



Fire Suppression systems in your Data Centre.

Overview of Presentation

- Background to Blaze
- 1st step – Building risk assessment & understanding fires
- Inert gas agents
- Points to consider
- Final questions



Who are Blaze?

Blaze is a market leader in the provision of fire protection and safety solutions for the UK and international Energy Industries.

Founded in 2006, Blaze's skills and expertise enable them to provide world class services including:

- Loss Prevention/Safety Studies
- Surveys
- System Design
- Manufacture
- Project Management
- Installation & Commissioning
- System Testing & Verification
- Service and Maintenance



Overview of Presentation

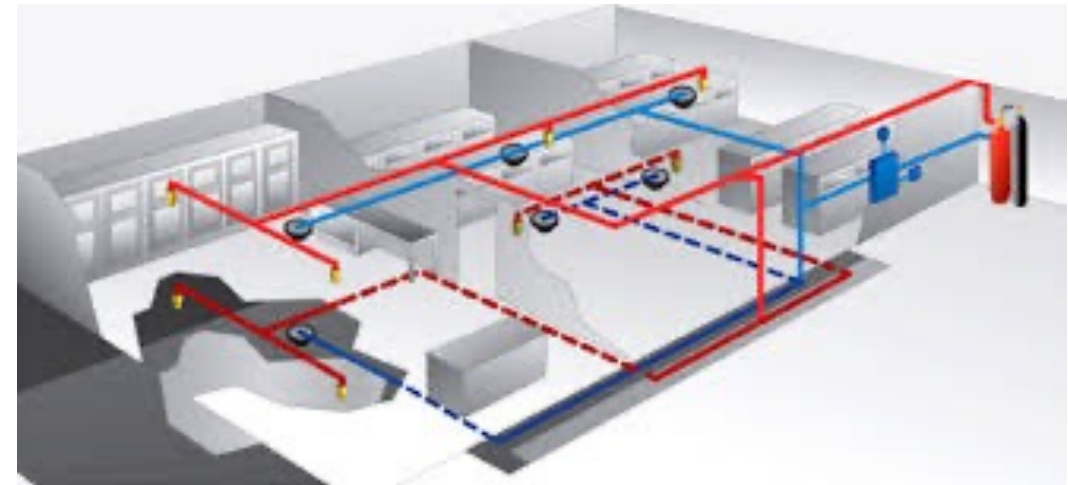
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Risk Assessment

- What requires protection?
- Is every cabinet critical vs infrastructure
- Response time
 - Early detection (e.g. VESDA / FFAST)
- Sensitivity to water (also watermist)
 - Post discharge clean-up
 - Effectiveness to access fires
- NFPA 75 requirements

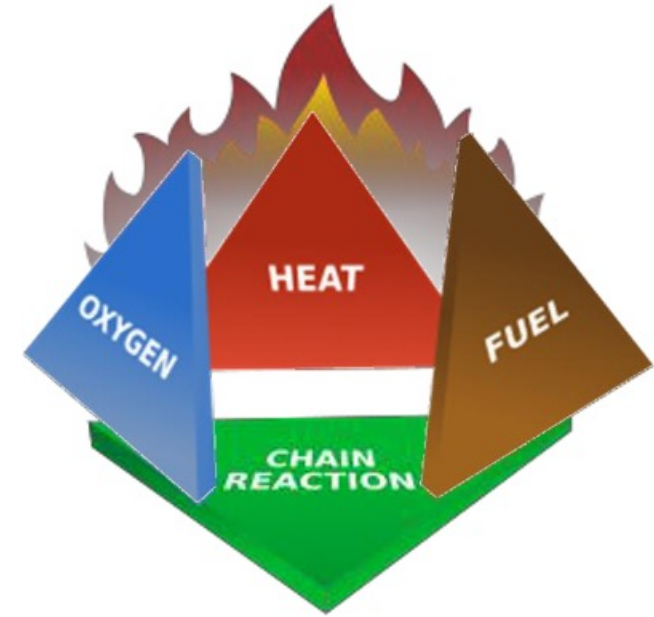
Protecting Data halls

- Gas systems activated by smoke detection
 - Discharge between 10 and 120 seconds
- Either Halocarbon (Halon substitute)
 - Chemical cooling and inhibition of the flame
 - 5-10 second discharge
 - Smaller cylinder footprint
- Or Inert gas
 - IG541, IG100, IG55, CO2
- Early detection recommended
 - No executive action
 - Several hours advance warning



