DATA CENTER AIR Management Solutions, LLC

AIRGUARD®

# Cable grommets with nylon brushes significantly reduce bypass airflow

*Overall an operating data center's room temperature is reduced by 8 degrees Celsius*


## Abstract

Data Center Air Management Solutions was interested in testing the performance characteristics between two major brands of cable grommets which utilize nylon brushes to reduce bypass airflow associated with raised access floors. The tests were conducted utilizing **the maximum** under-floor static pressures referenced by Liebert Corporation for their standard process cooling equipment; DS units @ 0.2"WG, Challenger @ 0.3"WG and Deluxe System 3 units @ 0.5"WG. Under these varied conditions, we simulated four (4) typical conditions found in nearly every data center to measure the actual bypass airflow; open hole, closed hole w/brushed grommet, grommet w/ ½" cable power, and grommet w/ ¾" cable. We also reviewed an independent client test measuring actual temperatures within an operating data center, both before and after, utilizing cable grommet with nylon brushes. The tests were performed to determine the quality and performance characteristics of utilizing cable grommets with nylon brushes.


## Conclusions

Cable grommets utilizing nylon brushes significantly reduce bypass airflow in all conditions by over 96% compared to a typical "open hole".

Installation (angle) of power cables through cable grommets with nylon brushes had minimal impact on bypass airflow with both the Koldloc® and AirGuard® products, but it should be noted that the Airguard® product did perform significantly better at the 70 degree cable test.

Cable grommets with nylon brushes reduced the overall temperature of an operating data center by 8 degrees Celsius without any modification to the existing air conditioning systems. This translates into significant energy savings.

We did find the AirGuard® cable grommet's "removable brush feature" very helpful during the data center test, because it eliminated the need to power down, and disconnect computer equipment, every time a floor tile w/cut-out was installed or relocated; as was required utilizing the specific Koldlok® product we tested.

**In summary, there are real and significant advantages for Data Centers to utilize cable grommets with nylon brushes**. We observed no significant differences in bypass airflow capabilities between the Koldlok® and AirGuard® products, although the AirGuard® performed slightly better in our tests.

## About Author


*Kenneth A. Rapoport, an engineering honors graduate from the University of Texas (Austin) is the founder and C.E.O. of Electronic Environments Corporation, and a principal with Data Center Air Management Solutions (DCAMS), LLC. Mr. Rapoport has over 30+ years of mission critical experience in data centers, both domestically and internationally. Electronic Environments Corporation has provided Design, Construction, and Maintenance services to data centers throughout the USA for the past 21+ years. DCAMS was established to bring the best data center air distribution & management products to market.*

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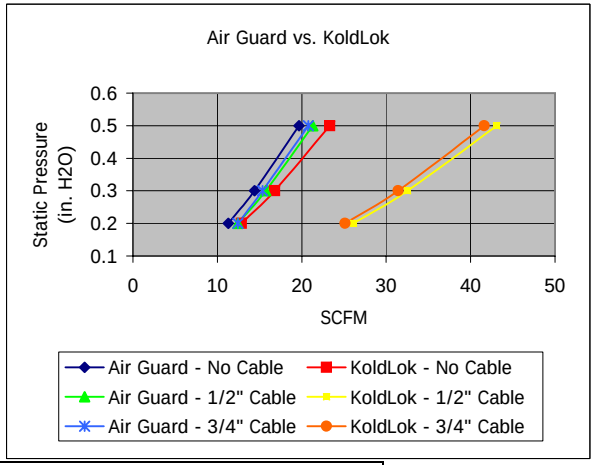
## AIR-GUARD vs KOLDLOK Testing




| | SCFM | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Hole Only | | No Cable | | 1/2 in. cable @ 70° | | 3/4 in. cable @ 70° | |
| | 34.125 sq.in | 43.75 sq.in | | | | | | |
| **Static Pressure (in. H2O)** | Air-Guard | KoldLok | Air-Guard | KoldLok | Air-Guard | KoldLok | Air-Guard | KoldLok |
| 0.2 | 385.3 | 500.7 | 11.3 | 12.9 | 12.4 | 26.1 | 12.4 | 25.1 |
| 0.3 | 461.9 | 602.3 | 14.4 | 16.8 | 15.7 | 32.5 | 15.3 | 31.4 |
| 0.5 | 588.8 | 767.9 | 19.7 | 23.3 | 21.3 | 43.1 | 20.8 | 41.6 |





