

REPORT

ASHRAE®-Published Report Finds that KoldLok® Brush Grommets Seal Best, Save the Most Energy

By
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Background

Upsite Technologies, Inc.'s KoldLok® Integral brush grommets not only provide data center operators with the most reliable, durable brush grommets available; KoldLok® Integral grommets also offer the highest potential data center operational expense savings among several brush grommets tested. KoldLok®, the industry standard for sealing openings in raised floors, offers a range of brush grommets that not only effectively limit bypass airflow—they also offer data center operators noteworthy annual operational expense savings approximately 50% greater than their next-closest tested competitors' brush grommets.¹ This paper, adapted and summarized from a more extensive report published by ASHRAE® documenting scientific test findings for a variety of brush grommets, demonstrates KoldLok's performance superiority among competitors.

Cable Cut-Outs in Raised-Floor Data Centers

Cable penetrations through raised floors in computer rooms are often the most significant culprits in expensive air leakages that hamper efficient operation of the cooling systems that serve air-cooled IT equipment. Measurements across numerous data centers have shown that misplaced perforated tiles and unsealed floor openings, on average, represent 48% bypass open area.² This bypass airflow, as it is commonly known, leads to equipment hot spots, inefficiencies for cooling units, and subsequent increased infrastructure and operating costs.

"... unsealed floor openings, on average, represent 48% bypass open area."

Installation of grommets to seal cable penetrations in raised-floor plenums can enable other actions to reduce the total cooling-system airflow rate and/or to increase the system return air temperature, which reduce data center operational expense. Based upon reasonable assumptions in the ASHRAE-published report, these actions could save up to \$960,000 over 10 years in a 1 MW data center.

A key question remains: to what extent does the choice of grommet affect a data center's efficiency and operational expenses?



Figure 1. KoldLok® Integral Brush Grommet Part No. 1010

The Impact of Grommet Choice on Energy Savings

The scientific test findings in the ASHRAE-published report determined that among five brush grommet brands tested, KoldLok's Integral grommet [Part No. 1010] allowed the lowest leakage at an average 16 SCFM per 100 sq. in. (1.1 L/s/100 sq. cm).³ KoldLok's area-corrected leakage results easily bested the second- and third-best-performing grommets in the tests: CoolBalance CB11 by Sealeze, which allowed an average leakage of 23 SCFM per 100 sq. in. (1.7 L/s/100 sq. cm), and the Air-Guard Extreme Flush Mount by PDU Cables, which allowed an average leakage of 27 SCFM per 100 sq. in. (2.0 L/s/100 sq. cm). Figure 2 below illustrates the results.

Summary of Grommet Test Findings
Area Corrected Leakage

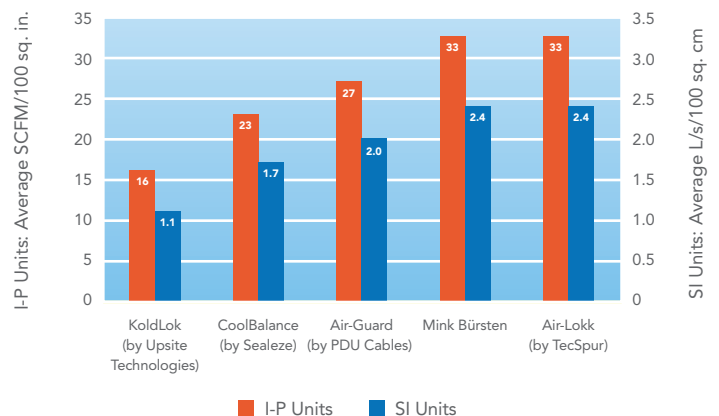


Figure 2. Average area-corrected leakage (in both SCFM/100 sq. in. and L s/100 sq. cm)⁴

¹ Based on incremental savings over those available through use of the test grommets exhibiting the highest levels of leakage on an area-corrected basis

² From the 2013 White Paper authored by Lars Strong, P.E. published by Upsite Technologies, *Reducing Room-Level Bypass Airflow Creates Opportunities to Improve Cooling Capacity and Operating Costs*

³ On an area-corrected basis to address varying usable areas among the five brush grommets tested

⁴ Mink Bürsten grommet tested: Product STL2004BS-300694, 234 mm. Air-Lokk grommet tested: AIR-LOKK DD.

The KoldLok® Integral grommet enables a 10 year savings of approximately \$960,000—48% more than CoolBalance and 75% more than Air-Guard.

While these air leakage rates may appear relatively small at first glance, one must consider that the measurements represent air leakage from a grommet per minute and per unit area. The exponential effect over a large data center for many years adds up to significant expense. The cooling system in a 1MW data center typically moves over 150,000 CFM (70,792 L/s) of air, and almost half of that is wasted due to bypass airflow. According to the ASHRAE-published paper, a conservative estimate of bypass airflow reduction in a 1 MW data center enabled by grommet installation is 40,000 CFM (37,756 L/s). Scaling the grommet leakage test results to this number provides potential savings as shown in figure 3. The KoldLok® Integral grommet enables a 10 year savings of approximately \$960,000, 48% more than the Coolbalance at \$648,000 and 75% more than Air-Guard at \$548,000.

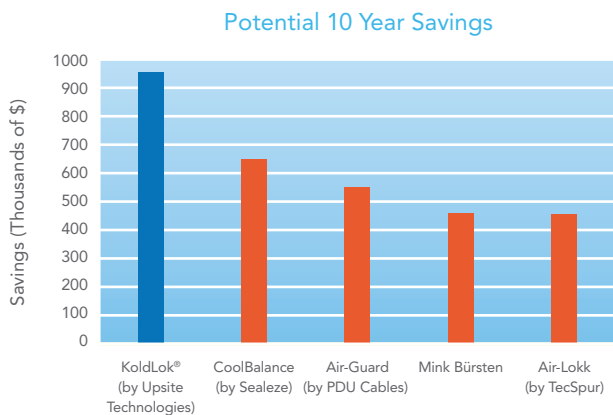


Figure 3. Potential 10 year savings

Conclusion

The minimal cost of grommets and the long-term savings potential differences among brands provide clear incentives for data center managers to choose the grommet that provides the lowest levels of leakage and yields the greatest energy savings. Based upon the research findings and calculations summarized in this report, the KoldLok® Integral brush grommet clearly outperforms its competitors through its superior leakage reduction and its highest operational expense savings, when coupled with actions to reduce the cooling-system airflow rate and/or change control settings.

For additional information on many of the analytical assumptions, methodologies and findings for this peer-reviewed scientific testing, please refer to ASHRAE® Transactions 2015, Volume 121, Part 1: CH-15-037 — *Plenum-Leakage Bypass Airflow in Raised-Floor Data Centers*.

About Upsite Technologies

Upsite Technologies, the global leader in data center airflow management (AFM) and cooling optimization, empowers data center managers to develop a best practice AFM strategy based on our research-driven methodology. We provide the tools and techniques for data center managers to create their own AFM strategy, and also provide on-site services to assist time-strapped data center managers in implementing their AFM strategy.

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