



Powell Technical Brief #23

Using Design Tests to Qualify Several Ratings of Equipment

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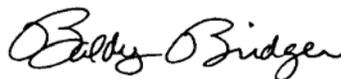
The many variations in construction and ratings encountered in the typical switchgear or motor control product line make the planning of design and conformance test programs quite complex at times. Of course, it is possible to run every test on every possible rating of equipment but such an extensive program is very expensive and is seldom required to fully document the performance of a product line.

The ANSI standards for switchgear recognize this complexity and provide for the qualification of a piece of equipment for all lower ratings provided test results show it to be qualified for the highest rating for which it is used. Some of the conformance test standards in the ANSI C37.50 series discuss the principles of testing to qualify multiple ratings. These standards also give guidance in the grouping of equipment ratings for testing.

A typical example of qualifying multiple ratings by a single test is the bus structure used in PowIVac[®] metal-clad switchgear. This bus structure is the same for all voltage and short circuit ratings, varying only for continuous current ratings. To demonstrate the momentary and short-time current ratings of this bus structure, tests are performed on the bus with the lowest continuous current rating, 1200 A, which uses the smallest, weakest bars of any continuous current rating of PowIVac[®] bus. The tests are performed at the maximum momentary current, 132 kA crest, and the maximum short-time current, 49 kA rms, required for any rating of PowIVac[®] switchgear. It is fairly obvious that passing these tests qualifies the 1200 A bus for this rating and for all lower momentary and short-time current ratings. What may not be quite so obvious is that successful tests on the 1200 A bus also qualify higher continuous current ratings, such as 2000 A and 3000 A. These higher bus ratings are covered because they use larger bus bars, which are mechanically stronger and which have greater thermal capacity than the bus bars used in the 1200 A bus.

The grouping of ratings and the selection of which rating to test requires a thorough knowledge not only of the standards but also of the particular product line being tested. The grouping of ratings may differ for different tests. It also may differ for different products, or different manufacturers offerings in the same product line. The example given in the previous paragraph is true for PowIVac[®] switchgear, but may not necessarily be true for other manufacturers' similar products.

Although Powell and many other manufacturers have used these principles in performing their design tests for many years, not everyone in the industry understands the concept. To aid in this understanding, all future Powell test reports will document the additional ratings covered by any test.



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