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## PowlVac® Ground and Test Devices; Ratings and Applications

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Grounding and testing (G&T) devices are switchgear assembly accessory devices that can be temporarily inserted in place of a drawout circuit breaker for the purpose of grounding the main bus or external circuits connected to the assembly, or for primary circuit testing.

[Tech Brief #124](#) focused on the types and descriptions of G&T devices Powell offers that are designed in accordance with IEEE C37.20.6. The purpose of this Tech Brief is to describe the ratings and applications of G&T devices. Although many of the G&T device ratings are the same as or similar to the ratings of the circuit breakers they are intended to temporarily replace, there are also differences. Because G&T devices are intended for grounding and testing use only, they do not require all of the capabilities of a circuit breaker.

The **rated maximum voltage** of a G&T device is the **maximum design voltage** of the G&T device. To properly apply the G&T device, the rated voltage must be greater than or equal to that of the compartment it will be used in. For example, where G&T devices have similar breaker-to-cell interface dimensions and drawout mechanisms, a 15kV G&T device can be applied in either 15 or 4.76kV equipment. However a G&T device with a rated maximum voltage of 4.76 kV cannot be applied in equipment rated 15kV. It's worth noting that 4.76kV is a rating very commonly referred to as 5kV class in the industry. However, the actual rating is 4.76kV.

The rated **dielectric withstand voltages** for G&T devices, commonly referred to as HiPot and BIL voltages, follow the same logic as the **rated maximum voltage**. That is, the rated power frequency withstand (HiPot) and rated impulse withstand voltage (BIL) of a G&T device must be greater than or equal to the compartment it will be used in.

The rated short-time and rated momentary (Peak) withstand currents of a G&T device must also meet or exceed the ratings of the switchgear assembly in which the device is intended to be temporarily inserted. As mentioned in [Tech Brief #124](#), the switchgear compartment ground connection must also be designed and tested for the rated short-time and momentary withstand current of the assembly if a G&T device is intended to be used in the switchgear assembly. All Powell switchgear where a G&T device is available meets those requirements, even if a G&T device is not supplied with the original equipment order. As described in more detail in [Tech Brief # 122](#), it's also very important to note that the rated short-time and momentary of the switchgear often exceeds the ratings of commonly used temporary grounding cables, whereas Powell G&T devices are fully rated and tested to withstand full short-time and momentary current values.

The ratings and performance requirements described above apply to all the G&T device models manufactured by Powell, both manual and electrically operated types. The major difference between manual and electrically operated G&T devices is the electrically operated G&T device has a closing and latching current capability. Manual G&T devices do not have this capability. The closing and latching current capability of an electrically operated G&T device is the maximum peak current that the power-operated ground-making switch is required to close into and carry. If, during use, an electrically operated G&T device is inadvertently closed onto a live circuit it is not required to interrupt the resulting fault current. This current must be interrupted by an upstream device.

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A G&T device has no continuous current rating simply because the only purpose of a G&T device is circuit grounding and voltage testing. Although there is no continuous current rating, compartment compatibility is an important consideration when applying a G&T device. The primary disconnecting devices for various continuous current ratings in some equipment designs may not be compatible between ratings. This is due to differing sizes or configurations such as round versus flat connections. Within product families, 4.76 and 15kV PowlVac up to and including 50kA and PowlVac ND employ the same dimension and configuration of stationary primary disconnects regardless of continuous current rating. This means that within the same type of equipment, PowlVac and PowlVac ND G&Ts are compatible with all continuous current ratings of all compartments. Other designs may require multiple G&T devices or conversion kits to allow compatibility with the various switchgear compartments a G&T device will be inserted into.

As mentioned previously, a G&T device may be used to test and/or ground the power circuit during maintenance work. The G&T device provides controlled access to the primary circuit that are normally energized with hazardous voltages. Great care must be exercised when using these devices. All primary circuits should be considered to be energized until proven otherwise.

It is extremely important to recognize that due to the inherent complexity and intended use of a G&T device, interlocks alone cannot fully protect the operator against all potential hazards. As stated in IEEE C37.20.6, "The operator should be a fully qualified person, specifically trained by the user to completely understand the proper operating procedures of the device as well as all grounding and testing procedures." As a minimum, a qualified person must be trained in accordance with NFPA 70E and OSHA regulations 29CFR1910.269, 29CFR1910.332, 29CFR1910.399 and 29CFR1926.449. In addition, each user must develop operational, interlocking and lock-out/tag-out procedures that are fully understood and followed by the operator.

It is also important to recognize that all G&T device testing procedures require that the switchgear compartment door to be open in order to gain access to the test ports. In addition, some G&T devices may be too large for the compartment door to be closed when the device is in the circuit breaker "test" or "disconnected" position. Under these conditions users must develop and employ additional or special operating procedures.

G&T devices should be used for testing of the switchgear assembly only. As the G&T device is only rated for the dielectric withstand capability of the switchgear assembly in which it is used, it should not be used for any testing procedures for connected equipment. Connected equipment may require either voltages or durations that exceed the switchgear ratings. As an example, some cable dielectric tests do not match the switchgear ratings. In these cases any testing of connected equipment must be made with that equipment disconnected from the switchgear. Failure to do so could damage the insulation integrity of the switchgear.

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