

## TRANSFORMERS

### DESIGN GUIDELINES

1. Summary:
  - a. This section provides guidelines and standards for Low-Voltage Dry-Type Transformers (600V and Below) and Medium Voltage Unit Substation Transformers.
2. Design
  - a. General
    - Transformers shall be mounted on concrete pads with vibration isolators installed between transformer and pad, secured with 3/8" bolts to pad.
    - Transformers shall have both primary and secondary over-current protection.
    - Loads must be balanced by design.
    - Insulation Temperature Rise: 115 deg C temperature rise.
    - Insulation Class: Class 220 deg C continuous insulation.
    - All distribution transformers shall meet the DOE 10 CFR Part 431 (2016) standards for energy efficiency.
    - Windings: Copper or aluminum are acceptable.
    - For transformers 3kva and above: Six 2.5-percent taps, 2 above and 4 below rated high voltage.
  - b. Low-Voltage Transformers
    - Transformers shall meet the NEMA standard ST-20 sound levels.
    - Transformers that serve heavy computer loads shall be K-13 rated with fully rated double neutral secondary.
    - Large (150-300 kVA and above) 480-208Y/120 V transformers shall feed distribution panels. Refer to Panelboard Design Standard.
    - Provide transformer lug kits for each transformer.
    - Dry Type Transformers Accessories: (Required where indicated to be installed by electrical engineer for that particular type of transformer.)
      1. Surge/Lightning Arrestors: Nema Standard, factory installed.
  - c. Medium Voltage Unit Substation Transformers
    - Transformers in substations shall have a sound rating of minimum 6db below NEMA ST-20 standards. If substation transformer is located on a mid-level floor with occupied areas below, the sound rating shall be determined by an acoustical engineer and applicable sound/vibration mitigating solutions shall be applied.
    - Substation Transformers shall feed switchboards. Refer to Service and Distribution Design Standard.

- Accessories: (Required where indicated to be installed by electrical engineer for that particular type of transformer.)
  1. Equipped for forced-air cooling; Class AA/FA 33% Overload Rating with model 98 Temperature Monitor.
  2. Cooling fans.
  3. Fan control box.
  4. Surge Arrestors: Nema Standard, factory installed.
  5. Thermometer with maximum temperature indicator (with contacts).
  6. Basic Impulse Insulation Level (BIL): Minimum 30kV or as required by the Engineer.

3. Related Sections

- a. Service and Distribution
- b. Panelboards
- c. Switchboards

EQUIPMENT and PRODUCT REQUIREMENTS

1. Circuit Breakers

- a. Approved Manufacturers:
  - Square D
  - Eaton Cutler-Hammer

END OF SECTION