Extinguishing Fires

- Three elements needed for a fire
 1. Fuel
 2. Oxygen
 3. Heat
- These elements in a certain combination
 - Chain reaction → Fire
- Extinguish a Fire
 - Remove or reduce any one or a combination of the elements
 - stop chain reaction

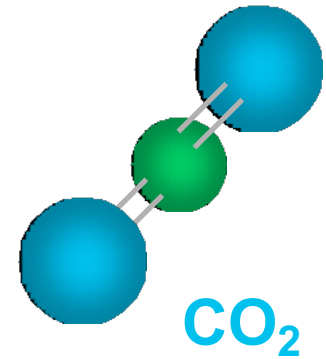
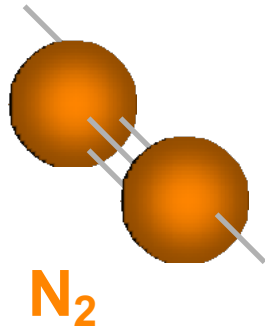


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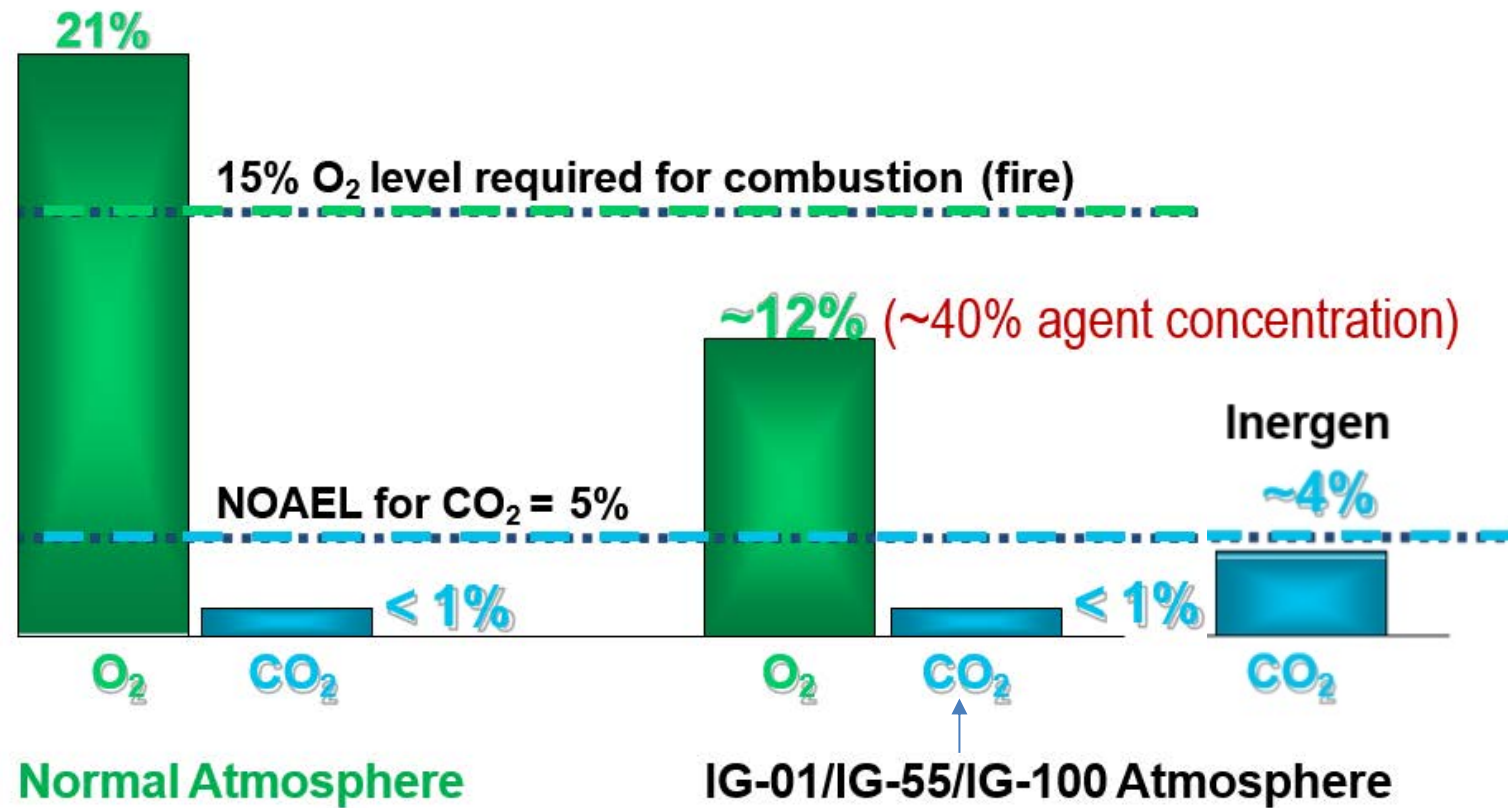
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Normal Atmosphere