**Testing Notes:**

**SCFM:** Cubic Feet per Minute at Standard Air Conditions
20°C/68°F, 50% RH, 101.325 kPa/14.696psi

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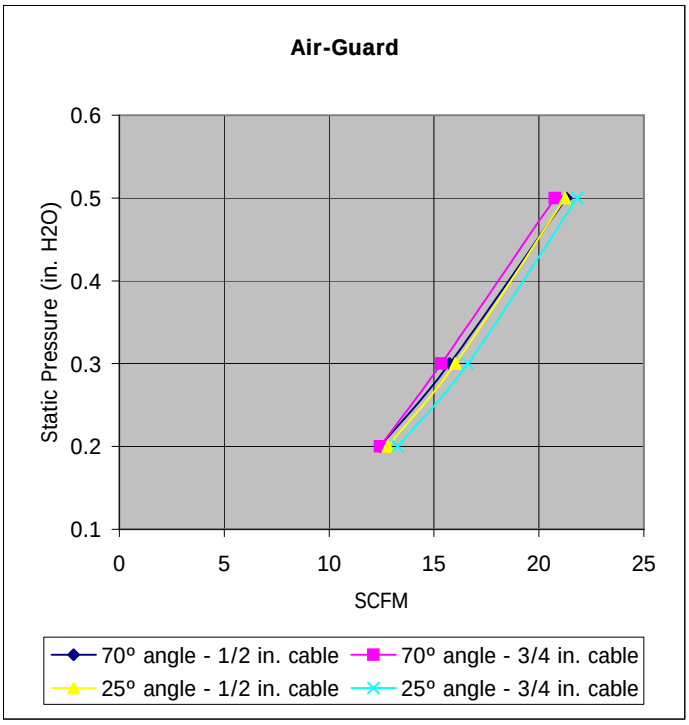
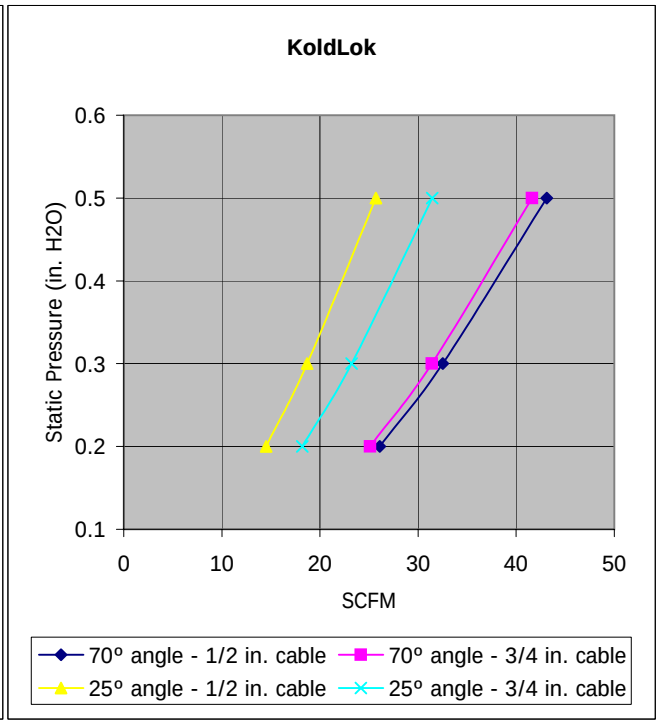
## Varying Angle of Cables



| | SCFM | | | |
|---|---|---|---|---|
| | 1/2 inch cable | | 3/4 inch cable | |
| **Static Pressure (in. H2O)** | Air-Guard | KoldLok | Air-Guard | KoldLok |
| **70° angle** | | | | |
| 0.2 | 12.4 | 26.1 | 12.4 | 25.1 |
| 0.3 | 15.7 | 32.5 | 15.3 | 31.4 |
| 0.5 | 21.3 | 43.1 | 20.8 | 41.6 |
| **25° angle** | | | | |
| 0.2 | 12.8 | 14.5 | 13.3 | 18.2 |
| 0.3 | 16.0 | 18.7 | 16.6 | 23.2 |
| 0.5 | 21.3 | 25.7 | 21.8 | 31.4 |



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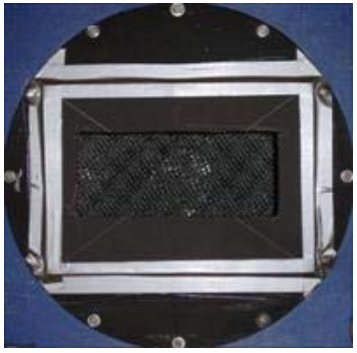
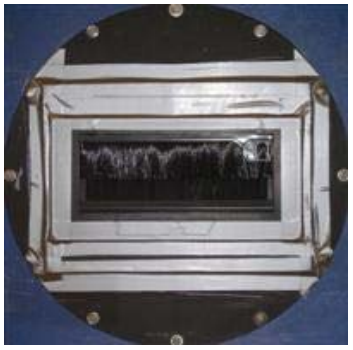
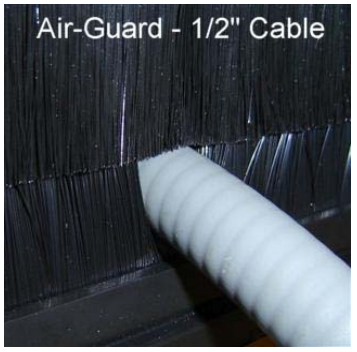
## Air-Guard Testing

