

Data center fire protection

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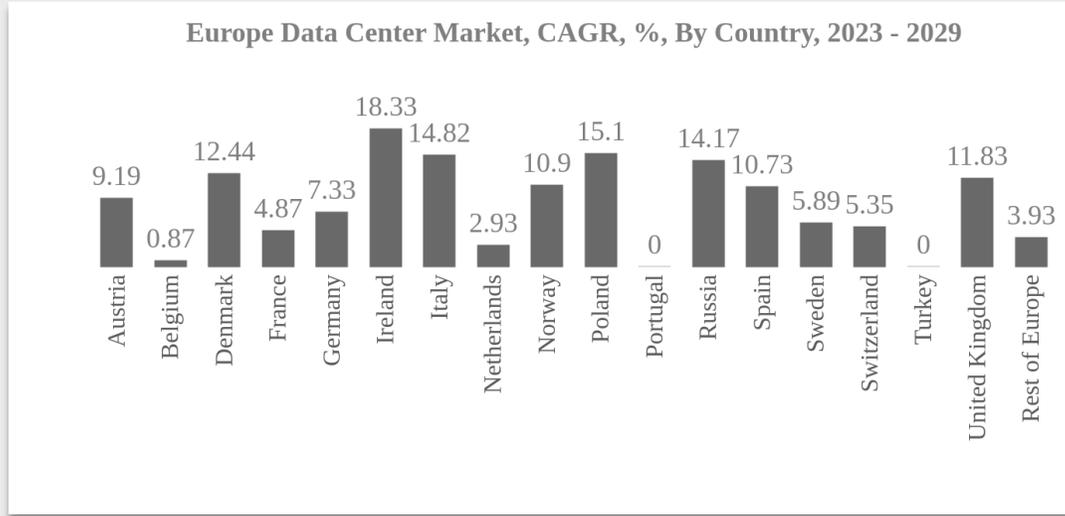
Date: 09-2025



Agenda

- 01 Fire protection in Data Centers
- 02 Why select water mist in a Data Center
- 03 Typical Data Center Hazards
- 04 Codes and standards
- 05 System layout FM approved VID FIREKILL and challenges
- 06 Inside the Industry: A Data Center Operator's View

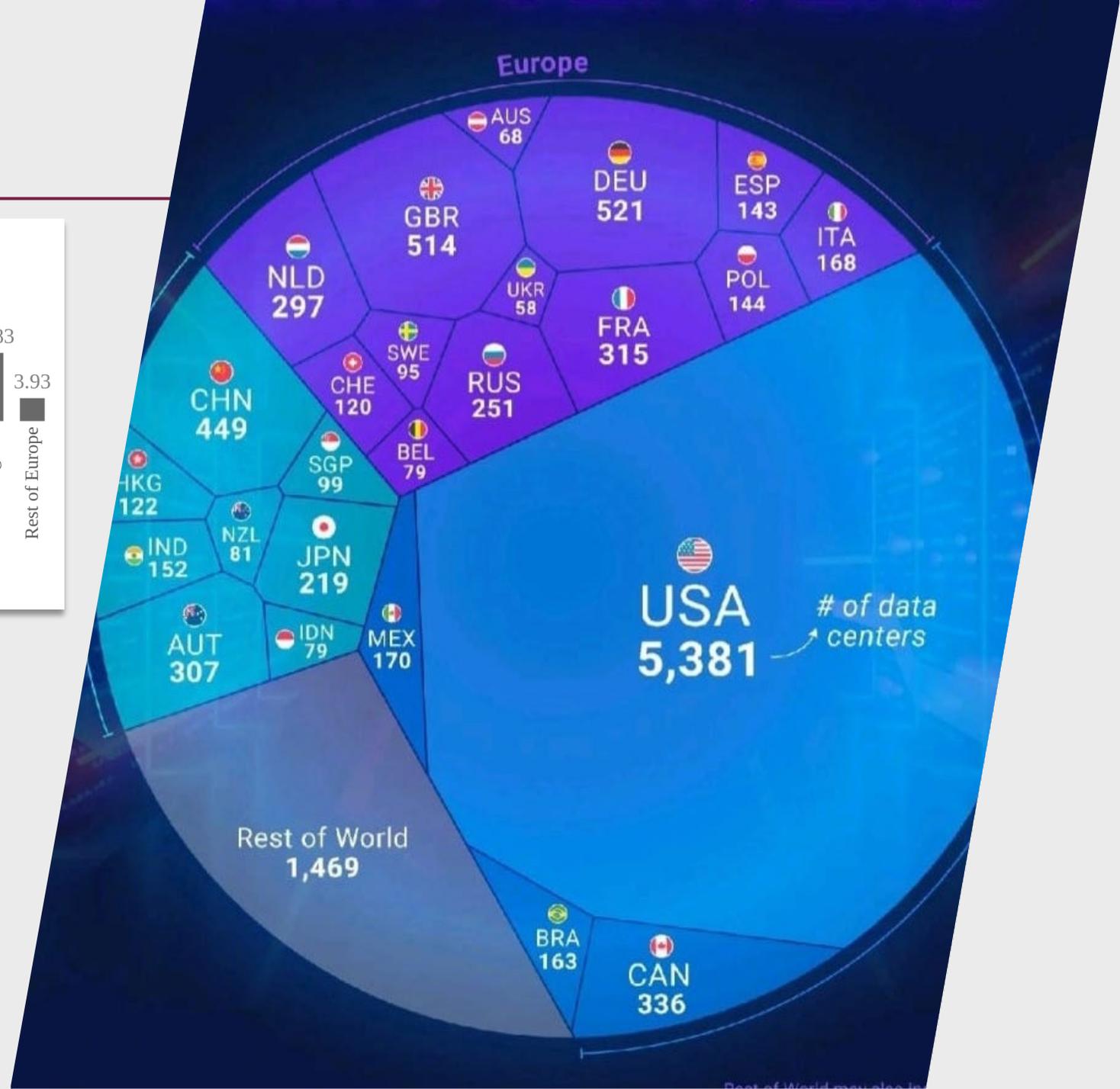
Growth forecast?



FLAPD → Primary Market + MM

APAC fast growth!

Europe is a market leader in density / km2



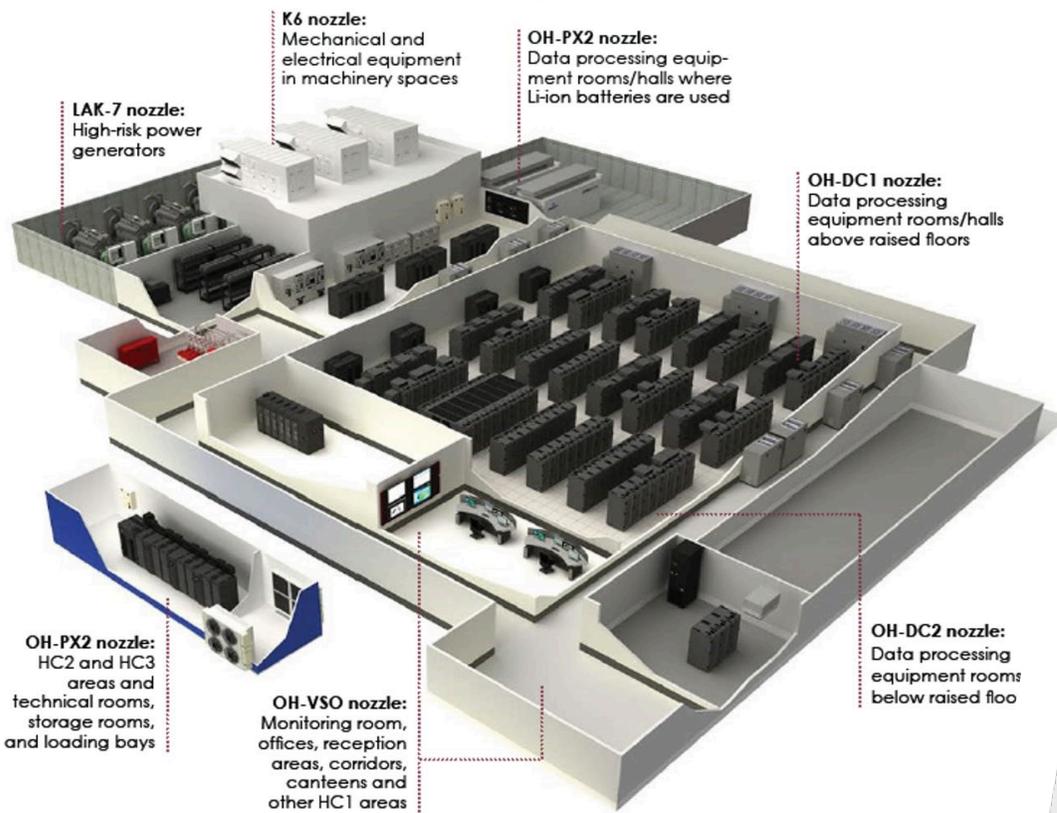
Fire protection in Data Centers:

Fire protection system objectives?

- Extinguishing
- Protect data (cabinets)
- Control
- Protect facility

What has to be taken into account?

- Fire protection objectives
- Configuration and infrastructure of the data center
- Ventilation & cooling
- Available space



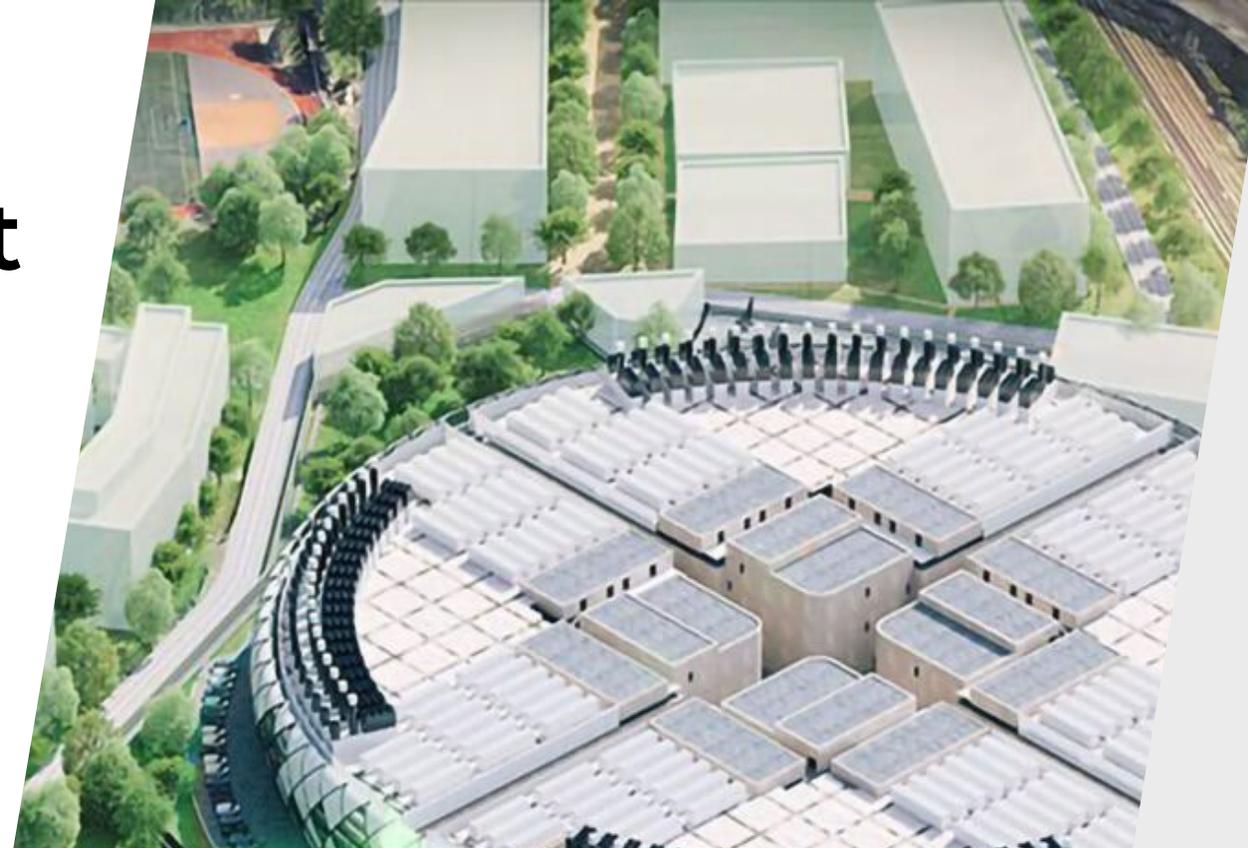
Topics affecting construction and layout