Nitrogen	78.0%
Oxygen	21.0%
Argon	1.0%
Carbon Dioxide	0,03%



Extinguishing with Inert Gases



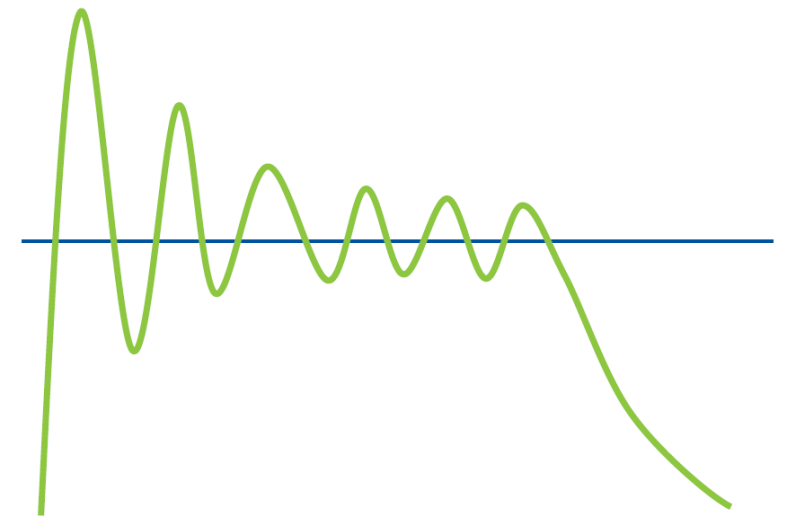
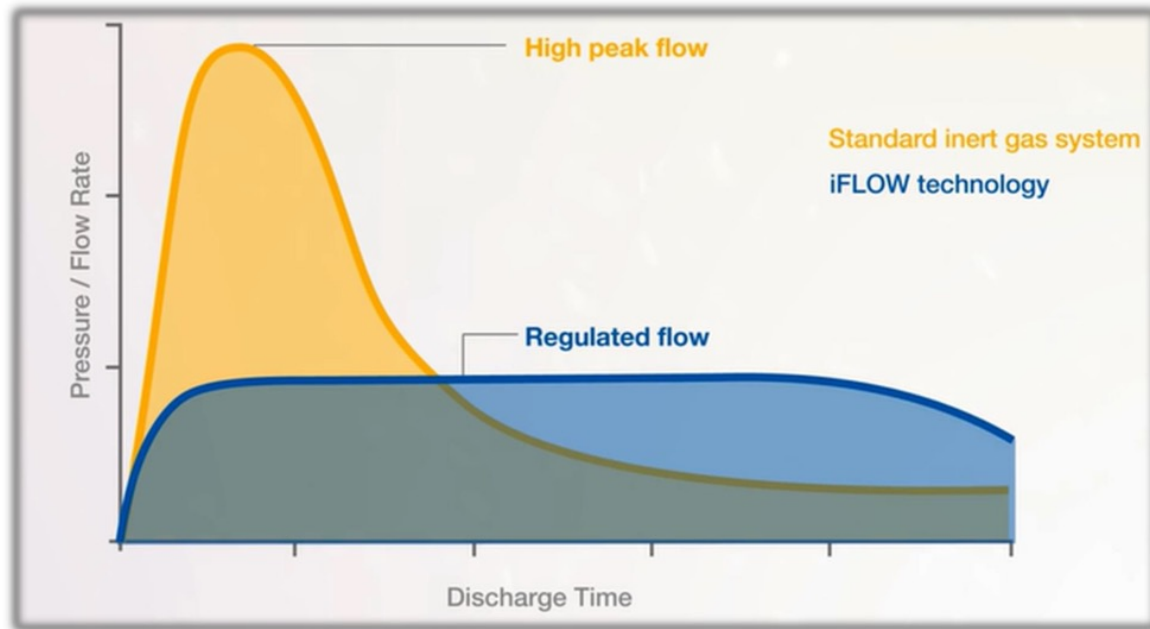
Noise during discharge

