

Fire alarm linkage in the cold aisle of the computer room

Article Overview

Effective fire alarm linkage in cold aisles requires early smoke detection, proper placement of aspirating detectors, and coordinated suppression integration with airflow and containment systems.

Early Detection in Cold Aisles

Cold aisles in data centers are designed to channel cool air between server racks, which can dilute smoke and delay detection if conventional ceiling detectors are used. Aspirating Smoke Detection (ASD) systems, such as VESDA or FFAST, are recommended because they continuously sample air from the cold aisle and underfloor plenums, detecting smoke before it becomes visible or reaches ceiling-mounted detectors . These systems often use multiple alarm thresholds (Alert, Action, Fire 1, Fire 2) to trigger graduated responses and reduce false alarms .

Placement Considerations

- o Sampling points should be located along the airflow paths in cold aisles, including underfloor supply and return ducts, to capture smoke carried by mechanical airflow .
- o Ceiling sampling points are recommended for fire sources outside IT cabinets, while nozzles for suppression agents should ideally be placed in the center of the longest wall of the cold aisle with at least 1.2 meters clearance to avoid obstruction .
- o In contained cold aisles, the system should treat the aisle as an enclosed space, similar to floor or ceiling voids, to ensure homogeneous agent distribution during suppression .

Integration with Fire Alarm and Suppression Systems

- o Fire alarm systems should be cross-zoned to verify smoke before triggering suppression, reducing false releases .
- o Alarms can be linked to Building Management Systems (BMS) or Data Center Infrastructure Management (DCIM) to control fan speeds, CRAH/CRAC shutdowns, and door access during a fire event .
- o Pre-action sprinkler systems (double-interlock) are standard in critical spaces, requiring both detection and sprinkler head activation before water is released .
- o Containment barriers and high airflow in cold aisles can impede smoke detection or suppression, so systems must be evaluated and tested to maintain compliance with NFPA 75 and other applicable codes .

Practical Recommendations

- o Map airflow paths and calibrate ASD systems for high air-change rates.
- o Use staged alarm thresholds to escalate responses appropriately.

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- o Ensure suppression nozzles have adequate clearance and are positioned to achieve uniform agent distribution.
- o Regularly test and maintain detection and suppression systems, especially after modifications to aisle containment.
- o Consider performance-based design approaches to account for unique airflow and temperature patterns in cold aisles . By combining early aspirating detection, strategic placement, and coordinated alarm-suppression linkage, cold aisles in computer rooms can achieve rapid response to fire events while minimizing false alarms and downtime.

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