



Powell Technical Brief #76

Bus Duct Enclosure Material

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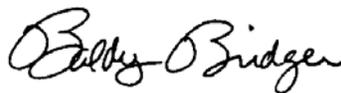
Bus ducts built by Powell are metal-enclosed, in accordance with ANSI/IEEE Standard C37.23. The metal enclosure of the bus duct, like the metal enclosure of switchgear units, performs several functions. First, it protects personnel from the hazard of contact with energized electrical conductors. Second, it provides mechanical support for the conductors and their insulation system. And third, it protects the conductors from mechanical damage and environmental distress.

The first material we think of when talking about metal enclosures is steel — ordinary, every-day hot-rolled carbon steel. However, steel has some drawbacks as an enclosure material. Most importantly, it is magnetic, and the magnetic field surrounding the conductors induces circulating currents in the enclosure. These currents have a couple of ill effects. They represent energy losses as they flow through the resistance of the steel. This, in turn, raises the temperature of the enclosure, reducing its effectiveness in dissipating the heat generated in the bus bars, making the entire bus duct run hotter. This effectively reduces the continuous current rating of the bus duct, since the continuous current rating is determined by the temperature rise of both the conductors and the enclosure.

The usual method of reducing these magnetic effects is to make at least one side of the bus duct enclosure of a non-magnetic material, often aluminum. Powell's usual practice is to make the top cover of bus ducts rated over 1200 A of aluminum. At some very high ratings, the entire bus duct enclosure may be made of aluminum.

Another drawback of steel is that, even with a good paint job on galvanized steel, it may not stand up well in some harsh environments. Powell routinely uses galvanized steel for all outdoor bus duct enclosures. To a lesser degree, aluminum may also have environmental problems. If steel is not suitable, but aluminum is, an all-aluminum bus duct enclosure is preferred.

However, if neither galvanized carbon steel nor aluminum is suitable for the environment, a third alternative is to make the bus duct enclosure of stainless steel, which withstands bad environments well and is also non-magnetic. The drawback to using stainless steel is its cost. The basic raw material is much more costly than either carbon steel or aluminum, and considerably greater effort is required to fabricate it. If the circumstances require it, Powell will furnish bus duct with stainless steel enclosures, at an appropriate price adder. Because of this increased price, a stainless steel bus duct enclosure should not be specified unless there is a real need for the material.



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