HOTLOK®

TWO FINANCIAL IMPACT STUDIES

Seal IT Equipment Cabinets for Significant Annual Cost Savings and Simple Payback in a Few Short Months

upsite technologies®

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As utility costs increase and budgets become tighter, there is growing demand to get as much capacity out of existing data center space as possible—all while reducing operating expenses, and preserving availability.

Upsite Technologies' sealing products for both raised-floor cable and server cabinet openings are proven energy savings best practices for airflow management—they increase the cooling capacity of data center infrastructure. As such, installing their sealing technology yields operating and capital cost savings, while preserving or increasing availability. Implementing airflow management best practices is often the most effective and least costly way to dramatically improve a data center's power usage effectiveness (PUE).

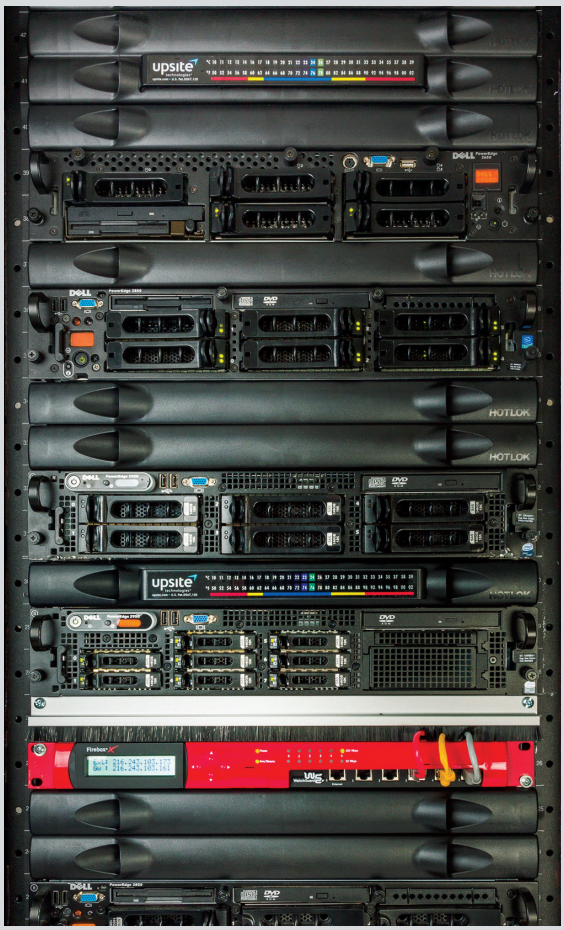
A third-party two-dimensional Computational Fluid Dynamics (CFD) analysis was commissioned by Upsite Technologies to study the effect of different types of blanking panels on airflow patterns and IT equipment intake-air temperatures within equipment server cabinets. HotLok® Blanking Panels proved to prevent the circulation of hot exhaust air to the IT equipment intakes. Competitor products, which leave small gaps between panels and equipment, allow 19 percent hot exhaust air circulation, which can reduce the reliability of equipment and unnecessarily reduce the efficiency and capacity of cooling units, ultimately resulting in higher operating costs.

Further, the CFD analysis revealed that HotLok® Blanking Panels (compared to panels that leave gaps) actually reduce average intake-air temperatures by 7°F (3.9°C), meaning that once HotLok® Blanking Panels are installed, the temperature set points in the computer rooms could be increased by 7°F (3.9°C) and the maximum intake-air temperature of IT equipment would not be affected. The cooler a computer room's operating temperature, the more likelihood there is for latent cooling, or condensation on the coils. For example, setting the computer room temperature at 72°F (22.2°C), not 65°F (18.3°C), could save a data center thousands of dollars a year in operating costs (energy savings) and capital costs (deferred additional cooling infrastructure costs).

Two financial impact case studies, one for a high-density facility and one for a lower density facility, were performed to demonstrate how installing the HotLok® Blanking Panel solution yields cost savings by allowing data center managers to raise computer room temperatures and spend less of their operating and capital budgets on cooling. Further, calculations determined that simple payback can be expected in just a few months.