Power Density: High-density space requires different cooling strategies;

Redundancy/Resiliency: Higher redundancy levels mean higher costs and strategy;

Timing: Rapid build-outs can be pricier than speculative developments;

Tier Certification: Higher certification levels, like Tier IV, can cost significantly more than lower tiers but can easily attract more customers;



Factors Influencing Data Center Costs

Location: The cost of land varies greatly depending on the region.

Infrastructure: The infrastructure required includes electrical systems, HVAC systems, and security measures. This infrastructure ensures the data center operates efficiently and securely.

Core and Shell: This refers to the basic structure of the building, including the exterior walls, roof, and foundation. Costs can vary based on the materials used and the complexity of the design.



Fire protection systems used in data centers

Gas suppression systems

- Chemical gas (FK-5-1-12 / HFC227ea)
- Inert gas (IG55 / IG541 / IG100 / IG01)

Sprinkler systems

- Wet pipe
- Pre-action

Water Mist systems

- Wet pipe
- Pre-action



Why select water mist in a Data Center

Water mist is an eco-friendly and sustainable technology with 70% less CO2-e

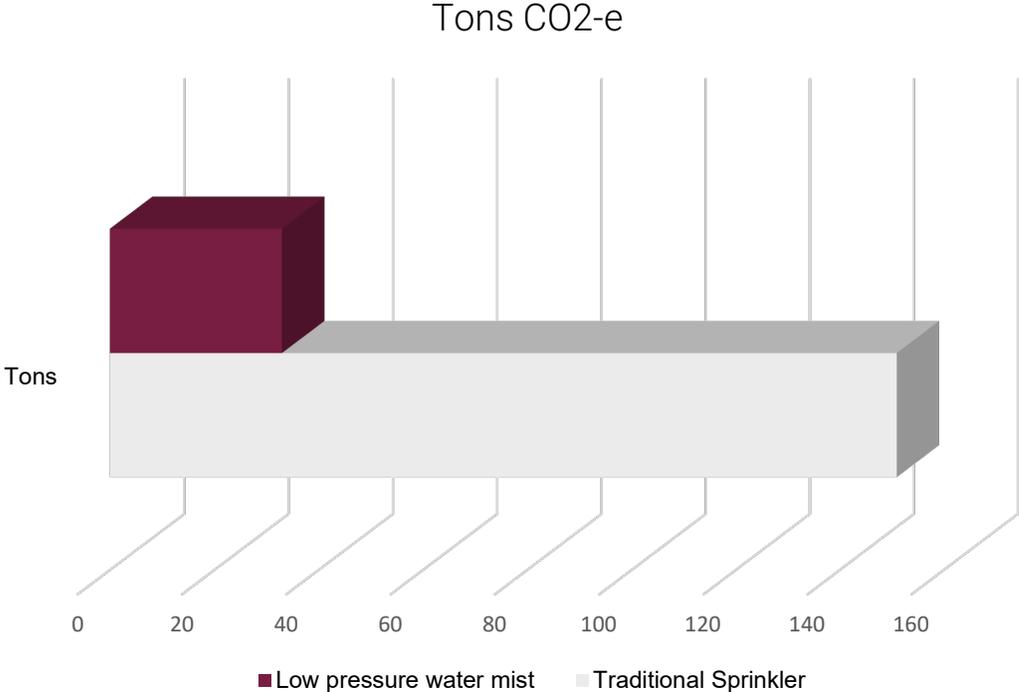
Protection of all critical areas of a data center with one system

Shorter lay-down time, no long refilling required

Smaller pipe dimensions, system weigh less

Space saving

Lower maintenance cost



Piping

Low pressure pipes – PN16 press fitted -> faster and easier installation

Less structural weight

No corrosive stainless steel

Lower transportation costs

Sprinkler pipe: source NFPA website;



NOT PRESSED

PRESSED

o-ring

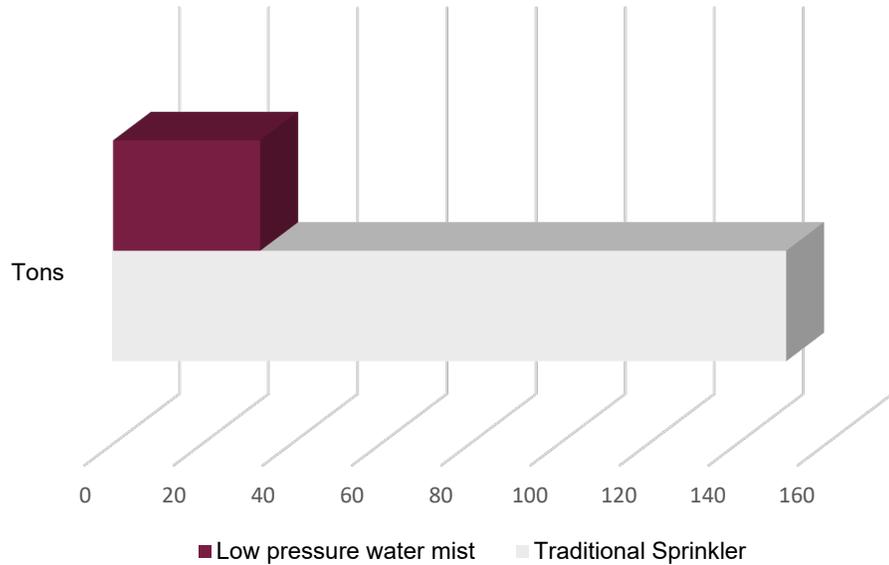
Visual indicator (sleeve)



Low pressure water mist pipe

Piping

Less structural weight:



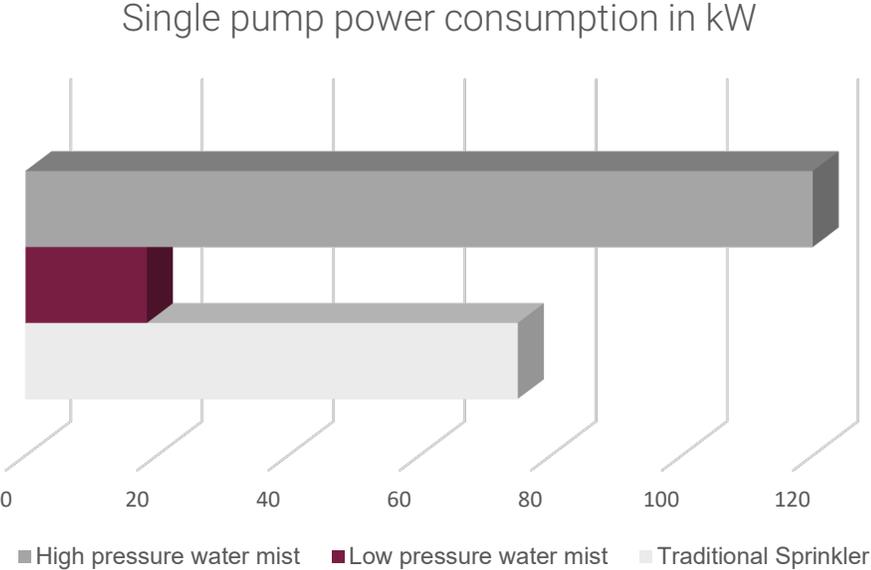
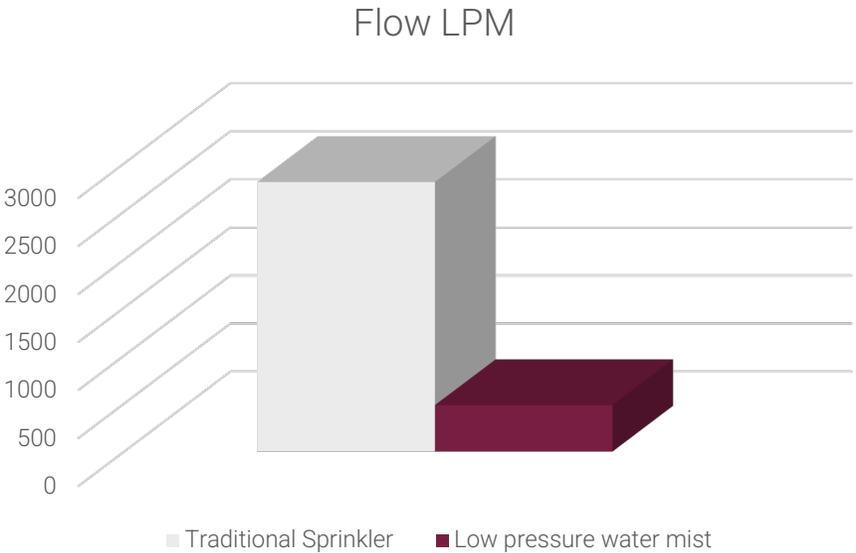
Data from a case study of a Data Center with 4000 nozzles head

Traditional Sprinkler	kg/m	m	kg
DN25	2.41	5456	19723
DN32	3.1	3780	17577
DN40	3.56	765	4085
DN50	5.03	6600	49797
DN80	6.76	153	1551
DN100	9.83	1084	15984
DN150	17.15	1656	42601
			151318

Low pressure water mist	kg/m	m	kg
18x1	0.426	2350	1502
22x1	0.625	5366	5031
28x1	0.805	1419	1713
35x1.5	1.258	3355	6331
42x1.5	1.521	1000	2282
54x1.5	1.972	3932	11631
76.1x2	3.711	900	5010
			33499

Why select water mist in a Data Center

Water mist is an eco-friendly and sustainable technology with 70% less CO2-e



- FM HC-3 pre-action double-interlock;
- HPWM currently not approved;

Values compared within water mist industry

VID FIREKILL Values Compared to High pressure water mist:

Energy saving	Flexibility	Stronger compliance	Less cost and less TCO	Greener solution	Approvals
70% less energy with same water consumption	Stronger against ventilation Up to 8m/s	Can be easily deployed and combined with sprinkler pumps if needed	More than 20% less cost	Less CO2 Emissions 70%	HC2/HC3 More levels of cables BBU with li-ion