| | SCFM | | | |
|---|---|---|---|---|
| **Static Pressure (in. H2O)** | Hole Only- 34.125 sq.in. | No Cable | 1/2 in. cable @ 70º | 3/4 in. cable @ 70º |
| 0.2 | 385.3 | 11.3 | 12.4 | 12.4 |
| 0.3 | 461.9 | 14.4 | 15.7 | 15.3 |
| 0.5 | 588.8 | 19.7 | 21.3 | 20.8 |









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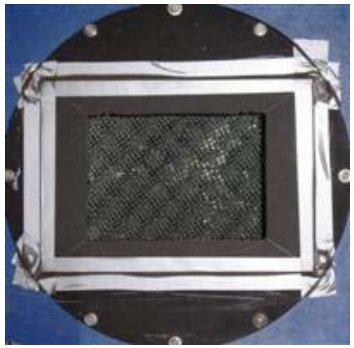
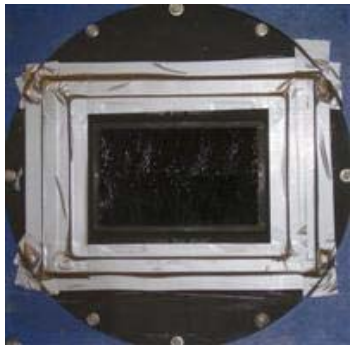
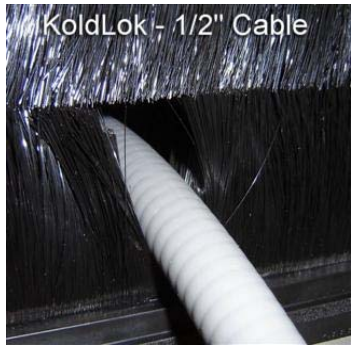
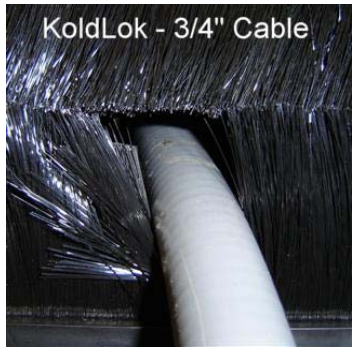
## KoldLock Testing

| | SCFM | | | |
|---|---|---|---|---|
| **Static Pressure (in. H2O)** | Hole Only-43.75 sq.in. | No Cable | 1/2 in. cable @ 70º | 3/4 in. cable @ 70º |
| 0.2 | 500.7 | 12.9 | 26.1 | 25.1 |
| 0.3 | 602.3 | 16.8 | 32.5 | 31.4 |
| 0.5 | 767.9 | 23.3 | 43.1 | 41.6 |







