

Substation Transformers

Reference Information

R210-90-1

When To Use A Substation Transformer

At Issue:

Substation-type single- and three-phase transformers may be specified instead of pad-mounted transformers when certain job site conditions apply.

Recommendation:

Substation transformers may be the economical choice when:

- Public access to the transformer is not a concern or a separate enclosure is acceptable.
- Incoming cables are overhead, transformer is connected to separate switchgear, or primary and secondary feeds are underground.
- Additional flexibility to handle overload conditions is required.

Rationale:

Three key considerations apply when determining whether a substation transformer should be specified: the location of the transformer, the location of the incoming and outgoing cables, and the required immediate and future load of the transformer.

Location Of The Transformer:

A key question to be asked is, "Is there going to be public access to the transformer?" If public access to the transformer is not a concern, a reliable and more economical choice may be the substation transformer. In lieu of the relatively more expensive tamper-resistant enclosure design used on pad-mounted transformers, the substation transformer is placed inside a fence or other suitably secured area.

Location Of The Incoming And Outgoing Cables:

If either the primary or secondary cables will connect to the transformer from over head, one option is the open substation transformer with cover-mounted bushings. If the unit will be close-coupled to switchgear, the unit substation transformer is an option.

Required Current / Future / Emergency Capacity Of The Transformer:

Substation transformers may be designed to hold additional capacity for future needs or periodic overloads. The design of the transformer allows for additional capacity with upgraded conductor material, lead assembly, and components. External fans may be included.

Depending on the size of the transformer, unit capacity can be increased by 15% to 25%.

The Cooper Connection:

Cooper Power Systems offers three-phase and single-phase substation transformers in the following ratings:

Three-phase:

- KVA Range: 75 kVA through 10000 kVA (With temperature rise and fans, capacity of up to 14000 kVA is possible.)
- Primary Voltage: 2400 - 46000, with or without taps; dual voltages available
- Secondary Voltage: 208Y/120 (through 1500 kVA only) through 14,400 Volts
- Temperature Rise: 55°, 55/65°, 65° (Optional: special temp rise)
- 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

Single-phase:

- KVA Range: 333 kVA through 4000 kVA
- Primary Voltage: 2400 - 46000, 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 Cooper Power Systems 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.

See Cooper publications:

- 210-15: Primary or Secondary Unit Substation Transformers
- 210-16: Primary or Secondary Open Substation Transformers
- Bulletin 91016: Product Guide-Transformer Products
- Bulletin 97055: VFI Transformers
- Bulletin 97069: VFI Transformers (economic analysis guide)
- Bulletin 98076: FM Approved Transformers
- Bulletin 98077: Envirotran Transformers



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