Values compared to other technologies _____

VID FIREKILL Values Compared to gas suppression systems:

Environmentally friendly

Lower maintenance cost

Smaller pipe dimensions, system weigh less and space saving

Easier installation and lower cost for extension

No danger for a false activation or extinguishing agent decomposition

No need for ventilation system shutdown or automatic power-down upon smoke detection
(Ref FM Data sheet 5-32, 2.4.3.4.C.1)

Chemical Gases: Novec1230 / FM-200

Novec1230 (FK-5-1-12) is containing PFAS and under evaluation from ECHA for being banned in the next future



FM-200 (HFC227ea) is already under a restriction program due to the long life in the atmosphere

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3M to Exit PFAS Manufacturing by the End of 2025



English

Energy, Climate change, Environment

Climate Action

Home | About us ▾ | Climate change ▾ | EU Action ▾ | Citizens ▾ | N

Home > EU Action > Fluorinated greenhouse gases > EU legislation to control F-gas

EU legislation to control F-gases

Inert Gases: present in the atmosphere, but:

Due to the new generation data center layout a huge amount of cylinders is required with almost impossible and very limited design;

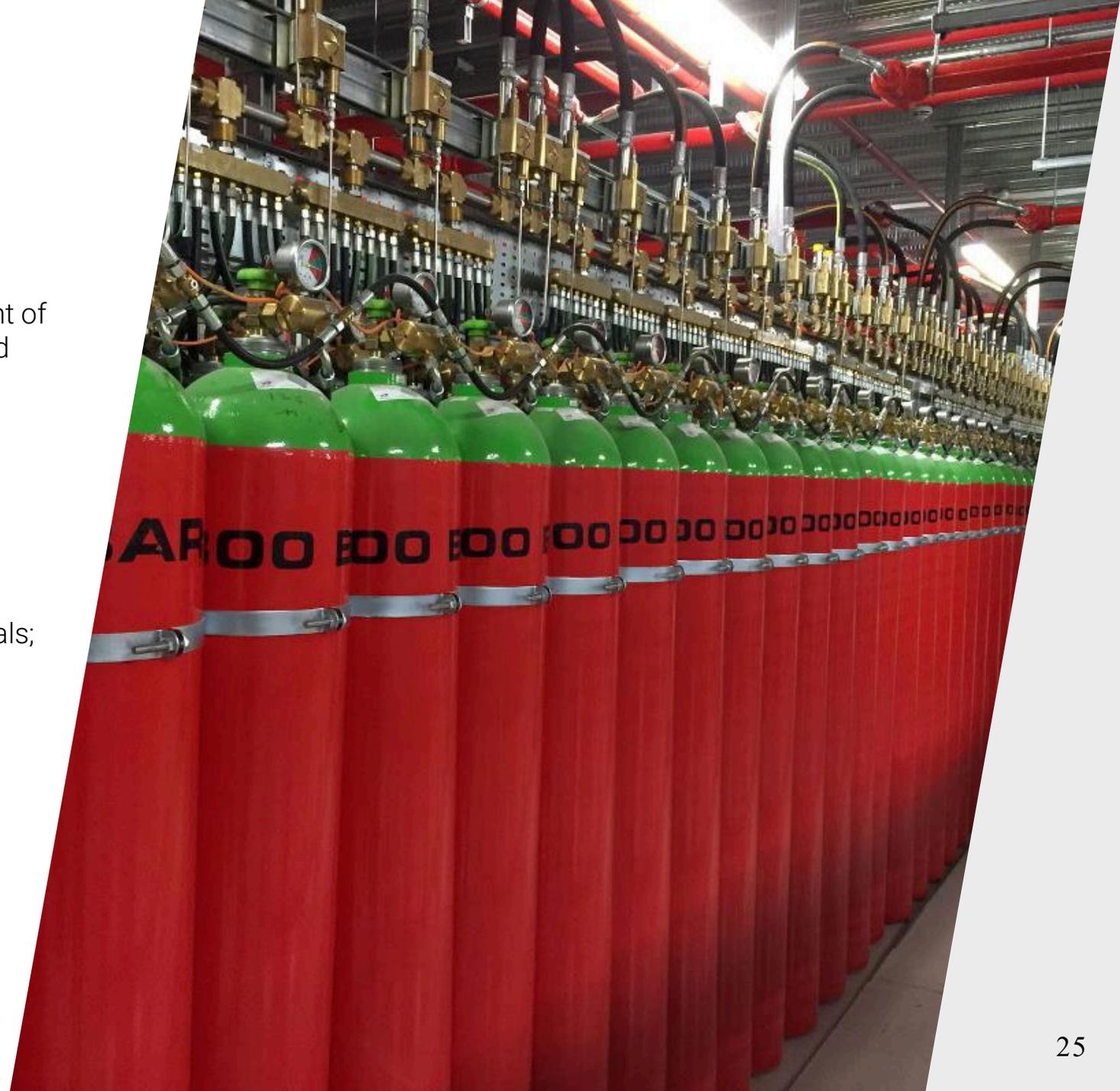
Large amount of cylinders:

10 years inspection and change; Is it sustainable?

Side equipment required and huge pipe and cylinder materials;

Is it really safe?

Extinguishing concentration for the electrical hazards is above NOAEL (No Observable Adverse Effect) level – Toxic for humans;



VID FIREKILL Water Mist solutions for Data Centers

Office / circulation spaces

Data halls

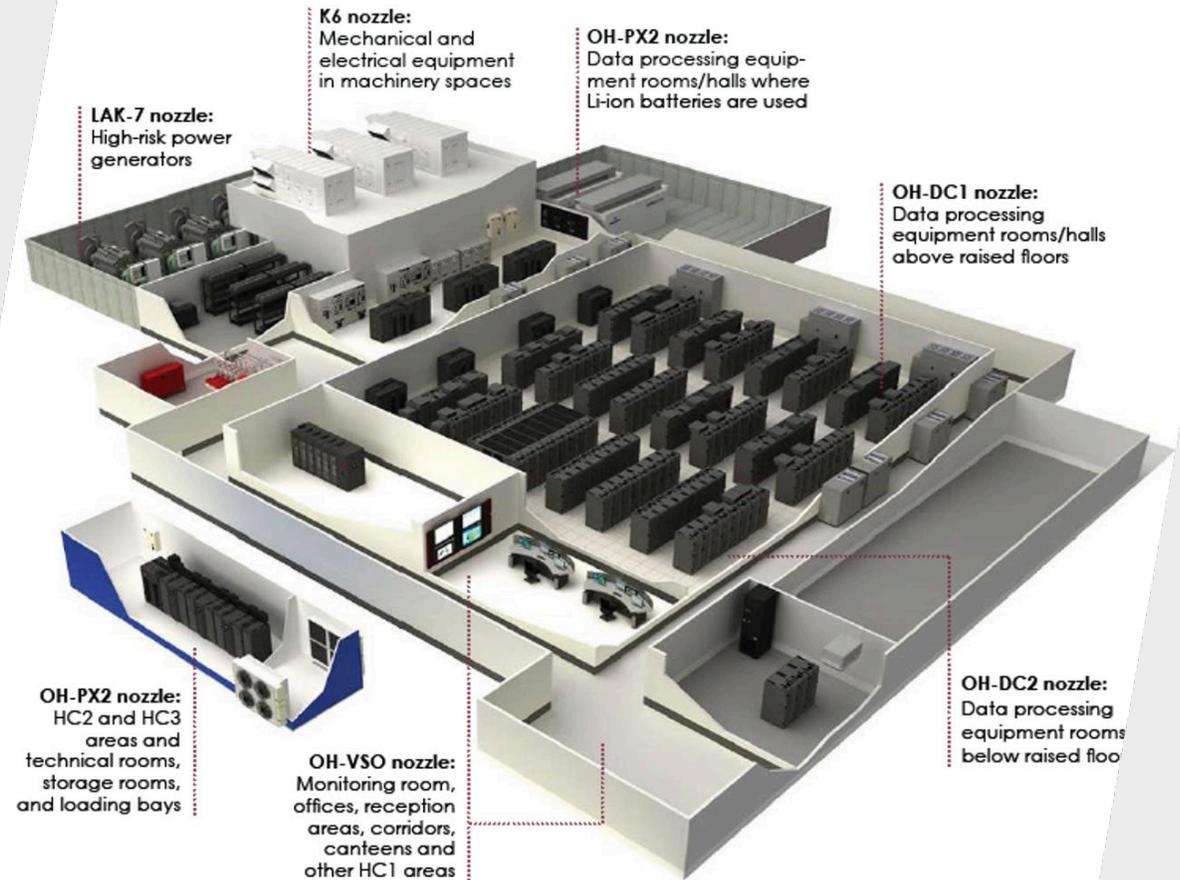
Electrical rooms (MDF / MMR)

Transformer / generator rooms

UPS / battery rooms

Storage rooms

Loading bays



Codes and standards used in Data Centers

EN 14972

NFPA 750 / NFPA 13

FM 5560

FM DS 5-32

FM DS 4-2

FM DS 3-26



C.3.13 Data Centers and Related Facilities. This application includes protection of data center processing equipment rooms/halls, which include control rooms, process control rooms, diagnostic equipment, and critical systems and equipment associated with data centers. This application is further defined in FM Global Property Loss Prevention Datasheet 5-32, *Data Centers and Related Facilities*.

FM 5-32 hazards

Occupancy	Hazard Classification	Fire Test Protocol	FM Approved Solution
UPS Battery rooms	HC-2 / HC-3	Water Mist: FM5560 Appendix P	OH-PX2
Data Halls with Li-ion BBU / Ceiling > 5m	HC-2 / HC-3	Water Mist: FM5560 Appendix P	OH-PX2
Office / Circulation spaces	HC-1	Water Mist: FM5560 Appendix G	OH-VSO
Transformer Rooms	HC-3 – dry Machinery space - Oil	Water Mist: FM5560 Appendices A to F, I	K6 (Total Flooding) LAK7 (Local Application)
Generator rooms	Machinery space	Water Mist: FM5560 Appendices A to F, I	K6 (Total Flooding) LAK7 (Local Application)
Technical Rooms	HC-2 / HC-3	Water Mist: FM5560 Appendix P	OH-PX2
Data Halls and MMR	Data Processing Room	Water Mist: FM5560 Appendices M & N	OH-DC1 (Ambient) OH-DC2 (RF and FC)

Global topics that can affect the design:

The use of lithium batteries

Business interruption

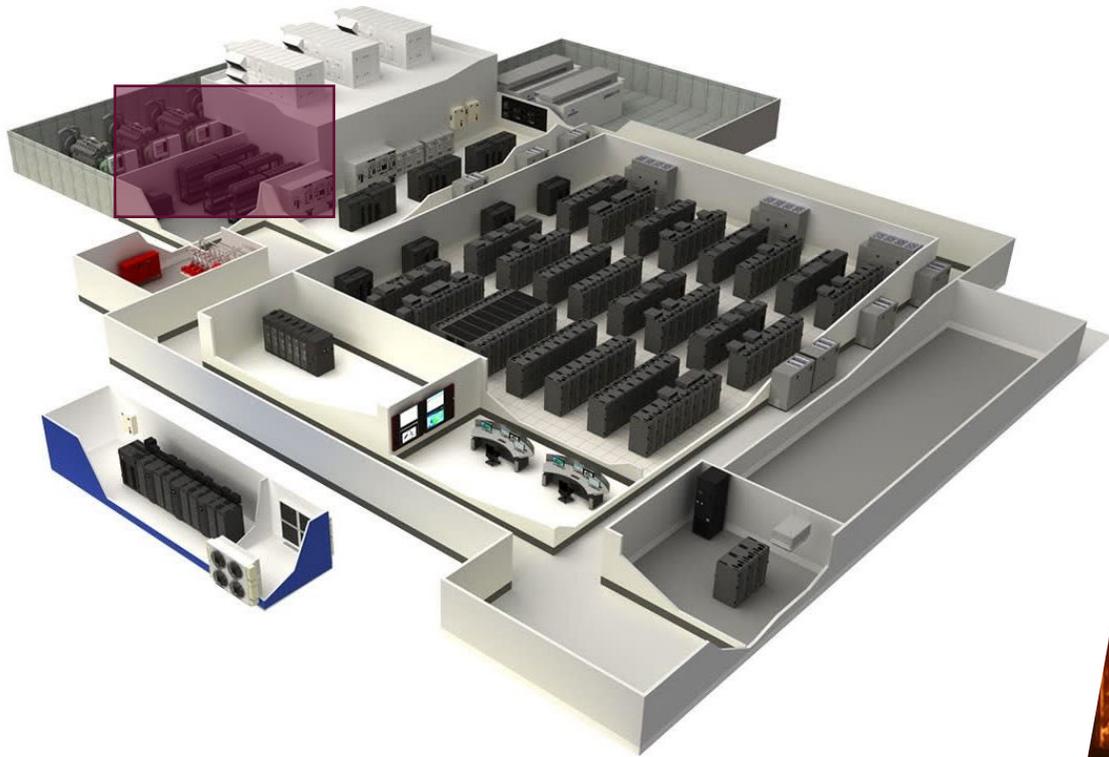
Flexibility

System activation temperature

Air velocity



Centralized



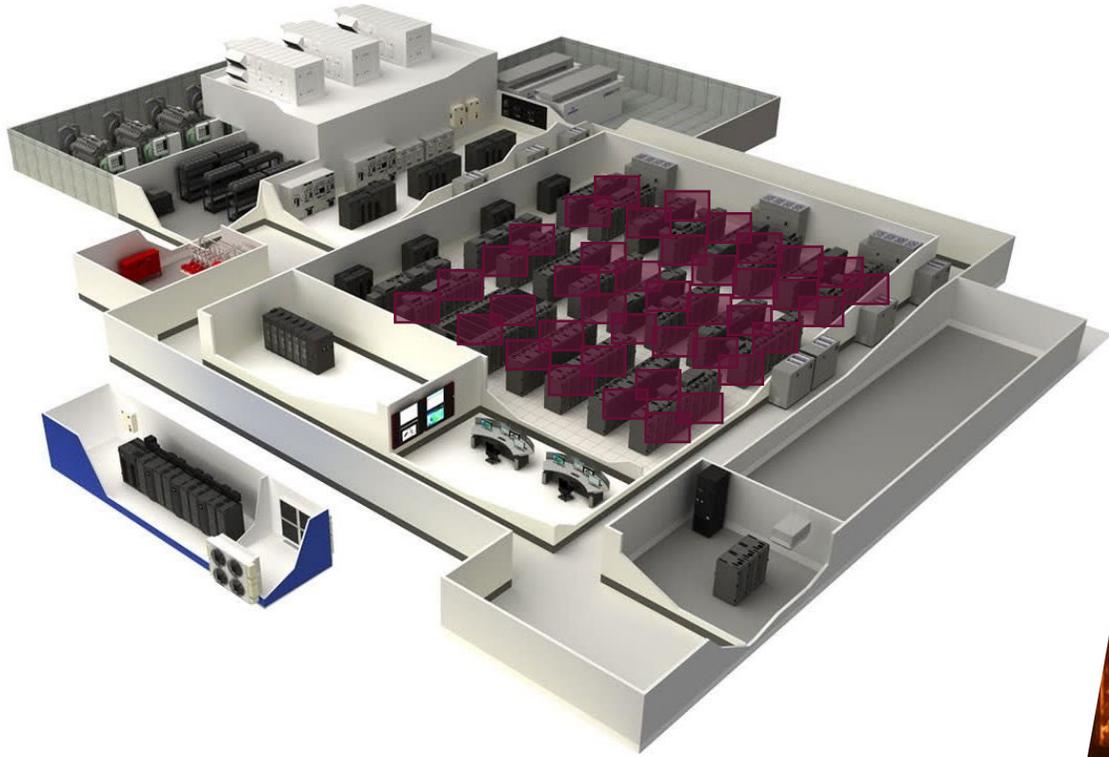
Failure of battery

Off-gassing

Smoke

Fire

Decentralized



Failure of battery

Off-gassing

Smoke

Fire

Li-ion batteries in data centers applying FM DS 5-32

Different ways in which li-ion batteries are used and installed in a data center facility today:

Installed in server racks as a distributed power system of data processing equipment

Installed in separate UPS rooms providing the necessary power backup

When li-ion batteries are installed in server racks as a distributed power system of data processing equipment in the data halls, we find the following conditions that this must meet to be considered as such.

2.4.4 Li-ion Battery Back-up Units for Distributed Power Systems

2.4.4.1 Where Li-ion battery back-up units (BBU) are installed in a server rack as a distributed power system, the recommendations in this section are to be applied if the following conditions exist:

- A. Maximum power capacity of 20 kWh per server rack as a distributed power configuration. (Refer to Section 3.4.1.2 for calculating power capacity.)
- B. No more than two shelves containing BBU modules located together in the same area of the rack. (See Figure 2.4.4.1 for typical configuration.)
- C. Aisle spacing between server rows is a minimum of 4 ft (1.2 m).
- D. Ceiling height is a maximum 30 ft (9 m). (Refer to Section 3.2.5.1.)
- E. No limitation on the building/room size (area in ft²/m²).

2.4.4.1.1 Server racks with distributed Li-ion Battery Back-up Units (BBU) exceeding the maximum capacity of 20 kWh per rack should be considered Energy Storage Systems (ESS); and the recommendations identified in OS 5-33, *Energy Storage Systems*, should be followed.

Li-ion batteries in data centers FM DS 5-32 FM DS 5-33

If these circumstances arise, the following recommendations for the application of an automatic fire protection system are made



If these circumstances arise, the following recommendations for the application of an automatic fire protection system are made



The installation must be seen as an electrical energy storage systems and the FM DS 5-33 needs to be consulted. Looking in this datasheet we can find the following recommendations:



2.4.4.3 Provide one of the following automatic protection options throughout all building areas associated with this hazard:

A. Use FM Approved quick-response (QR) sprinklers in accordance with Data Sheet 2-0, *Installation Guidelines for Automatic Sprinklers*, and the following specifications:

1. Minimum density 0.2 gpm/ft² (8 mm/min). Sprinkler deflector distance from the ceiling (min: 1.75 in. [44 mm]; max: 4 in. [100 mm]).
2. For wet, non-interlock or single interlock preaction systems, use a demand area of 2500 ft² (230 m²).
3. For double interlock preaction systems, use a demand area of 3,500 ft² (320 m²).
4. Provide a maximum linear spacing of 12 ft (3.6 m) and area spacing of 144 ft² (13.4 m²), or a reduced spacing and area for clearance from obstructions, in accordance with Data Sheet 2-0, *Installation Guidance for Automatic Sprinklers*.

B. Use FM Approved automatic water mist systems with the following specifications:

1. Approved for protection of non-storage, Hazard Category (HC-2) occupancies
2. Provided in accordance with Sections 2.4.7.2.2 through 2.4.7.2.9

2.4.4.3 Provide a hose allowance of 250 gpm (950 L/min).

2.4.4.4 Provide a water supply duration of 60 minutes.

2.4.4.5 Do not use clean agent fire extinguishing systems to provide protection. (See Section 3.4.1.2.)

2.4.4.1.1 Server racks with distributed Li-ion Battery Back-up Units (BBU) exceeding the maximum capacity of 20 kWh per rack should be considered Energy Storage Systems (ESS); and the recommendations identified in OS 5-33, *Energy Storage Systems*, should be followed.

2.4 Protection

2.4.1 Provide automatic sprinkler protection designed to a 0.3 gpm/ft² (12 mm/min) over 2500 ft² (230 m²) or the room area, whichever is larger, with an additional allowance of 250 gal/min (946 L/min) for hose streams.

2.4.1.1 Where the sprinkler demand area requires a water supply greater than what is available, provide the following:

A. Install noncombustible floor-to-ceiling partitions with penetrations protected by FM Approved fire stops between adjacent racks perpendicular to the rack door or opening to prevent fire spread. Ensure the partitions extend at least 12 in. (0.3 m) from the face of the rack. See Figure 2.4.1.1. Determine the horizontal distance between thermal barriers based on how many racks can be protected by the available water supply.

B. Install a solid metal partition on the back (non-aisle) of each rack to prevent heat transfer to adjacent racks in the next row. Where the rack design incorporates a solid metal back (no ventilation openings), additional partitions are not needed. (See Figure 2.4.1.1.)

Li-ion batteries in data centers applying FM DS 5-33

FM DS 5-33 is not recommending using a gaseous fire protection system and no other fire protection system is recommended nor rejected.

The recommended sprinkler density of 12 mm/min, corresponds to the FM Hazard Category 3(HC3)

FM has a fire test protocol for water mist systems for the protection of non-storage spaces, Hazard Category 2 (HC-2) and Hazard Category 3 (HC-3) in appendix P from the FM5560:2021

Hazard Category 3 (HC-3) water mist fire protection for UPS rooms could be considered

The reasons for limiting the use of gaseous are not applicable for water mist, since it is not limited, and cooling is one of the key benefits of using water mist over clean agents and sprinklers.



3.3 Gaseous Protection Systems

Generally, gaseous protection systems are not recommended for ESS applications for the following reasons:

- A. Efficacy relative to the hazard. As of 2019, there is no evidence that gaseous protection is effective in extinguishing or controlling a fire involving energy storage systems. Gaseous protection systems may inert or interrupt the chemical reaction of the fire, but only for the duration of the hold time. The hold time is generally ten minutes, not long enough to fully extinguish an ESS fire or to prevent thermal runaway from propagating to adjacent modules or racks.
- B. Cooling. FM Global research has shown that cooling the surroundings is a critical factor to protecting the structure or surrounding occupancy because there is currently no way to extinguish an ESS fire with sprinklers. Gaseous protection systems do not provide cooling of the ESS or the surrounding occupancy.
- C. Limited Discharge. FM Global research has shown that ESS fires can reignite hours after the initial event is believed to be extinguished. As gaseous protection systems can only be discharged once, the subsequent reignition would occur in an unprotected occupancy.

Li-ion batteries in data centers and FM DS 5-33

The conclusion in Appendix C from DS 5-33 is that no FM-approved solution exists today for the protection for electrical energy storage systems.



