

tech tips

TECHNICAL INFORMATION AND PRODUCT SOLUTIONS

ONEAC Power Conditioning Products as an Alternative to Dedicated Isolated Ground (I/G) Circuits

ONEAC has successfully substituted power conditioners and power conditioned UPSs for dedicated circuits with isolated ground connections for more than 20 years. The benefits for end users include simplified installation logistics, reduced site preparation expenses and enhanced operational reliability of electronic systems powered in this way. However, this recommendation has been oversimplified by some and can be a cause for misunderstanding. This Tech Tip offers a complete but simple presentation of the conditions under which this substitution can be made.

What is a dedicated I/G circuit?

A dedicated I/G circuit is one grounding method used to reduce electrical noise on the circuit and was allowed as an exception to the normal practice as permitted by the National Electric Code section 250.146 (D). This method requires the remaking of critical branch circuits before a system is installed, to provide a dedicated, continuous ground conductor from the ground bus on a sub-panel to the wall receptacle or outlet. The circuit when properly executed, also provides a dedicated 12 amp or 15 amp circuit breaker to a pre-defined load by providing receptacles only at the end point of the circuit. A standard branch circuit would allow several receptacles along the length of the circuit.

Why is a dedicated I/G circuit recommended?

Some system manufacturers specify dedicated I/G circuits to:

- reduce electrical ground noise (I/G); see related Tech Tip on Ground Skew: Problems and Solutions.
- ensure a sufficient source of power is protected from competition of other loads (dedicated circuit breaker).
- ensure integrity of the electrical system by requiring freshly installed/inspected electrical distribution systems.

What are the shortcomings of a dedicated I/G circuit?

Although a properly executed dedicated circuit typically ensures ample power, uncontested by other loads on the same circuit, ONEAC agrees with the IEEE Emerald Book on the purpose and limitations of dedicated I/G circuits¹ and further summarizes the limitations as:

- provides no protection from lightning and other power disturbances — instead it creates a direct circuit path between the service panel and the dedicated load and delivers electrical surge energy directly.
- is often a higher impedance at a high frequency than a shared branch circuit — adding to power problems.
- is rarely free of electrical noise than a properly executed standard branch circuit — all ground wires share a common bus at the service entrance and sub-panel.
- increases installation expenses.

Using ONEAC power conditioning products where dedicated lines are specified offers these advantages:

- provides superior normal (L-N) and common mode (N-G) noise reduction — delivering an absolutely clean signal reference with ONEAC's Virtual Kelvin Ground® methodology.
- provides high performance and long lasting protection against lightning and other damaging electrical noise, even that created by loads on the same circuit or elsewhere on the building power distribution system.
- eliminates costs associated with special electrical rework at the site — so long as the existing site wiring conforms to the National Electric Code for standard branch circuits.

¹ "This type of equipment grounding configuration is only intended to be used for reducing common mode electrical noise on the electronic load equipment circuit as described in the NEC. It has no other purpose and its effects are variable and controversial." IEEE Std 1100-1999, Emerald book, chapter 8, section 8.5.3.2, pg. 322.



A CHLORIDE POWER PROTECTION COMPANY

ONEAC Corporation • 27944 N. Bradley Rd. • Libertyville, IL 60048-9700 • (847) 816-6000 • Fax (847) 680-5124 • Web www.oneac.com

TT9801 Rev. A

© ONEAC Corporation, 2004