Arc Resistant Equipment In A NEMA 3R Configuration

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NEMA 3R is a common configuration for indoor Metal-Enclosed and Metal-Clad Switchgear placed in a non-hazardous outdoor location. The switchgear is modified to provide a degree of protection against rain, snow, and sleet. A question that is often asked concerns applying the 3R rating to Arc Resistant Switchgear.

There are several areas of concern when addressing the necessary modifications to an Arc Resistant design to meet the NEMA 3R rating. Typically, standard switchgear is modified by either making the enclosure water-proof or by placing an external water-proof enclosure around the indoor design. The doors containing control devices are usually covered by an additional weather-proof door or cover. In the case of AR gear, the pressure relief venting is typically located on top of the equipment. Since these vents are intended to open with minimum pressure, it is not always possible to make them water-tight and not adversely affect their performance under the overpressures caused by internal arcing. Further, these vents may not operate at all if covered by ice. It is therefore advisable that the top of the equipment be fitted with some type of protective cover or a water-proof plenum design.

The door-within-a-door concept for weather-proofing typical indoor switchgear to the NEMA 3R requirements is often not possible with the larger, heavier Arc Resistant doors due to the opening swing required to remove a circuit breaker. In line-ups of two vertical sections it may be possible, but in line-ups of three sections or more, opening the exterior doors becomes restricted by adjacent sections. Further, in cases where the circuit breaker door is surrounded by an external, weather-proof door, a lifting device is usually required to insert or remove the circuit breaker. This device must be stored and any work requiring breaker removal would be performed while exposed to the outside elements.

For these reasons, Powell chooses not to offer Arc Resistant designs in the traditional NEMA 3R configuration. Powell places the switchgear in a cost-reduced modified Power Control Room (PCR®). The design provides space above the switchgear for proper opening of all pressure relief vents, creates a plenum so those fault gases may be directed away from the switchgear in a controlled manner, and provides all the necessary protection from adverse environmental conditions. By creating a covered aisleway, the design offers a more user-friendly area to work in and to store items such as a lift truck or spare circuit breaker. The sheltered aisleway also allows the circuit breakers in one-high configurations to be inserted or removed from the switchgear without the use of a lifting device.

While there is an increase in the equipment footprint that must be considered for the intended site, this modest size increase is offset by the increased reliability and operating conditions of the design.

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