FM base this on the results of fire tests conducted in the past where the effectiveness of a sprinkler system could also not be verified, which they are also explaining in the 5-33.



In these fire test which FM conducted in 2019, the results between the tested lithium iron phosphate (LFP) and Li-nickel manganese cobalt oxide (NMC) were very different

C.5 Fire Protection Technologies

To date there is no publicly available test data that confirms the effectiveness of any active fire protection for energy storage systems, and there are no fire protection systems FM Approved for this application. The ability of active fire protection to stop or prevent Li-ion battery thermal runaway reactions has not been shown. At the same time, some manufacturers are providing active protection systems as an integrated component of the ESS.

3.2 Fire Protection and Minimum Separation Distances for Indoor Installations

Thermal runaway events create a large amount of heat. The heat, coupled with plastic construction components, can lead to a very large fire. Although fire protection may not be practical in exterior installations, it is the best method of cooling a fire involving ESS.

Limited research has been performed on lithium ion-based ESS systems to assess fire propagation characteristics and protection schemes. The report Development of Sprinkler Protection Guidance for Lithium Ion Based Energy Storage Systems, published in June 2019 on the FM Global Website, is the basis for recommendations on fire protection and separation distances from both noncombustible and combustible materials. However, it must be recognized that the research was limited in scope, and the effect of rack design, materials-of-construction, battery specifications and chemistry, and other design features are not well understood. Because of these issues, it does not appear possible to extrapolate the results obtained with the tested lithium iron phosphate (LFP) and Li-nickel manganese cobalt oxide (NMC) systems to other ESS. The recommendations in DS 5-33 represent the current state of knowledge. The data sheet will be updated as additional information is available.

In addition, the National Fire Protection Association (NFPA) recently published the first fire protection standard for ESS, NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*.

Link to *Development of Sprinkler Protection Guidance for Lithium Ion Based Energy Storage Systems*:

<https://www.fmglobal.com/research-and-resources/research-and-testing/research-technical-reports>

Summary li-ion batteries in data centers and FM datasheets

LI-ION BATTERIES IN SERVER RACKS

In case a data center services provider wants to be able to have tenants using li-ion batteries in server racks as a distributed power system of data processing equipment. They can use either a HC-2 sprinkler or water mist solution as an automatic fire protection.

The VID FIREKILL solution is tested and approved against appendix P from the FM5560:2021 and approved for the protection of HC2/HC3 areas.

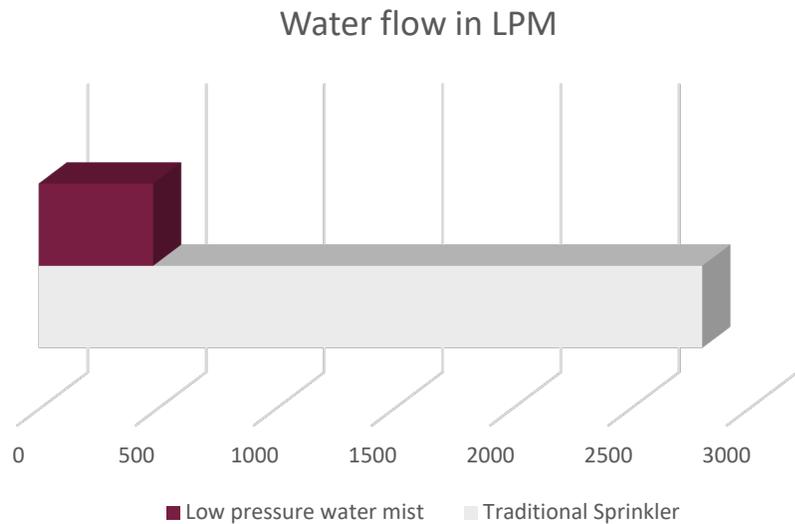
UPS ROOMS USING LI-ION BATTERIES

In case a data center services provider allows for li-ion batteries entering their UPS rooms. They can use a HC-3 sprinkler solution as an automatic fire protection. But since FM global is confirming that there is no FM approved solution and water mist is tested against appendix P from the FM5560:2021 and approved its use for the protection of HC2/HC3 areas, a water mist solution can also be considered.

The VID FIREKILL solution that is tested and approved against appendix P from the FM5560:2021 and approved for the protection of HC2/HC3 areas.

Global topics on data centers fire protection: business interruption

Low pressure water mist	Total Flow	Duration	Power kW
HC-3 wet / single interlock	484 lpm	60 min	18.5
Sprinkler	Total Flow	Duration	Power kW
HC-3 wet / single interlock	2806 lpm	60 min	75



Sprinkler

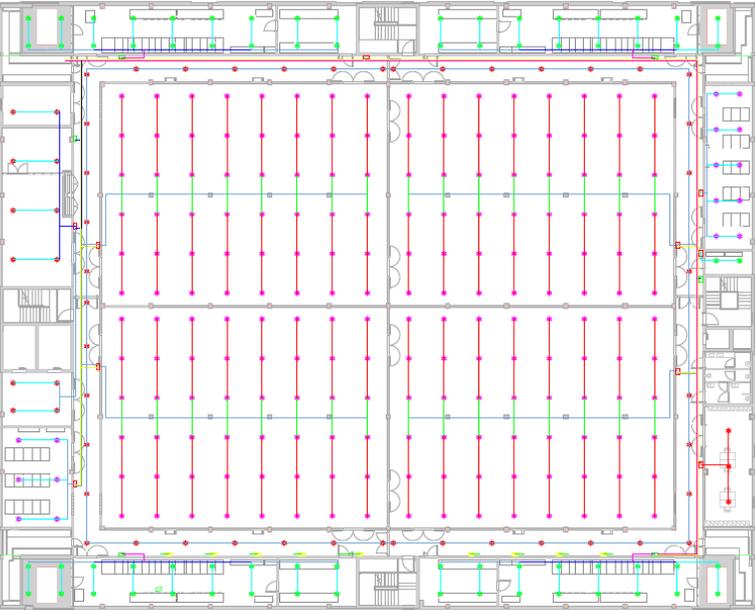


Low pressure water mist

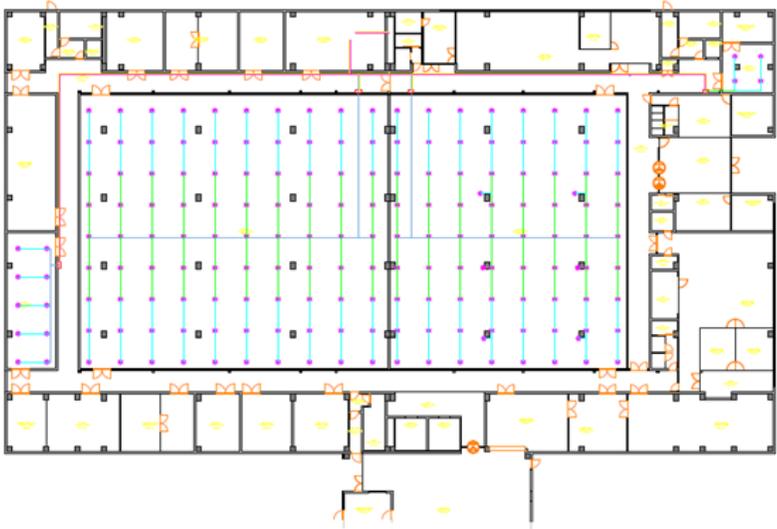


Global topics on data centers fire protection: Flexibility

Both developments are based on a protection of a typical Data Processing Equipment hazard



PIPE SIZE	PIPE COLOR	EXTERNAL Ø x H (mm)	INTERNAL Ø (mm)
DN20	Red	22 x 1.2	19.8
DN25	Green	28 x 1.2	26.6
DN32	Blue	36 x 1.5	32.0
DN40	Yellow	42 x 1.5	36.0
DN50	Purple	54 x 1.5	51.0
DN65	Pink	76.1 x 2.0	72.1
Compressed air pipe	Orange	12 x 1.2	9.6



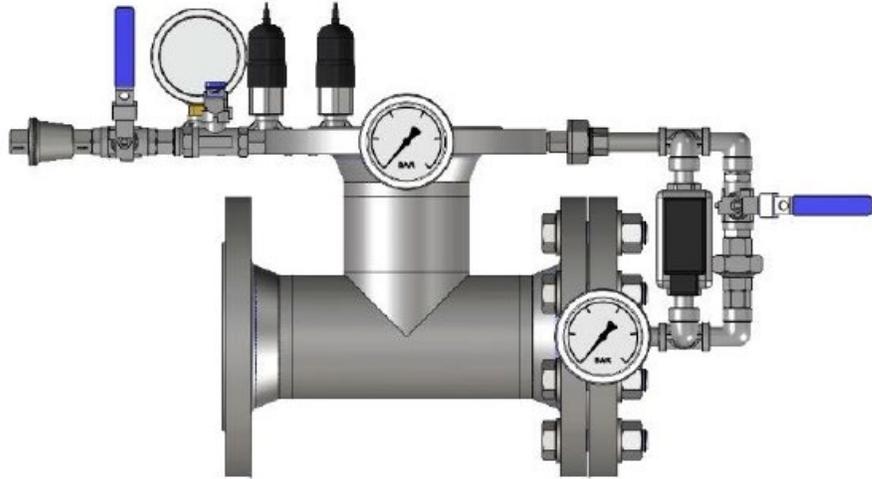
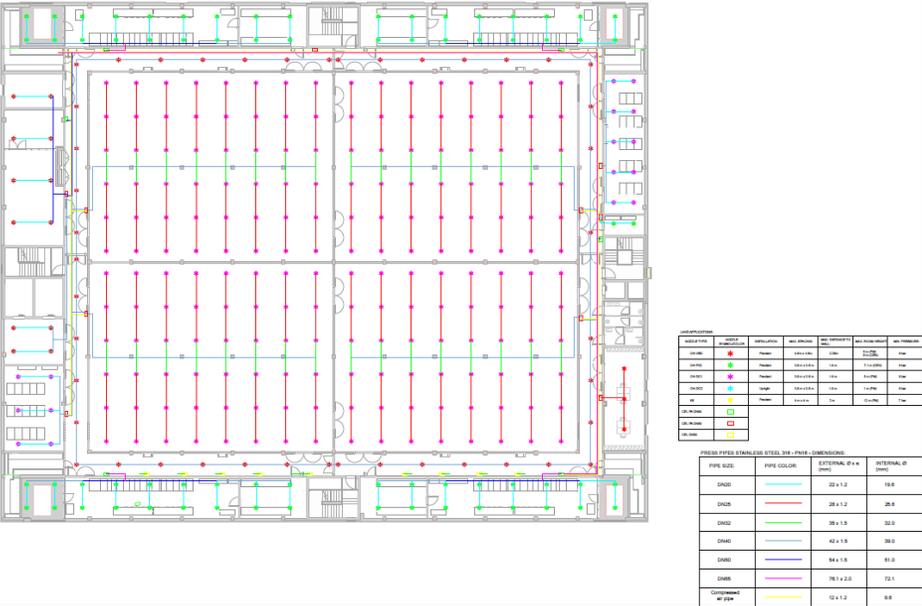
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Compressed air pipe	Orange	12 x 1.2	9.6

OH-DC1 design example 1

OH-DC1 design example 2

Space planning: no valves drain connection needed



The pre-action control valve does not require to be connected to a drain system



- Cost saving for less drainage systems;
 - Possibility to decentralize valves;
- ↓
- More space;
 - Faster water discharge; Faster fire control and suppression;

Global topics on data centers fire protection:

Air velocity

FM DS 2-0 states that for non storage occupancies, arrange any airflow taking place between the protected occupancy and a horizontal plane located at the ceiling-level sprinklers so the airflow velocity does not exceed 5 ft/s (1.5 m/s);

NFPA13???