- A regular IG system discharge is LOUD due to high agent flow rates (80 – 130dB)
- High level sound power (causes vibration, read/write heads to go off data track)
- Studies of acoustic energy impact on HDD's
 - Gas suppression isn't getting louder, HDD's have become more sensitive
 - Conclusion was the sound level needed to be reduced below 110dBZ



Constant Flow – No Peak Flow

- The greater the flowrate of agent, the greater the noise energy. Constant flow (pressure regulated) discharge systems help reduce this intensity



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Points to consider – early detection

- The best strategy is to detect the fire early
 - E.G VESDA (VEA, VES)
- Up to 800 times more sensitive than point detection



The Test Results

Summary of test results for general area fire room tests:

Test Location	Detector which responded first	VESDA detectors that responded	Average VESDA Alert times and ranges (s)			Point detector response
			Ceiling	Return Air	Duct	
Worse-case location	Ceiling (VLP)	All	93s (74 - 122)	117s (99 - 154)	159s (96 - 217)	No Detection
Normal-case location	Cabinet (VLF)	All	117s (63 - 128)	99s (79 - 138)	98s (78 - 138)	No Detection
In front of return air grille	Duct (VLC)	Duct	Not Available	Not enough to count	21s (17 - 24)	No Detection
Normal-case location, large scale smoke test	Cabinet (VLF)	All	55s (37 - 94s)	43s (36 - 60)	45s (30 - 61)	(in some tests*)

* Reported above pre-alarm level in 3 out of 8 tests
Missed 2 out of 8 tests

Summary of test results for in-cabinet fire tests:

Test Location	VESDA detectors that responded	Average VESDA Alert times and ranges (s)		Point detector response
		Ceiling	Return Air Duct	
Cabinet 1 - Ventilated bottom to top	Cabinet, Return	53s (47 - 64)	76s (64 - 92)	No Detection
Cabinet 2 - Fully sealed	Cabinet	26s (22 - 28)	Not Available	Not Available
Cabinet 3 - Ventilated front to back	Cabinet, Return [#]	26s (24 - 28)	37s [#] (28 - 47)	No Detection

Points to consider – Room integrity

Why is room integrity important?

- to reach the required agent concentration
- to maintain the concentration for at least 10 minutes (hold time)

EN 15004 – 1:2008 § 8.2.4 - Review of Enclosure Integrity.

