Rectangular vs. Round Coils

At Issue

Manufacturers promote product design features to give themselves competitive advantage in the marketplace. Potential customers may be influenced by these promotions, and act without careful consideration of alternatives. In transformers, specifying round coil designs does not necessarily result in benefit to the customer. In some cases, it may even cost the customer more.

Eaton's Cooper Power series transformer designs* meet all ANSI Short Circuit and other performance requirements, and may provide significantly better value than competitive designs featuring round transformer coils.

Recommendation

Identify essential performance needs throughout product specifications. In transformer requirements, specify adherence to ANSI C57.12.00 criteria and other applicable industry standards. Then, look for the best value among all alternatives meeting or exceeding your specifications.

Rationale

Performance Tested

Eaton designs meet all ANSI Short Circuit test requirements for rectangular coils, and certified Short Circuit test data (design tests) are available on request for many of these designs. Measured performance on some test units actually exceeds the requirements for round coils.

At Eaton, all Cooper Power series three-phase transformers undergo impulse testing. The impulse test, which consists of a reduced wave and a full wave, is performed on all primary windings as well as on all secondary windings designed to 60 BIL and above.

Design

As a manufacturing standard, Eaton's Cooper Power series coils are compressed, then baked under pressure to set the "B" stage epoxy paper used to bond the coil.

With full width secondary windings, there is no significant vertical short circuit force. Horizontal short circuit forces are supported on the sides of the coil both by core clamps sized for the maximum radial short circuit forces as well as by solid pressboard phase-to-phase and phase-to-core clamp insulation. This added support protects coils against premature wear due to vertical and horizontal vibrations when subjected to repeated motor starting loads or when through-faults occur.

First Cost Considerations

In specifying a particular product feature such as "round coil", customers may be unknowingly limiting their transformer purchases to more expensive designs that do not provide corresponding increased value.

Conclusion

Specify performance requirements instead of product features, and choose transformers from the supplier providing the best overall value: Eaton.

The Eaton Connection

Eaton offers Cooper Power series three-phase pad-mounted transformers in the following ratings:

- KVA Range: 45-10,000 kVA
- Primary Voltage: 2,400 - 46,000 volts (with or without taps, dual voltages available)
- Secondary Voltage: 208Y/120 - 14,400 volts

Eaton offers Cooper Power series three-phase substation transformers in the following ratings:

- KVA Range: 75 kVA through 12,000 kVA (with temperature rise and fans, capacity of up to 14,000 kVA is possible)
- Primary Voltage: 2,400 - 46,000, with or without taps; dual voltages available

* 10,000 kVA and below

- Secondary Voltage: 208Y/120 (through 1500 kVA only) through 14,400 Volts
- Temperature Rise: 55°, 55/65°, 65°, 75°, 55/75°, 65/75°
- Basic Insulation Level: 30 kV BIL through 250 kV BIL
- SUSS - Secondary unit substation
- PUSS - Primary unit substation
- SOSS - Secondary open substation
- POSS - Primary open substation

Eaton offers Cooper Power series single-phase substation transformers in the following ratings:

- KVA Range: 333 kVA through 4000 kVA
- Primary Voltage: 2,400 - 46,000, with or without taps; dual voltages available
- Secondary Voltage: 208Y/120 (through 1500 kVA only) through 14,400 Volts
- SOSS
- POSS

Units meet all applicable ANSI, NEMA, and IEEE standards. The primary ANSI standard that governs substation transformers built by Eaton is C57.12.10. Several other ANSI standards that govern the construction, loading and testing of pad-mounted and substation transformers are C57.12.00, C57.12.70, C57.12.80, C57.92, and C57.105.

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