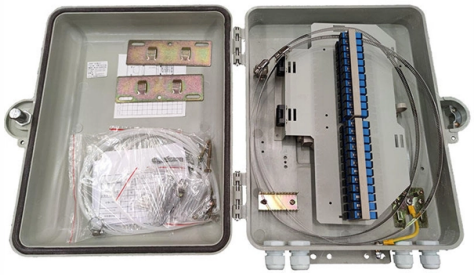
Power outage in the cold aisle of the computer room



Overview

In cold aisle configurations the supply air is contained and the hot discharge air allowed to return to the CRAC unit.

Key Takeaways

A power outage in the cold aisle can rapidly increase server inlet temperatures, risking equipment failure unless backup power and emergency cooling systems activate promptly.Impact on IT Equipment

Cold aisles are designed to supply the coolest air directly to server intakes, maintaining temperatures within ASHRAE's recommended range of 18–27 °C (64.4–80.6 °F) and 20–80% relative humidity . When power is lost, cooling components such as CRAC/CRAH fans, chilled water pumps, and chillers may stop, causing the cold aisle temperature to rise quickly. Observed data shows temperatures can increase 1–2 °F per minute, with high-density racks affected first, potentially triggering automatic shutdowns or SMART errors in disk arrays once ambient temperatures exceed 95 °F .

Timeline and Risk

The rate of temperature rise depends on server density, initial air supply temperature, and containment design. For example, in high-density setups with chilled water supply at 18–25 °C, IT equipment may remain within safe limits for only approximately 5 minutes before rapid temperature increases threaten hardware reliability . Without immediate intervention, prolonged exposure can lead to overheating, throttling, or permanent damage.

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Emergency Response and Mitigation

• Backup Power Activation: UPS systems provide instant power to critical IT loads, but cooling systems are often not connected to UPSs. Generators should start automatically to restore long-duration power .

• Thermal Load Management: Reduce non-critical workloads and shut down unused servers to limit heat generation .

• Airflow Optimization: Close cabinet doors, install blanking panels, and prevent hot-air recirculation to maintain cold aisle effectiveness .

• Monitoring and Alerts: Continuous temperature and humidity monitoring is essential to detect rapid changes and trigger emergency procedures .

Design Considerations

Data centers often implement redundant cooling and power systems (N+1 or 2N redundancy) to ensure reliability during outages . Cold aisle containment and underfloor air plenums improve cooling efficiency but also mean that temperature can rise faster during a power loss, emphasizing the need for rapid backup activation . Planning should include reserve cooling capacity, thermal storage, and short restart times for critical cooling equipment .

Key Takeaways

• Cold aisle temperatures can rise quickly during a power outage, especially in high-density racks.

• Immediate activation of backup power and emergency cooling is critical to prevent IT equipment failure.

• Redundant systems, airflow management, and thermal monitoring are essential for mitigating risks.

• Data center design should account for transient temperature rise and ensure that emergency procedures can maintain safe operating conditions until full power and cooling are restored .

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Hot aisle containment is used to capture and direct hot exhaust air back to the cooling units. This popular option is ideal for data

Aisle Containment

Open Aisle Containment Traditional open aisle data centres use perimeter PAC (precision air conditioning) or CRAC (computer room

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