

## TechTopics Topic: Ground Bus Ratings

We often see specifications which require that the ground bus in Metal-Clad switchgear have a continuous current rating, typically 600A. Such requirements illustrate a common misunderstanding about the function of a ground bus in switchgear.

In installations subject to the National Electrical Code® (NEC®) (ANSI/NFPA 70-1999), the equipment ground conductor is not intended to carry normal load current. The ground bus is intended to carry current only when some sort of fault occurs that involves ground. The equipment ground conductor is connected to the metallic structure of the switchgear, to maintain the enclosure at ground potential. If the ground bus were to carry normal load current (such as unbalance current in a three-phase, four-wire circuit), the resulting voltage drop on the ground bus could create a shock hazard for personnel. Any normal currents in the fourth wire should be constrained to flow only over the dedicated neutral conductor. In turn, the neutral conductor is only to be connected to the equipment grounding conductor at a single point. Thus, while the neutral conductor and the equipment grounding conductor are connected together, they do not present parallel paths for normal current flow.

As a side comment, it should be mentioned that installations subject to the National Electrical Safety Code® (NESC®) (ANSI/IEEE C2-2002) often use the equipment ground conductor as the return path for single phase to ground loads. Such systems are outside the scope of the discussion in this issue of TechTopics.

Since the purpose of the equipment grounding conductor is only to carry return current in the event of a fault involving ground, it is required to have the same short-circuit capability as the main bus system of the switchgear. ANSI/IEEE C37.20.2-1999 (clause 5.4.6) requires that the switchgear short-time current rating be equal to the short-time rating of the associated circuit breakers, and that the main bus and connections be tested to withstand this current for two seconds. Likewise, the ground bus is tested to the same requirement (see clause 6.2.4.2), with the test current applied between the nearest main bus phase conductor and the ground bus.

ANSI/IEEE C37.20.2 also requires that the ground bus withstand the same peak current exposure as the main bus. This is most commonly referred to as the momentary withstand, and requires that the ground bus withstand a 10-cycle momentary test between the nearest main bus phase conductor and the ground bus, with a peak current equal to the peak close and latch current rating of the associated circuit breakers. The peak close and latch current rating for the new “kA-rated” circuit breakers (ANSI C37.06-2000) is 260% of the symmetrical short-time current rating of the circuit breakers.

To summarize, the ground bus in Metal-Clad switchgear does not have a continuous current rating. Instead, it must have a short-time rating and a momentary current rating which match the ratings of the switchgear.

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