Specifications for metal-clad switchgear often include a requirement to provide a grounding and testing (G&T) device. Those same specifications normally include a reference to the IEEE standard that covers G&T devices; IEEE C37.20.6, IEEE Standard for 4.76 kV to 38 kV Rated Ground and Test Devices Used in Enclosures. Unfortunately, specifying a G&T is rarely that simple.

The customer specifications for a G&T can vary from a few sentences to a few pages. The reason is twofold. First, as is the case with all IEEE standards, only the minimum performance requirements are covered. This means the standard covers minimum essential operational interlocks, such as an interlock to prevent a G&T equipped with a ground-making switch from being racked in or out with the switch closed, but not the specific site-related requirements. Procedural requirements would not be covered in the standard. Second, the standard states: “Interlocking for G&T devices can be very detailed depending upon the complexity of the device, especially when it is equipped with multiple functional components.” So depending upon the end-user site operating safety requirements for a G&T, the specifications can and do vary greatly. It seems no two G&Ts are alike in this regard.

To further complicate matters, the function of the G&T is very different from the circuit breaker it replaces even though it must interface with the same compartment and the devices and interlocks used in that compartment for normal equipment operation. Since the circuit breaker and the G&T are not operationally the same, there can be instances where using the G&T may be incompatible with the features provided for normal circuit breaker operation. Some specifications go into great detail describing required mechanical and/or electrical interlocking. Few, if any, specifications detail what the intended use of the G&T is or how the G&T is intended to be used.

There have been occasions in the past when a G&T was specified, ordered, built, tested, and inspected in-factory by the client’s representatives only to have it rejected at the job site because it did not meet the operator’s expectations. In short, the feedback from the operators in those cases was “It doesn’t do what we want it to do. Our site safety rules say we can’t use it.” In the end it didn’t matter if it met the spec or not. It didn’t meet the client’s expectations, regardless of what was written in the specification.

How does something like this happen? In some cases the written specifications simply did not keep pace with more quickly evolving safety requirements. In other cases there was confusion between what the specification required, the operational characteristics of the G&T and the on-site procedures and expectations of the users. There was simply a gap between “what” the G&T was specified to do and “how” the user actually must use it to comply with current safety procedures.

The most common application of a G&T is to ground a portion of the circuit. The device is inserted into the compartment after the circuit breaker has been removed, a check for absence of voltage on the terminals to be grounded is made and subsequently a ground is applied to those terminals through the device. In order to accomplish those steps with a manual G&T, the device must be racked into the connected position with the ground conductors disconnected. The operator then checks for voltage presence using a “hot stick” voltage measuring tool.
The Problem with Grounding and Testing Devices: Standards, Specifications and Expectations

When the circuit to be grounded is determined to be de-energized the G&T is racked to the disconnected position and removed from the compartment where grounding conductors that connect the terminals to be grounded to the G&T ground connection are installed. The device is then re-inserted into the compartment and racked to the connected position. The circuit is now grounded and may be locked and tagged-out according to site procedures.

This sounds like a simple procedure, however, it violates any safety program where operators are forbidden from opening the circuit breaker compartment door with a device in the connected position and the gear energized. Many specifications also require compartment door interlocks that prevent the door from being opened unless the removable element is in the disconnected position. This is especially true with arc-resistant construction. Opening the door to use a G&T in the connected position in order to check for voltage presence would require intentionally defeating a safety interlock. Although a manual G&T was used in this example, the door must be opened to perform voltage testing with electrically operated G&Ts as well. In fact, the compartment door must be opened to perform any testing function enabled by using the G&T. It’s a “Catch 22”; you cannot meet the project requirements of the specification without providing a device that will violate the safety requirements of the specification, even if it is used correctly.

How can this conflict between operational safety procedures and the use of a G&T be avoided? In our experience, it’s crucial to talk with the customer or the actual end user about their on-site safety requirements, procedures and expectations concerning temporary equipment grounding. In the case above, a G&T was specified, but in reality the operators could not use it without breaking the site safety rules. Had we known “what” the customer had to do to comply with their on-site safety requirements rather than simply “what” equipment they wanted, this could have been avoided.

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