Low pressure water mist is tested and FM approved with 1.7 m/s air velocity in the data hall:



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Global topics on data centers fire protection:

Bulbs rating

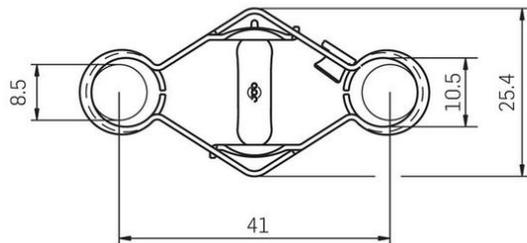


Response	Type	Length mm	RTI*		Strength				Temperature						
			Response Time Index		Average crush load		Lower tolerance limit		Additional temperatures available						
			ms ^{1/2}	fts ^{1/2}	kN	lbs	kN	lbs	57°C 135°F orange	68°C 155°F red	79°C 175°F yellow	93°C 200°F green	141°C 286°F blue	182°C 360°F mauve	260°C 500°F black
Standard	G5	16/20	90	163	4.0	880	2.5	550							
	G5-XS	16/20	90	163	5.5	1210	4.0	880							
Inter- mediate	F5	16/20	68	123	4.0	880	2.5	550							
	F4	16/20	58	105	4.0	880	2.5	550							
Fast	F3-SP	20	32	58	4.1	900	2.3	500							
	F3	16/20	32	58	3.5	770	2.0	440							
	F3-XS	16/20	32	58	4.5	990	3.0	660							
Super Fast	F3-F	16/20	24	43	4.1	900	2.3	500							
	F2.5	16/20	24	43	2.5	550	1.25	275							
	F2.5-XS	16	24	43	4.0	880	2.1	460							
Ultra	F2	16	19	34	2.0	440	1.0	220							
	F1.5	16	14	25	1.0	220	0.5	110							

*F	°C	Color
135	57	orange
155	68	red
165	74	red
175	79	yellow
200	93	green
212	100	green
250	121	blue
286	141	blue
325	232	mauve
360	182	mauve
400	204	black
450	232	black
500	260	black



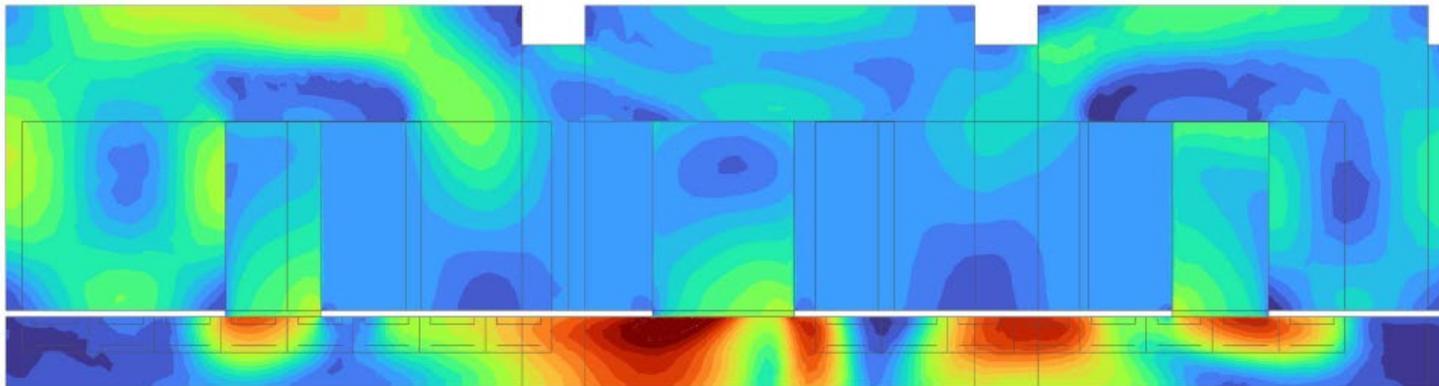
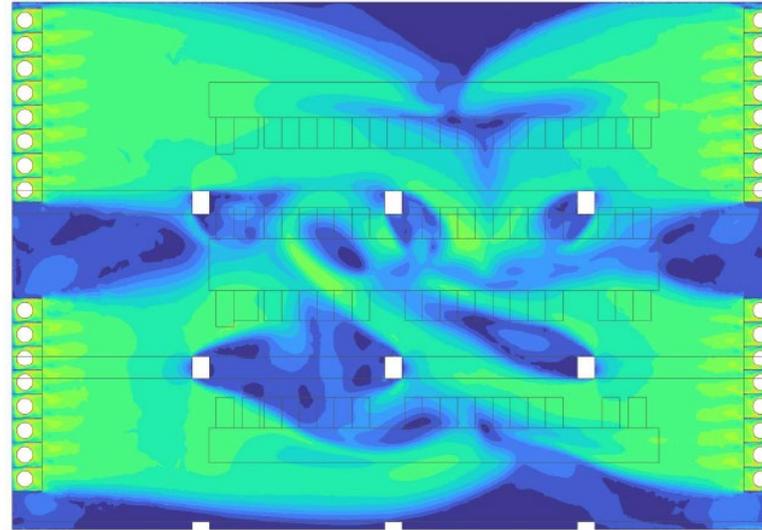
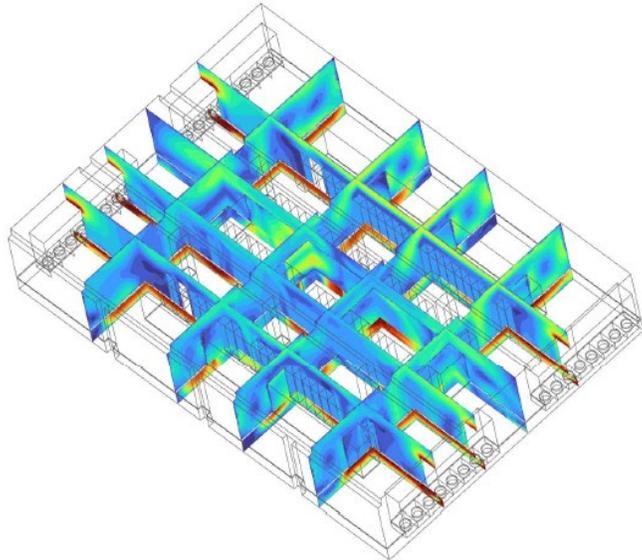
Marked acc. to UL approval and manufacturing date codes



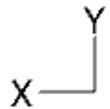
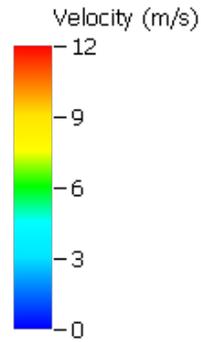
Bulbs temperature can be flexible according the data hall needs; Such as 57°C, 68°C or 93°C;

RTI – response time index for water mist glass bulbs is by far more efficient!

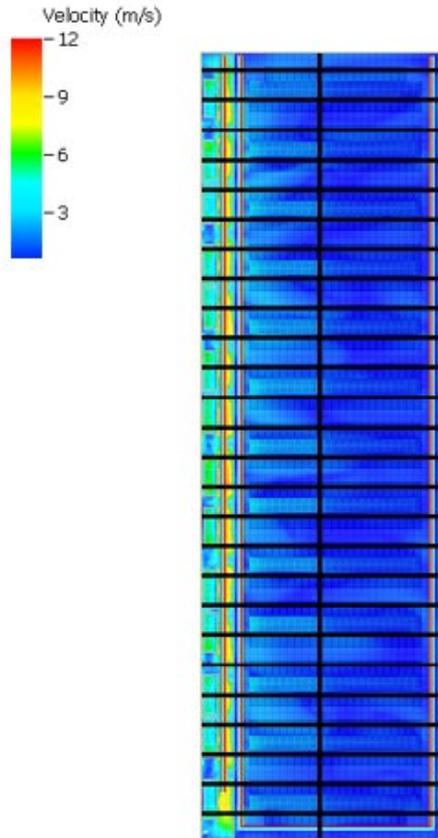
Example with cold aisle containment



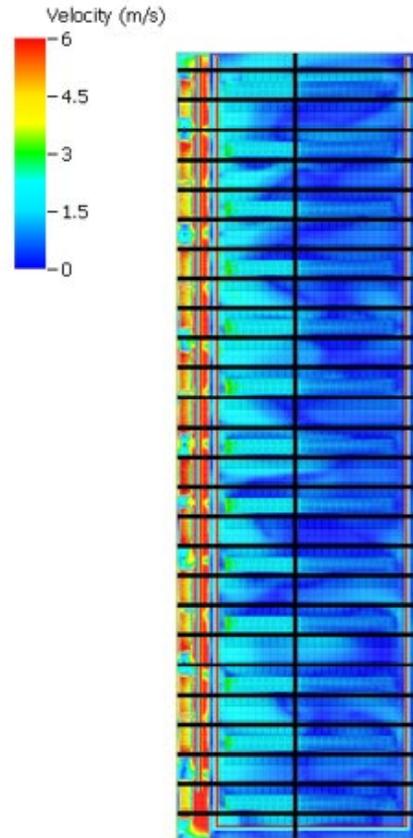
Example with hot aisle containment



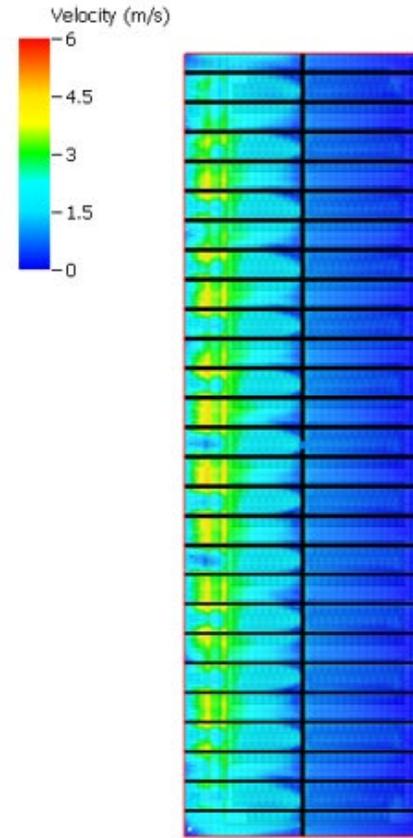
Example with hot aisle containment



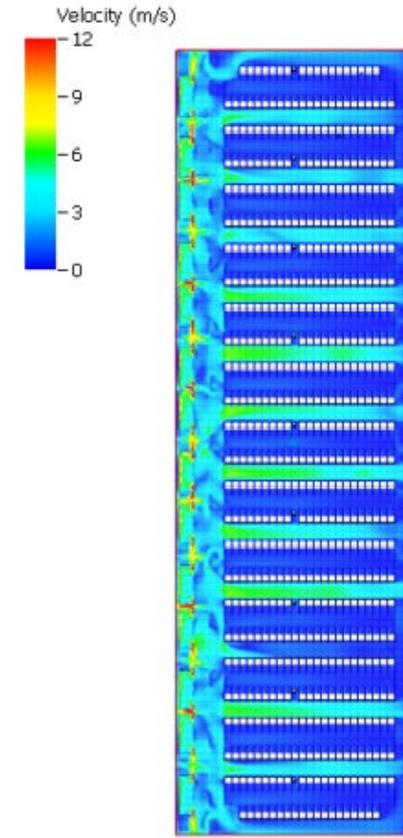
Velocity Plot at 100mm below the false ceiling height (Velocities scaled to the cooling corridor)