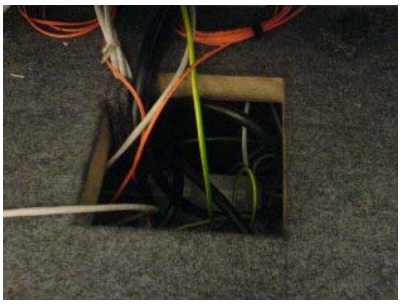

## Independent Client Air Guard Test

*8 ºC drop in data center temperature*

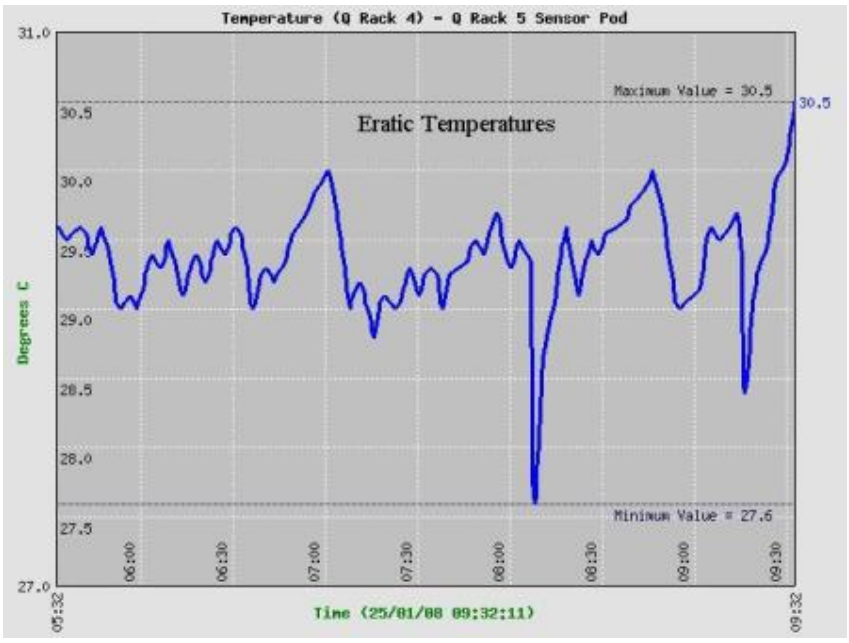
The Air Guard Solution Tests …

We have a lot of holes cut into the floor tiles which have power, copper and fibre routing through from racks to under the floor. These cut outs allow air to escape, thus reducing the under floor pressure, robbing the fronts of racks (and thus servers) of efficient cooling via the CRAC units which in turn waste a lot of energy and efficiency …

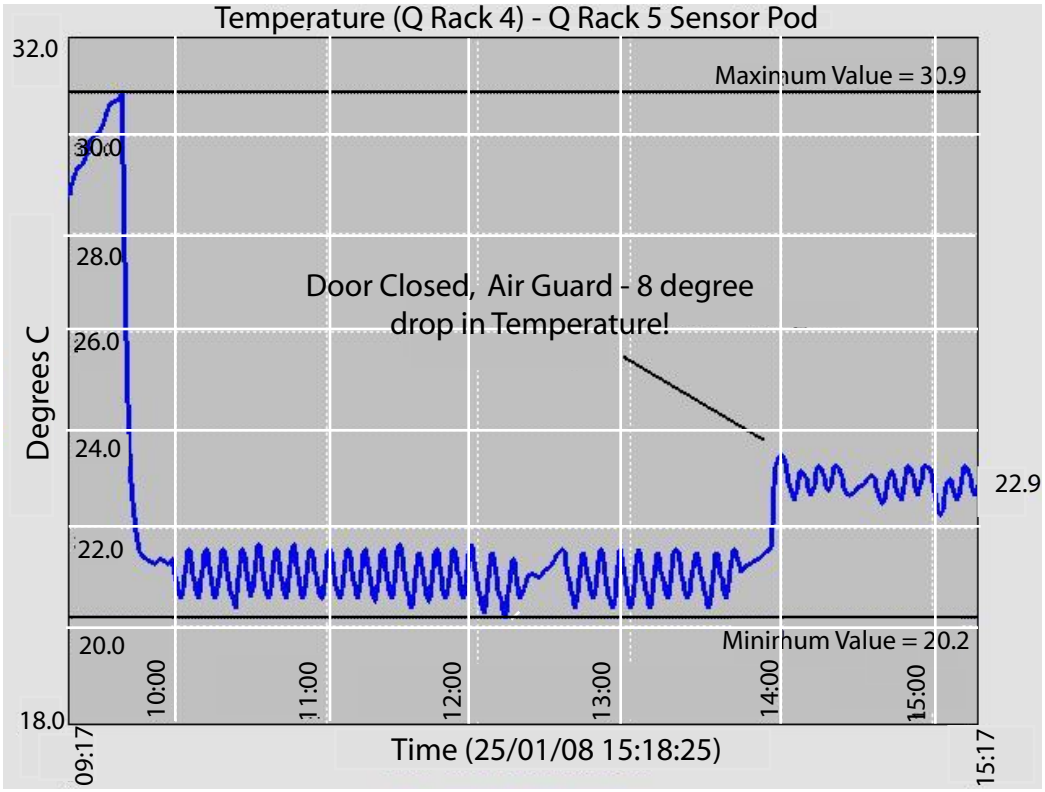
As you can see below, the hole allows a lot of air to escape, but with the Air Guard it's sealed up with the use of a brush strip, also eliminating the trip hazard and making for a safer working environment behind the racks.



I recorded the temperature of the rack before the installation of this solution and again afterwards, and the difference is significant … The erratic temperatures caused by poor air pressure and cooling are shown below



You can see from the chart below it gave us a drop of at least 8°c, dropping from 30°c down to 22°c with the Air Guard in place and with the door closed and has stayed that way. That is a massive improvement, (the lower temp shown is because the door was open for comparison)




I believe that the use of this solution will aid cooling efficiency, reduce the work load of the CRAC units and in the long term save the DC money on the energy we use. It will also create a safer working environment at the back of the racks. I would like to propose the use of these throughout the Data Centres on all of the holes we currently have.

*Ash Burton*, Director of Information Technology
University of South Hampton, United Kingdom