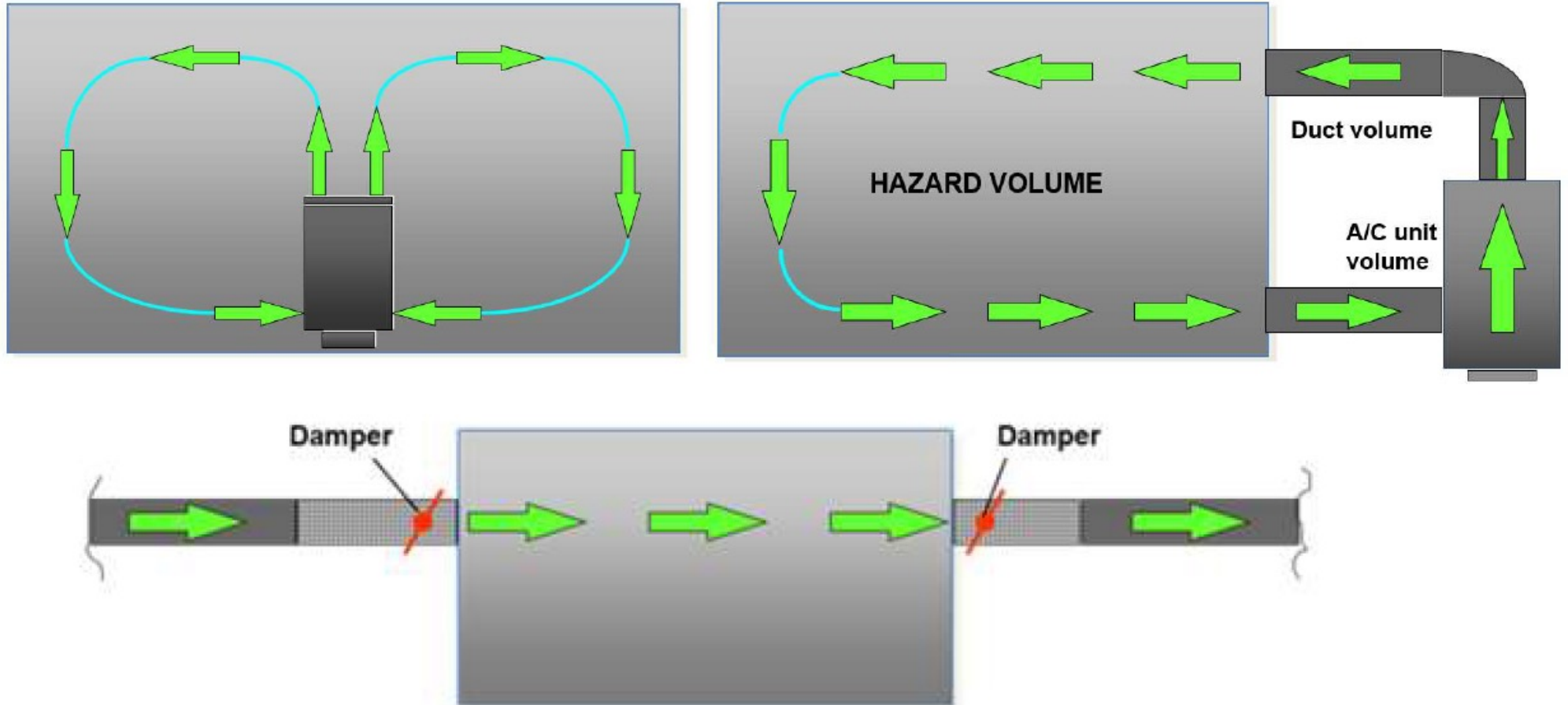
All total flooding systems shall have the enclosure checked to locate and then effectively seal any significant air leaks that could result in a failure of the enclosure to hold the specified extinguishant concentration level for the specified holding period (see also 7.4.1). Unless otherwise required by the authority, the test specified in annex E shall be used.

