floor void (OH1):

Pre action system :

- Area of operation : 72 m²
- Approved floor void nozzle : according to VdS False ceilings and false floors
- Flux density : 0,5 to 2,5 mm/min/m²
- Maximum flow : 180 lpm

4. Designing the system

Ordinary Hazard 3:

Pre action system :

- Area of operation : 216 m²
- Typical storage area in data center : 85m²
- Approved OH3 nozzle : according to R2B storage setup (ST5, Cat. IV. Max 2.2 m storage height)
- Flux density : 2,2 to 3 mm/min/m²
- Maximum flow : 648 lpm

4. Designing the system

Special hazard:

Total Flooding system :

- Area of operation : the complete volume of the room.
- Typical volume of a generator room with 5 m ceiling height : 480 m³
- Approved TF nozzle : according to IMO1165, FM5560 **appendix E and F, VDS**

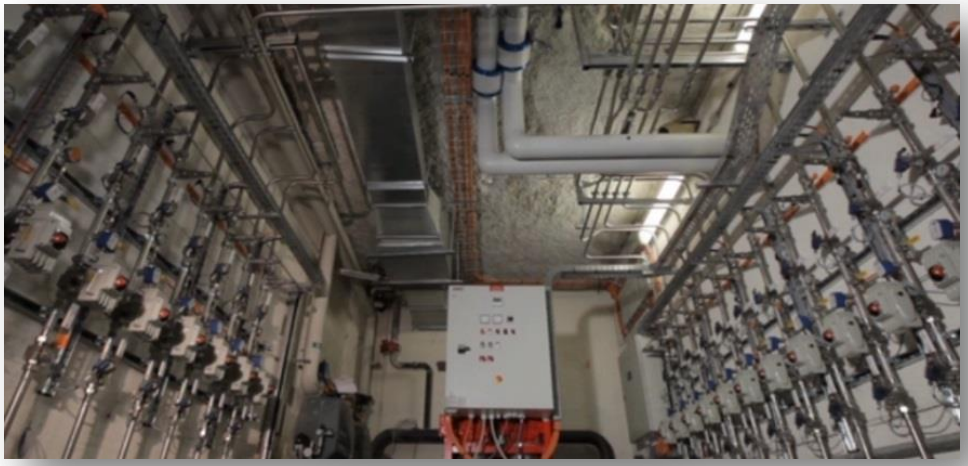
Nozzle layout :

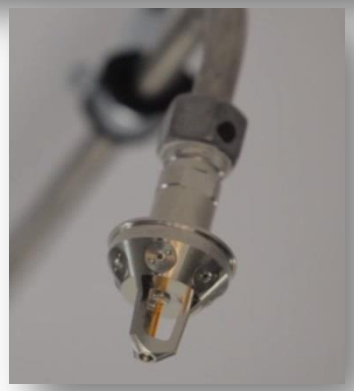
- Medium flux density : 0,2 lpm/m³
- Maximum flow : 96 lpm

5. Project examples

Project ILIAD (FREE)

- 24 rooms protected
- 24 pre action valve
- More than 8000 m² protected
- One pump unit 224l/min





5. Project examples

Project GMF

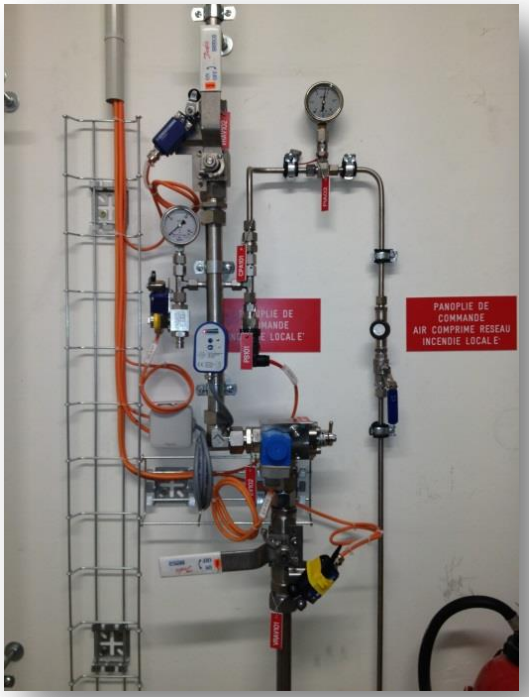
- 3 rooms protected
- 3 pre action valve
- 1000 m² protected
- two pump unit 224l/min

5. Project examples

Project GMF

5. Project examples

Project GMF



5. Project examples

Project Digital Realty Trust

- 3 data rooms protected
- 13 generators protected
- More than 20 technical rooms protected
- 8 pre action valve
- One pump unit 560l/min