Velocity Plot at 100mm below the false ceiling height (Velocities scaled to the data hall)

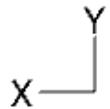
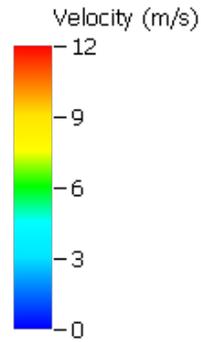


Velocity Plot at 100mm below structural steel

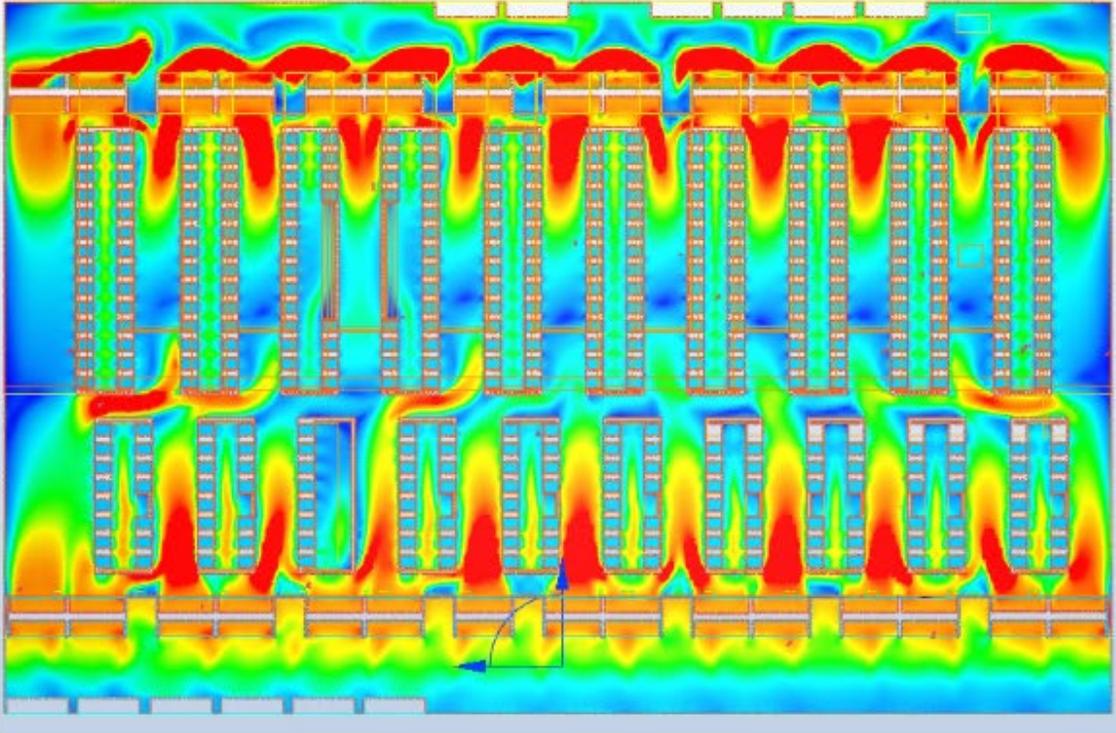
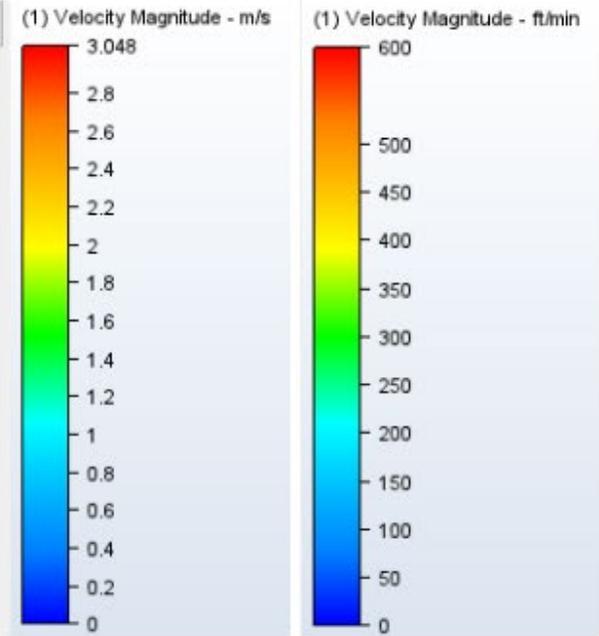


Velocity Plot at 100mm above floor level

Example with hot aisle containment



Velocity 1.5 m above ground



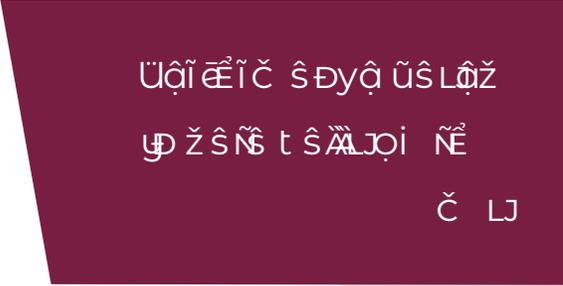
Where to measure?

FM DS 5-32 highlights where are the measuring point of the data hall air velocity.

Measure maximum air velocities in the commissioning phase of the data center to confirm the ventilation air velocity.

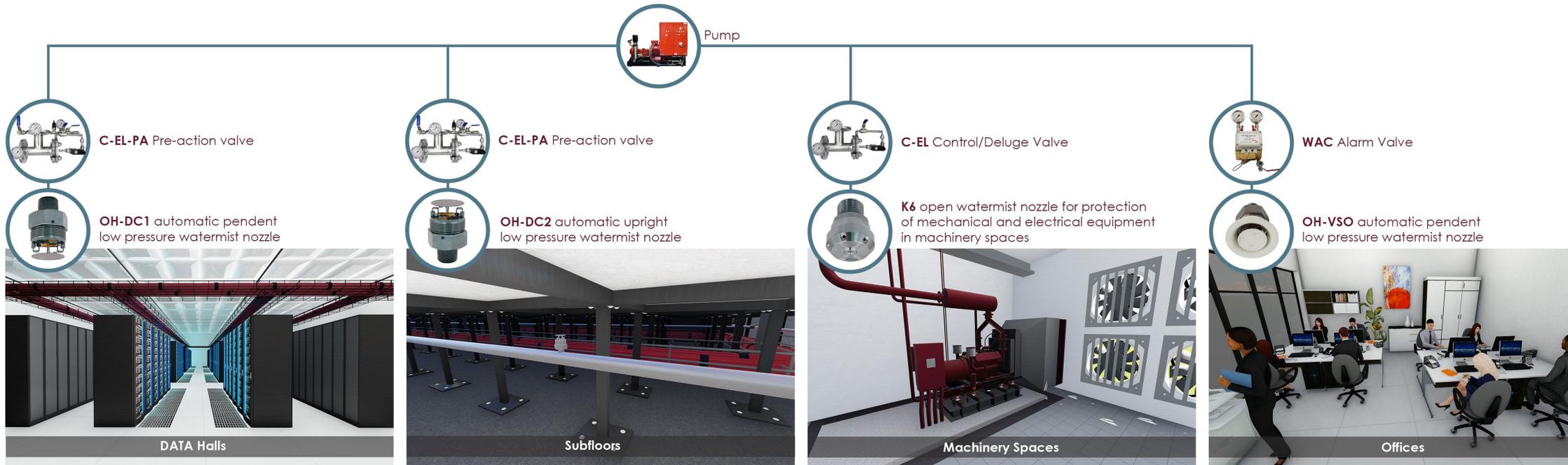
- i. Horizontal velocity should be measured along the length of the aisle at heights of 5 ft (1.5 m) from floor, at the midpoint of the horizontal cable tray(s) height, and within 4-10 in. (0.1-0.25 m) of the ceiling.
- ii. Measure multiple locations along the length of the server rack aisle.
- iii. Horizontal velocity should not be measured in close proximity to fan walls (as these velocities are expected to be higher) and should be measured no further than at the leading edge of the server racks from the fan wall.

Low pressure water mist is tested and FM approved with 1.7 m/s air velocity in the data hall;



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System layout Data Center protection



FM 5-32 hazards

Occupancy	Hazard Classification	Design requirement	VID FIREKILL solution
UPS Battery rooms	HC-2 / HC-3	9 nozzles	OH-PX2
Data Halls with Li-ion BBU / Ceiling > 5m	HC-2 / HC-3	9 nozzles	OH-PX2
Office / Circulation spaces	HC-1	9 nozzles	OH-VSO
Transformer Rooms	HC-3 – dry Machinery space - Oil	9 nozzles	K6 (Total Flooding) LAK7 (Local Application)
Generator rooms	Machinery space	All nozzles in the enclosure	K6 (Total Flooding) LAK7 (Local Application)
Technical Rooms	HC-2 / HC-3	9 nozzles	OH-PX2
Data Halls and MMR	Data Processing Room	6 nozzles	OH-DC1 (Ambient) OH-DC2 (RF and FC)

HC-1 Areas

Areas defined as HC-1 by FM DS 3-26

Corridors;

Offices;

2.3.5.5 Water mist nozzles of different hazard categories can be used on the same system if a water supply capable of supporting the greatest rate of flow and terminal nozzle pressure for the demand area is provided.

2.3.5.6 Determine the design area for water mist systems FM Approved for use in HC-1 occupancies with unrestricted enclosure areas using whichever of the following is **greater**:

- A. The hydraulically most remote nine (9) automatic nozzles
- B. All automatic nozzles within a 1500 ft² (140 m²) demand area

2.3.5.7 Determine the design area for water mist systems FM Approved for use in HC-1 occupancies with specified maximum compartment area to supply all automatic nozzles within the compartment.

2.3.5.8. Determine the design area for water mist systems in corridors that can be protected by one row of nozzles, using whichever of the following is less:

- A. A maximum of five (5) automatic nozzles for the demand area.
- B. In an unrestricted enclosure area, all automatic nozzles within a 1500 ft² (140 m²) demand area.
- C. For corridors smaller than 1500 ft² (140 m²) all automatic nozzles in the area.

