



Cool IT Equipment Efficiently to Lower Energy Use and Cut Costs

Optimize Your Data Center's Critical Infrastructure with Innovative Airflow and Thermal Management Products and Services from Upsite Technologies

Did you know that the operation of cooling systems typically consumes the highest percentage of the total power required to run data center infrastructure? Not to mention that 70 percent of the available cooling in a typical computer room is wasted due to bypass airflow (lost conditioned air). Further compounding the issue is that estimates indicate national data center electricity consumption could double by 2011 to three percent of the US total or a cost of nearly \$740 million annually.

What does all of this mean for you? You are likely spending more money on data center cooling than you need to because of the inefficiencies created by over-capacity and poor conditioned airflow management.

Upsite Technologies develops sealing products and services designed to reduce bypass airflow and mitigate hotspot and energy-efficiency challenges, all while significantly reducing costs by lowering energy usage and eliminating the need to purchase additional cooling equipment. Its growing suite of innovative sealing products for the raised floor and cabinet, and advisory services for the overall data center environment currently optimize more than 17 million ft² (1.5 million m²) of data center space.



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BEST PRACTICES APPROACH:

Optimize Data Center Cooling with Four Best Practices Steps from Upsite Technologies

To optimize your data center infrastructure, consider these four practical best practice steps that Upsite's engineers have devised for solving cooling inefficiencies through proper airflow management.

Step 1: Seal the Computer Room Envelope

Seal all the openings in the perimeter walls, in particular, cable trays and conduits passing through the perimeter walls. Also, inspect the area around columns to make sure conditioned air is not escaping through column facades to adjacent floors. Look for other openings, including, for example: air leaks through entrance doors and elevators, loading dock doors, windows, overhead wall openings where cables pass through, and holes in the perimeter walls above the dropped ceiling.

KoldLok® Extended Raised Floor Grommets from Upsite Technologies seal a variety of existing larger openings along the wall, with the added flexibility of modification for unique openings. The solution improves airflow and thermal management.

Step 2: Seal Openings in the Raised Floor

Seal all openings in the raised floor that do not deliver conditioned airflow directly to the face, or intakes, of IT equipment. The most common openings that require sealing are cable openings under or behind cabinets. Other openings that should be sealed are holes under Power Distribution Units (PDU) or for conduit penetrations.

A variety of other Upsite solutions in the KoldLok family offer highly effective filament seals to eliminate or reduce bypass airflow and hotspots.

Step 3: Install Internal Blanking Panels, End Row Panels, and Over the Top Blockage

Install blanking panels in unused rack unit openings to prevent rear-to-front circulation of hot exhaust air from the servers. This action helps to ensure that the computer equipment air-intake temperature, especially at the top of racks, is within the ASHRAE-recommended range for maximum reliability (68-77°F or 20-25°C). As IT equipment load densities continue to increase, hot air circulation into the cold aisle through open spaces in cabinets, as well as around the ends of rack rows and across the top of racks, becomes more significant.

The Upsite solution called HotLok® Blanking Panels prevents the damaging effects of internal cabinet circulation, thereby increasing IT equipment reliability and improving cooling system efficiency.

Step 4: Tune Computer Room Cooling

Once all the undesired openings are sealed, the next step is to tune the computer room. Begin with a detailed study of the heat-load, cooling capacity, and airflow, which takes into account how many cooling units need to be operating, how many perforated tiles need to be installed, and where they should be placed.

A) Determine the heat-load by adding together all of the PDU or Remote Power Panel (RPP) outputs or by summing the Uninterruptible Power Supply (UPS) system(s) outputs.

B) Evaluate the configuration of the cooling units on the raised floor by checking temperature and relative humidity set points and sensitivities. Are they at the correct setting and are they consistent throughout the room?

C) Check the calibration of the return-air sensors. A key factor is to ensure that the instrument being used to monitor the calibration is itself properly calibrated.

D) Check each cooling unit to verify they are each delivering their rated cooling capacity. Both airflow volume and temperature drop across the unit need to be measured to determine the delivered cooling capacity.

E) Determine the required number of operational cooling units from the heat-load data and the cooling capacity information. There should be redundant cooling capacity operating in every area of the room.

F) Determine the proper number and placement of perforated tiles installed. To estimate the required number of perforated tiles, take the total airflow in cubic feet per minute (CFM) or cubic meters per hour (CMH) from the operating cooling units and divide it by 750 CFM/tile (1,274 CMH/tile). This calculation will identify the minimum total number of perforated tiles that should be installed in the room. Once the approximate total number of perforated tiles is determined, their arrangement must be adjusted within the cold aisle based on careful monitoring of IT equipment air-intake temperatures.

Tuning the room is a complex process that requires following a proper sequence of actions that need to be adjusted to accommodate the conditions of each environment. Sealing the bypass openings and tuning the room must occur in tandem, or increased equipment air-intake temperatures and equipment damage may result. Throughout all aspects of the computer room tuning, IT equipment air-intake temperatures must be monitored to avoid excessively high temperatures.

Upsite solutions, offered as a suite called KoldWorks® services, provide specialized engineering and educational services that enhance data center performance without additional capital investments.