Points to consider – Occupied areas

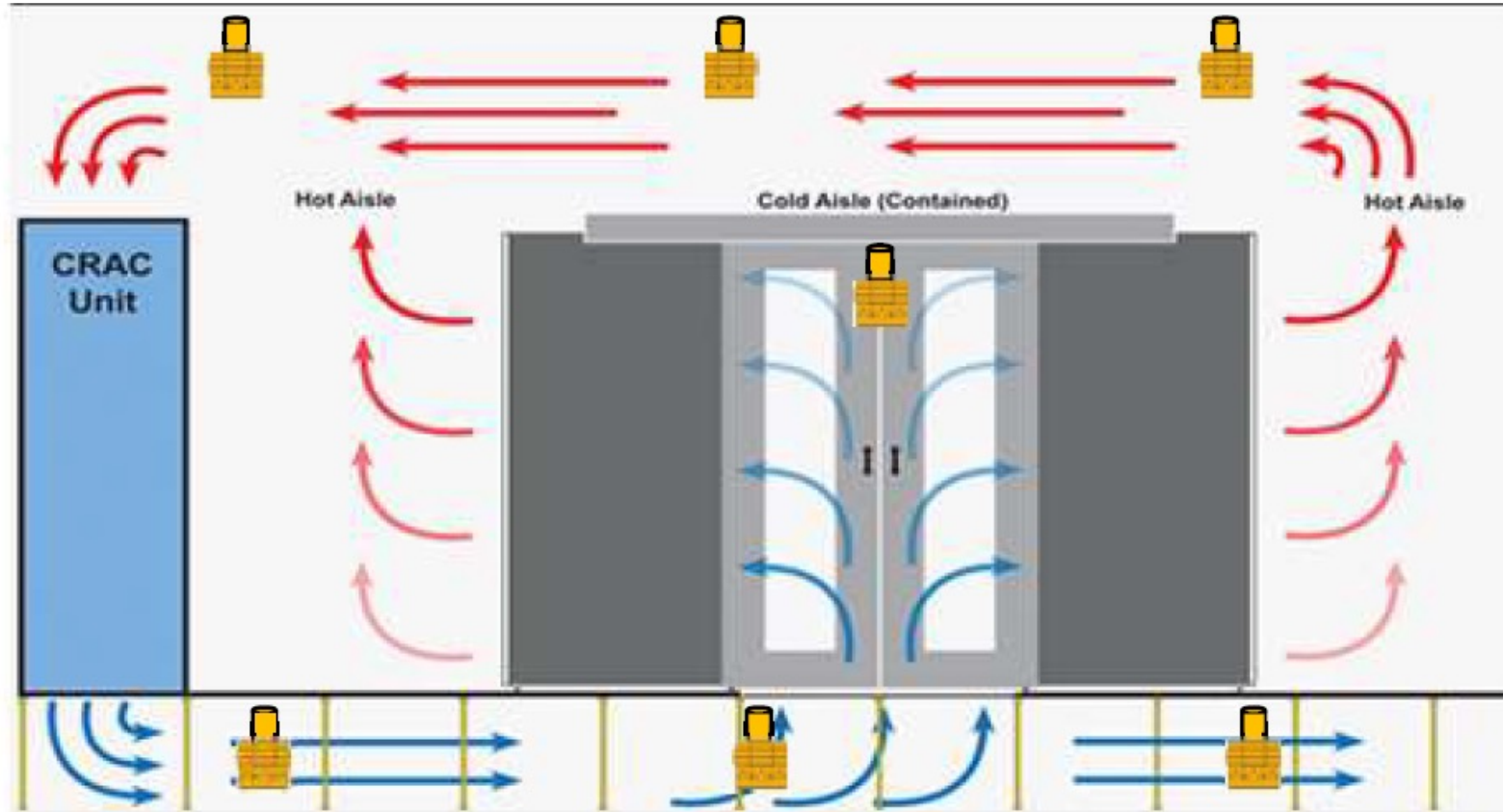
- For normally occupied areas
 - Exit routes & design concentrations
 - Hand held extinguishers
 - “Fireballs!”
- Un-occupied areas
 - Ceiling voids
 - Floor voids



Points to consider – HVAC



Points to consider – Cold aisle containment



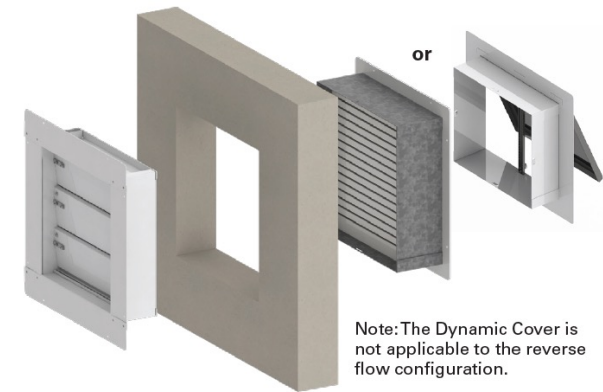
Points to consider – O/P Venting

NFPA 2001 § 5.3.7

The protected enclosure shall have the structural strength and integrity necessary to contain the agent discharge.

If the developed pressures present a threat to the structural strength of the enclosure, venting shall be provided to prevent excessive pressures.

Designers shall consult the system manufacturer's recommended procedures relative to enclosure venting.



Points to consider – Post discharge

- Inert gas is a clean agent (no water, foam etc)
 - Replace discharged cylinders (heavy, storage location)
 - Refill costs depend on the agent & labour to exchange
 - Displacement of false ceilings
- Watermist systems less water than sprinklers
 - Also enters cabinets (may be just as impacting as the fire!)
- Back up systems (connected reserve)
 - 24/7 operation is essential

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