Appendix J: Zero EMI® — Frequently Asked Questions

How does the Zero EMI® System work?

It uses an electrical compensator to exactly mirror the conductor current in the sheath.

Where is the compensator located?

At either the supply or load end.

Is the sheath used as a grounding conductor?

No. A separate grounding conductor is run.

What happens it the sheath is accidentally grounded?

A short between sheaths, or sheath to ground, decreases the effectiveness of the EMI mitigation from the location of the short to the end of the run.

What current limit applies to the cable?

The standard 75°C free air ratings apply when using spaced configurations. When using trefoil configurations, the 75°C free air ratings must be reduced by 25%.

How do the compensators affect the circuit?

Other than the beneficial effect of reducing the EMI, there is no other effect to the circuit because although the cable impedance is reduced it is replaced by the impedance of the compensator.

What if a fault occurs somewhere on the system?

There is no adverse effect; it does not add to the clearing time of the protective device because the impedance of the circuit is not changed by the use of the compensator.

Does the system reduce EMI on the busduct that the MI cable is normally attached to?

No. The system only eliminates EMI around the MI cables.

Is there any delaying of tripping of a breaker under fault conditions as a result of the Zero EMI compensator?

No. The impedance of the compensator decreases under fault conditions to approximately the same level as the cable itself.

What is the short circuit capability of the compensator?

In the order of 30 kA. The actual value has to be calculated for a particular design. HRC fuses can be used to protect against higher fault currents.

It the cable gets cut through so the sheath is brought into contact with the conductor, what happens?

It's a direct short to ground – the circuit protection activates, just as in a standard circuit.

Is the voltage drop in the circuit affected by the compensator?

There is no appreciable voltage drop introduced by the use of the compensator.

What determines the size of the compensator?

It is designed to operate at a certain flux density in the core and is also designed to handle a certain amount of resistance in the sheath. Therefore, circuit length, cable design and current level all play a part. The effectiveness is designed for about a 350:1 mitigation of EMI, which gives the < 5 milligauss guaranteed levels.

Suppose the actual circuit is longer than designed?

There are two options to handle this – increase the core inductance with a tuned circuit (the compensator is designed with this feature available) or add a second compensator. Contact Tyco Thermal Controls for additional information.

Is EMI associated with harmonics eliminated?

Yes, the EMI associated with harmonics, up to several kHz, is effectively eliminated. However, harmonics themselves are passed through to the load.

What standards apply to EMI?

IEEE 644 is the standard that describes how flux is to be measured. In addition, the American Conference of Governmental Industrial Hygienists, who set indices for chemical, physical, and biological agent exposure, has set levels of EMI at very high levels. The typical guideline for offices is very low – “single digit” milligauss at 3' separation.

Where is Zero EMI normally used?

In horizontal runs under offices, computer rooms, hospitals, etc. In vertical runs up to a level where unprotected cabling or bus duct is acceptable.

If PCs are everywhere in a building, why isn't the whole vertical run protected?

The main vertical run can often be arranged so that there is no office space within 8–10' of the wall on which the cabling/busduct is installed.

Why is the sheath so thick?

To reduce the resistance. Reducing the resistance enhances the EMI mitigation effect and also reduces heating associated with the current in the sheath.

Must the cable be insulated?

Yes, the addition of polymer insulation over the copper sheath is an easy way to isolate the cable sheaths from each other.

How is the MI cable connected to the compensator?

The cable enters the compensator through an insulating plate (red) and the sheath is connected to a brass plate using a standard gland. The conductor emerges from the sheath and is bolted to the plated terminal using a crimp-style 2-hole lug. The cable is sealed using QuickTerm™ termination kit components.

Why use MI cable?

The single conductor concentric sheath construction of MI cable is ideal for this application.

What are the alternatives to the Zero EMI System?

Other ways to reduce EMI in these applications include: rerouting of conventional cables (increase the distance from the source) or using magnetic shielding. Both options are likely to increase installation costs.

Who is interested in reducing EMI?

Owners of buildings with leased office space, hospital engineers, building design engineers, and perhaps utilities engineers – in some jurisdictions the utilities are responsible for routing power all the way from the transformer to the switchgear.

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