

AisleLok[®] Modular Containment and Magnetic Field Strength

AisleLok[®] Modular Containment products will never come in direct contact with any piece of IT equipment when used as designed. The AisleLok[®] products mount on the outside of the IT cabinet, far removed from any piece of IT equipment, and shielded from any piece of IT equipment by multiple layers of sheet metal.

Upsite Technologies tested the magnetic field strength for the magnets used in the AisleLok[®] Modular Containment products. Figure 1 (below) shows the magnetic field strength of the AisleLok[®] Modular Containment magnets (in air) as a function of distance from the inside of the IT cabinet side panel. The magnets were tested on an APC AR2200 Net Shelter rack having 18 gauge sheet metal side panels.

The sheet metal sides of IT equipment mounted on 19 inch rails in 24 inch wide racks is typically three (3) or more inches distant from the inside of the IT cabinet side panel. The magnitude of the magnetic field in air is less than 10 Gauss at that distance. This weak DC magnetic field will not penetrate the ferrous metal case of server or disk drives to a measurable amount. Table 1 (on the back) has the manufacturers' specifications at the device level. The device level is often several inches inside the IT equipment case which consist of 1 – 2 layers. Based on the testing done at Upsite, with the results shown in Figure 1, the magnetic field on the inside of the rack will not affect the IT equipment within the rack.

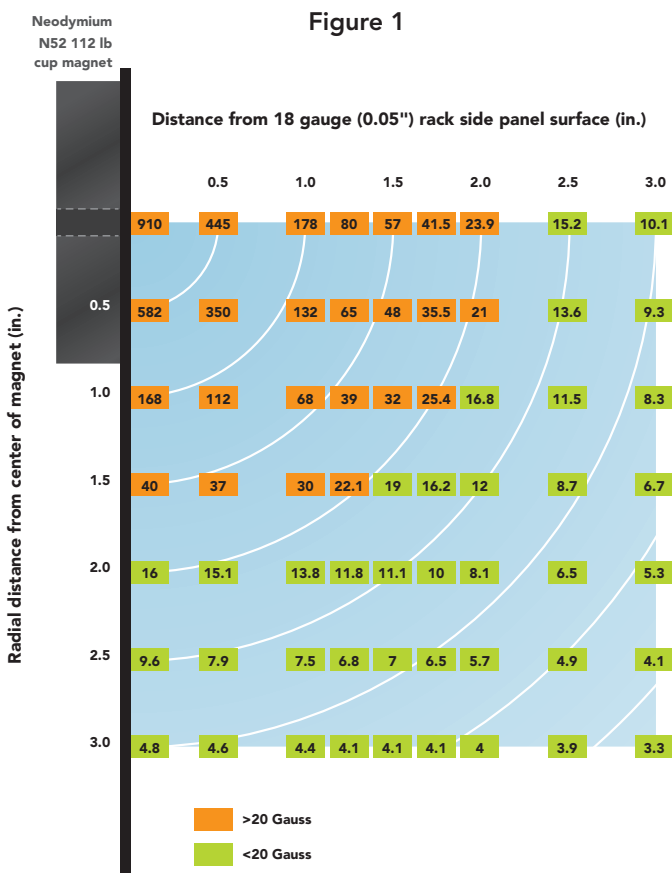
Susceptibility of IT Equipment to Permanent Magnet Magnetic Fields

The susceptibility of modern IT equipment in the data center to permanent magnet magnetic fields is not widely discussed, tested or publicized. The advancement of storage systems—in particular disk drives—and the hardening of IT server components and server case shielding, makes most IT equipment immune to all but extremely high permanent magnet magnetic fields. Typically, these high magnetic fields need to be present at the device level to cause any loss of data or malfunction of the equipment. For Western Digital this is specified at the read/write head of the storage disk. Today, almost all the magnetic field susceptibility specifications are for electromagnetic compatibility (EMC), specifically IEC 61000-4-3, not permanent magnet magnetic fields.

Effects of Permanent Magnet Magnetic Fields on Power and Data Cables

Permanent magnetic fields have no effect on data cables. For additional detail, please see the Siemon White Paper in the reference section.

Power cables are affected by time varying magnetic fields according to Faraday's Law. The equation dictates that as the frequency of the magnetic field goes zero (permanent magnets are a zero frequency magnetic field), the induced voltage on any power cable also goes to zero. Therefore, a static permanent magnetic field cannot induce any voltages on a power cable.



Upsite conducted research and found a sampling of magnetic field strength limits published by certain IT manufacturers. The following table shows the consolidated findings of the published limits:

Table 1

| Manufacturer | Product Details | Gauss Limit |
|-----------------|--------------------------------|------------------|
| IBM | Cathode ray tube video display | 15–20 Milligauss |
| | Liquid crystal display (LCD) | 10 Gauss |
| | Magnetic tape equipment | 20 Gauss |
| | Disk drive equipment | 20 Gauss |
| | Processors or systems | 20 Gauss |
| Western Digital | 20–220 kHz Frequency Range | 6 Gauss |
| | 220–400 kHz Frequency Range | 1 Gauss |
| | 400 kHz–20 MHz Frequency Range | .005 Gauss |
| | DC Frequency Range | 300 Gauss |
| Hitachi | Ultrastar 10K300 | 4 Gauss |
| | Travelstar C4K40-40/20 | 15 Gauss DC |
| Seagate | UB Family Products | 5 Gauss |

Based on the research and testing conducted by Upsite Technologies, and Kleinholz Inc. Consulting and Forensic Engineering Services, the following conclusions can be made:

1. Servers and disk drives are much less susceptible to permanent magnet magnetic fields than they once were, to the extent that specifications for maximum withstand is not readily available.
2. It will take direct contact on the server or disk drive case, with a very strong rare earth magnet, to *potentially* interfere with the internal components or functionality of the device.
3. Since AisleLok® Modular Containment products do not directly contact the IT equipment when correctly installed, they pose no risk to potentially harming any equipment.

References

IBM Magnetic Susceptibility

http://pic.dhe.ibm.com/infocenter/whsesys/index.jsp?topic=%2Fcom.ibm.7700.r2.planning.doc%2Fp7eeh_electromagneticcompatibility.html

Kleinholz Inc. Paper on Magnetic Susceptibility

<http://www.datacenterdynamics.com/focus/archive/2012/11/magnets-data-center-dangerous-data>

Siemon White Paper on Magnetic Impact on Data Cables

http://www.siemon.com/uk/white_papers/06-05-01-magnets.asp



Designer and Manufacturer

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