5. Project examples

Project Telecity Group

- 4 data rooms protected
- 6 generators protected
- More than 15 technical rooms protected
- 6 pre action valve
- One pump unit 224 l/min

5. Project examples

Project Global Switch

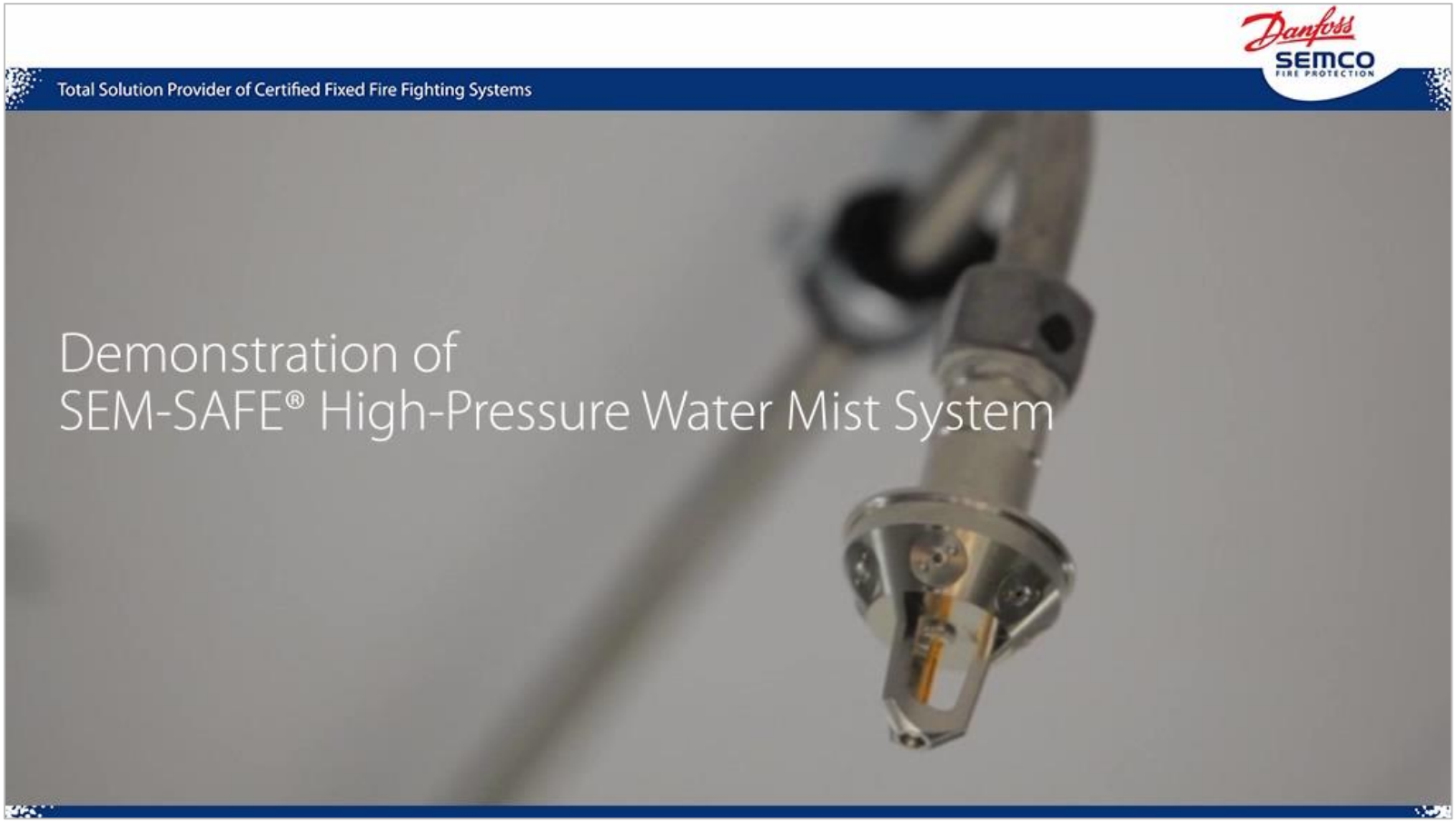
- 12 diesel unit (generators and drups) protected
- 12 pre action valve
- One pump unit 176 l/min

5. Project examples

Equinix AM3 Data Centre, The Netherlands

- 17 pre action valve
- 826 nozzle heads
- One pump unit 336 l/min

6. Full scale fire test



Thanks for your attention!