HotLok® Blanking Panels

HotLok® Blanking Panels (shown installed below) reduce intake-air temperatures on average by 7°F (3.9°C)



Financial Impact Study 1:

Chilled Water Liebert 600C Computer Room Air Handler (CRAH) Cooling Units in High-Heat Density Facility

- 400 cabinets in a computer room with 10,000 ft² 2 (approx 1,000 m²) of raised floor
- Each cabinet dissipates 8.5 kW of power, for a total critical load of 3.4 MW
- Heat density yield of 316 W/ft² 2 (approx 3.400 W/m²)
- One third of cabinets (14U) contained no IT equipment and required blanking panels
- Of the one third requiring blanking panels, 40 percent (6U) are filled with 1U Panels and 60 percent (8U) are filled with 2U Panels
- The cost for Panels is the average selling price

Before the HotLok Blanking Panel installation: At 65°F (18.3°C)/45% Rh, the 600C units have a 70 kW 100% sensible cooling capacity, therefore there is no latent cooling penalty in this calculation. For these return air conditions, a total of 61 CRAH units are required, 49 units at full cooling capacity and 12 for redundancy.

After the HotLok Blanking Panel installation: At 72°F (22.2°C)/45% Rh, the 600C units have a 98 kW 100% sensible cooling capacity. For the 4.25 MW of total cooling capacity, a total of 43 CRAH units will be required, 35 units at full cooling capacity and 8 for redundancy.

PLEASE NOTE: There is no difference in the total cooling capacity as that takes place in the mechanical room and the chiller(s) will dissipate the same amount of heat no matter how many CRAH units are operating in the computer room. The chilled water flow rate will not be included for simplicity, although in actuality there may be additional savings associated with reduced chilled water flow rates.

Here's a summary of the operating cost savings available by installing HotLok Blanking Panels:

(1) Increase return-air temperature set point by 7°F (3.9°C)—for this example, 65°F raised to 72°F (18.3°C raised to 22.2°C).
(2) 18 units placed on inactive stand-by.

Annual Operating Cost Savings

18 units with 10 hp fans X 0.757 kW/hp	136 kW
Annual energy consumption savings (8760 hrs/yr)	1,191,360 kWhrs
Annual cost savings at $0.07 (€.12) per kWhr	$83,395 (€142.963)
Maintenance cost savings on 18 units ($3,000 or €3.000 per unit)	$54,000 (€54.000)
Total annual operating cost savings	$137,395 (€196.963)*

**This represents a 29 percent reduction in the annual operating and maintenance costs of the cooling units.*

Cost and Savings

# of cabinets	400
open U (1/3 of 42Us)	5,594
# of 1U Panels	2,238
# of 2U Panels	1,678
Total cost of Panels	$21,762 (€27.021)
Annual savings	$137,395 (€196.963)
Monthly savings	$11,450 (€16.414)

Simple Payback

Month	1	2	3	4	5	6	7	8	9	10	11	12
US $	-10,312	1,137*	12,587	24,036	35,486	46,936	58,385	69,835	81,284	92,734	104,183	115,633
EU €	-10.607	5.806*	22.220	38.633	55.047	71.461	87.874	104.288	120.701	137.115	153.529	169.942

With the total annual cost savings at $137,395 or $11,450 per month (€196.963 or €16.413 per month), simple payback occurs in the second month of the HotLok Blanking Panel installation.*

Financial Impact Study 2:

DX System in a Low-Heat Density Facility

- Total Critical Load: 600 kW
- 12 Liebert 267W, water-cooled CRAC units, with 7.5 hp fan motors •
- Return air conditions: 65°F (18.3°C)/50% Rh •
- Sensible cooling capacity of cooling units: 61 kW with 2 kW of latent cooling
- Cooling units required: 600kW /61kW = 9.8 + 2 = 11.8 (12 units with 2 for redundancy)
- One third of cabinets (14U) contained no IT equipment and required blanking panels
- Of the one third requiring blanking panels, 40 percent (6U) are filled with 1U Panels and 60 percent (8U) are filled with 2U Panels
- Cost for Panels is the average selling price

With HotLok® Blanking Panels installed, the return air temperature to the CRACs can be increased without increasing the intake-air temperature of the IT equipment. With a return air temperature of 72°F (22.2°C) / 45% Rh, the cooling units have a 100% sensible cooling capacity of 71.8 kW. This capacity is 10.8 kW (17.7%) greater than at the lower return air temperature conditions. Therefore, only 11 CRAC units are required, 9 for cooling and 2 for redundancy or 600kW/71.8kW = 8.4 + 2 = 10.4.