Data Processing Room

Data Halls and MMRs with the following conditions:

Ceiling height < 5m;

No BBU with Li-Ion batteries;

Single level of cable trays;

Multiple trays non-propagating and/or cable trays/raceways non-combustible equipped with automatic/manual power isolation see 2.3.5.4.1

For above raised floor protection the water supply shall be capable of supplying 60 minutes of water to the hydraulically most remote nozzles. The design area of the water mist system shall be 6 nozzles or 1.5 times the number of operated nozzles during fire performance testing, whichever is greater. For below raised floor protection the water supply shall be capable of supplying 60 minutes of water to the hydraulically most remote nozzles. The design area of the water mist system shall be a minimum of 6 nozzles for an area of coverage design and a minimum of 4 nozzles for a local application design. For an installation including both above and below raised floor protection the design area of the water mist system shall be based on the most hydraulically demanding protection.

2.3.5.4.1 Power Isolation Method

2.3.5.4.1.1 Provide a power isolation method to achieve the following (separately or together):

- A. De-energize all electrical power to the data processing equipment in the room or designated zone(s), except power to lighting, in the event of sprinkler, water mist system, clean agent fire extinguishing system and/or hybrid fire extinguishing system operation.
- B. When appropriate, de-energize all dedicated heating, ventilation and air-conditioning (HVAC) systems for the data processing equipment serving the room or designated zone(s) in the event of sprinkler, water mist system, clean agent fire extinguishing system and/or hybrid fire extinguishing system operation. See Section 2.3.5.3 for further guidance on the impact of power isolation to HVAC equipment.
- C. If abrupt power isolation will damage the data processing equipment, use a controlled shutdown of the data processing equipment prior to isolation of the power source.

2.3.5.4.1.2 Provide the appropriate power isolation method based on the type of fire protection installed and site conditions, per the criteria below. The critical goal is to achieve power isolation before the end of the fire protection agent duration.

A. For areas protected by a wet or preaction sprinkler system in accordance with the recommendations of Section 2.4.4.2, or a water mist system in accordance with the recommendations of Section 2.4.4.3, provide one of the following, listed in order of preference:

1. Automatic power isolation with controlled depowering
2. Manual power isolation in accordance with Section 2.7.3

HC-2 and HC-3 Areas

Areas defined as HC-2 and HC-3 by FM DS 3-26 and FM DS 5-32:

Data Halls with ceiling >5m

Data Halls with BBU with Li-ion

Data Halls with multiple cable trays

Technical Rooms

Dry transformer

Battery room

UPS

MER

Storage (see FM DS 3-26 limitation)

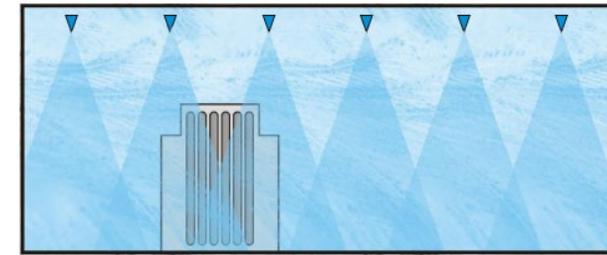
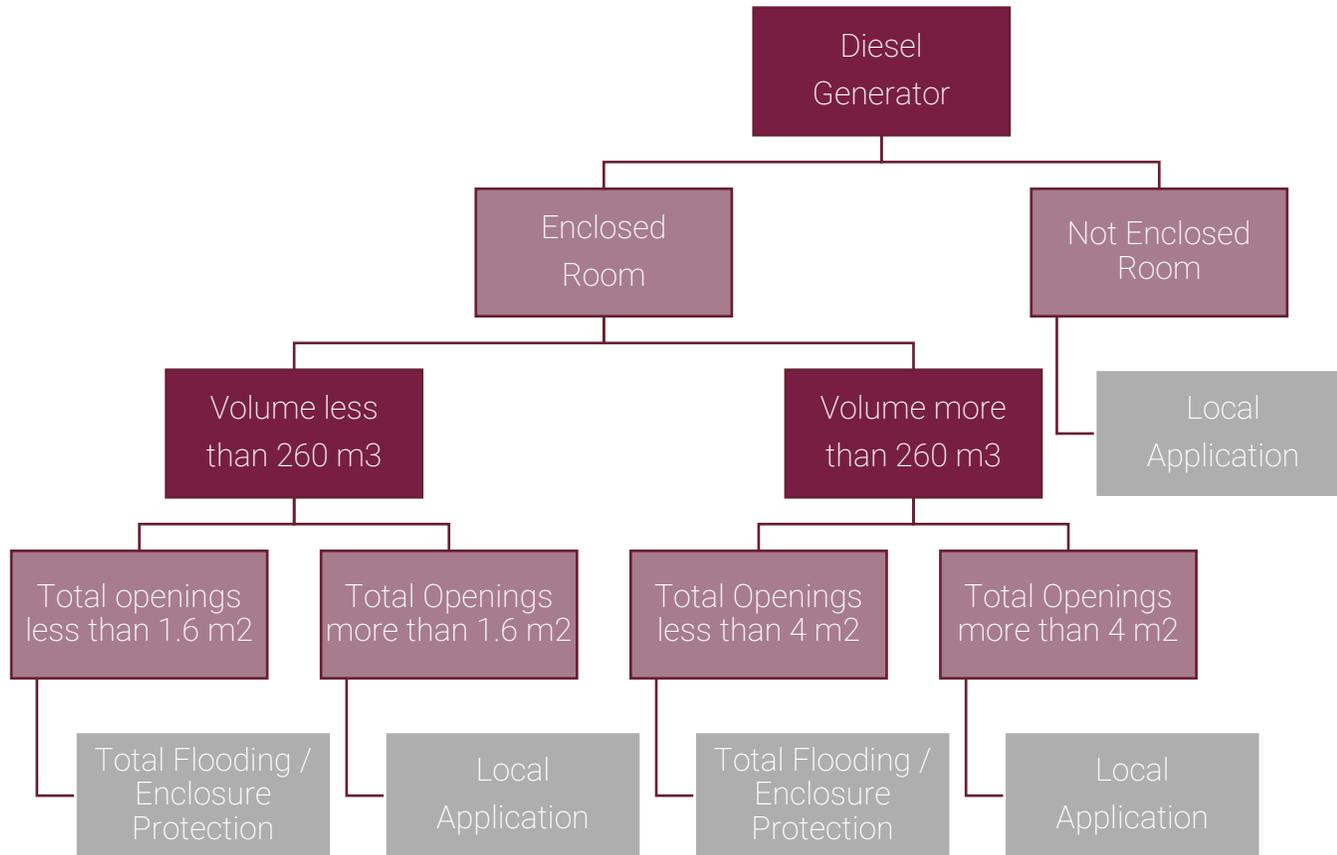
Loading bay

2.3.5.9 Determine the design area for water mist systems FM Approved for HC-2 and HC-3 occupancies using whichever of the following is greater:

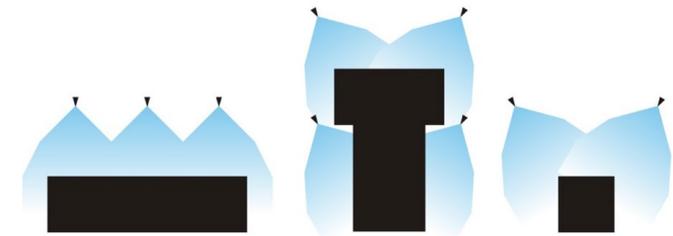
A. The hydraulically most remote nine (9) automatic nozzles.

B. The hydraulically most remote number of automatic nozzles as specified in the FM Approval listing.

Machinery spaces



Total flooding discharge



Local application discharge

Nozzles used in data centers



	OH-DC1	OH-DC2	OH-VSO	OH-PX2	K6	LAK7
Hazard type	Data Hall	Raised Floor	Office/Corridors	HC2 & HC3	M. Spaces	Local App.
Type	Pendent	Upright	Pendent	Pendent	Open	Open
Notified body	FM	FM	FM	FM	FM	FM
Spacing	3.6m x 3.6m	3.6m x 3.6m	4.5m x 4.5m	3.65m x 3.65m	See DS	See DS
Mex height	5m	1m	5m	7.6m	12m	See DS
K-factor	13.4	13.85	16.7	19	5.6	7
Min. pressure	8 bar	8 bar	8 bar	8 bar	7.7 bar	8 bar
Flow	37.90 l/min	39.17 l/min	47.23 l/min	53.74 l/min	15.54 l/min	19.8 l/min
Min. design	6	6	9	9	All	All
Min flow	228 l/min	236 l/min	425.07 l/min	485 l/min	All	All
60 min	13.50 m3	14.20 m3	25.50 m3	30 m3	All	All



Comparison above raised floor data halls solution

	VID FIREKILL	Vendor A	Vendor B	Vendor C
Type	Pendent	Pendent	Pendent	Pendent
System	LP	LP	HP	HP
Water pressure	8 Bar	7,60 Bar	80 Bar	60 Bar
Min. Air pressure pre-action	5 Bar	5 Bar	25 Bar	5 bar
Spacing	3,60 m	3,70 m	4,30 m	4,00 m
Design number of nozzles	6	18	6	6
Design flow l/min	228 l/min	421 l/min	220 l/min	193 l/min
Max distance to ceiling	10 -135 mm	102 mm	100 mm	110 -215 mm
Minimum clearance to cable tray	1,07 m	1,75 m	1,75 m	1,25 m
60 minutes operation	13,68 m3	25,26 m3	13,20 m3	11,58 m3
Max operating area during tests	25 m2	164 m2	55 m2	32 m2
Max upward air flow (Above-Below)	1,7 m/s – 1,7 m/s	1,0 m/s	1,0 m/s - 1,0 m/s	1,3 m/s - 1,0 m/s



VID FIREKILL used for the water mist fire protection



Some reference projects

Digital Realty Frankfurt FRA33 (Germany)

Interxion Frankfurt FRA27 (Germany)

Interxion Frankfurt FRA23 (Germany)

Digital Realty Paris PAR13 (France)

Server farm Amsterdam AMS1 (The Netherlands)

Interxion Paris PAR10 & PAR11 (France)

Stack Infrastructure Milan MIL3 (Italy)

Digital Realty London Airport gate site (UK)

Some reference projects

Interxion Marseille MRS4 (France)

Interxion Brussel BRU4 (Belgium)

Equinix London Docklands (UK)

Equinix LD9 Powergate (UK)

Oxford University (UK)

Ministère de la défense (France)

BPCE Paris (France)

CIC bank (France)

Some reference projects

Digital Realty Amsterdam AMS11 (The Netherlands)

Digital Realty BCN1 (Spain)

Reliance Jio Jamnagar IDC 1 & IDC 2

Reliance Jio Nagpur IDC 1 & IDC2

Reliance Jio Ahmedabad IDC

NTT Navi Mumbai DC-12

NTT Navi Mumbai DC-02

Reliance Jio Mumbai CHO

Summary: Values compared to other technologies

Energy and Water efficiency	Faster fire suppression	TCO cost effective	Standardization and flexibility	Greener solution	Approvals
<p>Water saving of 60-90%</p> <p>Energy saving of 20-70%</p>	<p>Less collateral damages and costs</p> <p>Less business interruption</p>	<p>Small and high-quality system components</p> <p>Longer lifecycle</p>	<p>Same system for all data centers</p> <p>More space available</p> <p>Less cost for modifications</p>	<p>71% less CO2 emissions</p>	<p>Approved by the main insurance companies and global/local standards</p>

Thank you

www.vidfirekill.com