Here's a summary of the operating cost savings available by installing HotLok Blanking Panels:

(1) Increase return-air temperature set point by 7°F (3.9°C)—for this example, 65°F raised to 72°F (18.3°C raised to 22.2°C).

(2) 1 CRAC unit placed on inactive stand-by.

Annual Operating Cost Savings

1 extra unit cooling due to the latent cooling	
▪ power to run compressors	17kW
▪ power to run fan (7.5 hp x 0.757 kW/hp)	6kW
10 units with 2 kW of latent cooling = 68 lbs. (31 kg) of water/hr @ 22 lbs. (10 kg)/hr/unit = 3.1 units humidfying x 7.2 kW per unit	22 kW
Total extra power consumed	45 kW
Annual energy consumption savings (8,760 hours/year)	394,200 kWhrs
Annual cost savings at $0.07 (€.12) per kWhr	$27,594 (€47.304)
Maintenance cost savings ($3,000 or €3.000 per unit)	$3,000 (€3.000)
Total annual operating cost savings	**$30,594 (€50.304)***

**This represents a 15 percent reduction in the annual operating and maintenance costs of the cooling units.*

Cost and Savings

# of cabinets	175
open U (1/3 of 42Us)	2,448
# of 1U Panels	979
# of 2U Panels	734
Total cost of Panels	$9,521 (€11.822)
Annual savings	$30,594 (€50.304)
Monthly savings	$2,550 (€4.192)

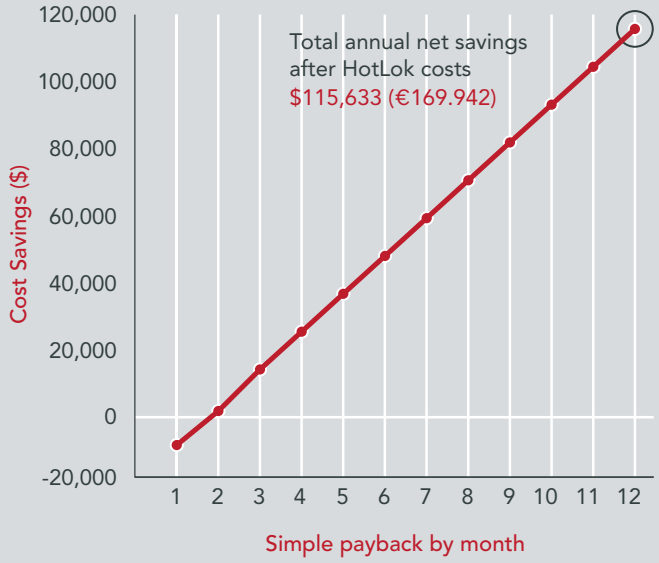
Simple Payback

Month	1	2	3	4	5	6	7	8	9	10	11	12
US $	-6,972	-4,422	-1,873	677*	3,227	5,776	8,326	10,875	13,425	15,974	18,524	21,073
EU €	-7.630	-3.438	754*	4.946	9.138	13.330	17.522	21.714	25.906	30.098	34.290	38.482

With the total annual cost savings at $30,594 or $2,550 per month (€50.304 or €4.192 a month), simple payback occurs in the third (EU) and fourth months (US) of the HotLok Blanking Panel installation.*

Financial Impact Study 1

Simple Payback Analysis



Financial Impact Study 2

Simple Payback Analysis

Conclusion

These financial studies underscore the importance of installing HotLok® Blanking Panels, an industry-recognized best practice for airflow management. Sealing IT equipment server openings with HotLok® Blanking Panels is among the simplest and most effective ways to reduce annual operating costs in the data center and improve PUE.

DISCLAIMER: There is no guarantee that installing HotLok® Blanking Panels in every data center will produce the results listed herein. To perform the calculation, assumptions had to be made about the operating environment and type of cooling infrastructure equipment used. The interrelated effect of conditions and equipment unique to every data center will affect the results. Contact Upsite Technologies to discuss what opportunities may exist in your data center for reducing operating costs.

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Designer and Manufacturer

CONTACT US TO LEARN MORE

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