medium-voltage transformer vaults or rooms. Connect ionization-type smoke detectors to the building fire alarm system.

G. Provide automatic sprinkler protection system with a discharge density of not less than 0.20 gpm/sq. ft. over floor area of the transformer vaults, rooms, or spaces.

H. Provide mechanical cooling or ventilation powered from a reliable source to maintain transformer vaults or rooms within temperature limits appropriate for transformer operation.

I. Provide power ventilation system from an emergency or standby power source if available.

J. Specify primary overcurrent protection devices to provide through-fault protection of transformer in accordance with IEEE Std 242™.

K. Select distribution-class, gapless-type metal-oxide surge arresters for connection to the primary side of the transformer to provide additional protection against abnormally high voltage transients. Specify the maximum continuous operating voltage (MCOV) of the arrester according to its voltage-class rating. Apply arresters in accordance with IEEE Std C62.22, *IEEE Guide for the Application of Metal-Oxide Surge Arresters for Alternating-Current Systems* or as recommended by the arrester manufacturer.

7.3 Outdoor Oil-Filled Pad Mounted Medium-Voltage Transformers

A. Install oil-filled medium-voltage transformers outdoors only.

B. Provide outdoor, pad-mounted, mineral oil-insulated, self-cooled medium-voltage transformers with integral dead-front loop-feed primary and live-front radial secondary cable terminating compartments. Windings shall be copper; aluminum windings are not acceptable.

C. Transformers shall be designed, constructed, and tested in conformance with IEEE C57.12.22TM, Requirements for Pad-Mounted Compartmental-Type, Self- Cooled, Three-Phase Distribution Transformers (High Voltage, 16340 Volts and Below; 2500 KVA and Smaller).

D. Transformers shall be designed to operate at a 65 ºC average winding temperature rise over a 30 ºC average, 40 ºC maximum ambient temperature.

E. Furnish each transformer with the following accessories:
   1. Oil-immersed, load-break, bayonet fuse-holders with expulsion style fuses.
   2. Oil-submersible protector with current-limiting fuses rated for 50kAIC. Current-limiting fuses shall be placed in series with expulsion style fuses.
   3. Distribution-class, metal-oxide varistor elbow (MOVE) type surge arresters
   4. Two 2-1/2% above and two 2-1/2% below rated-voltage, full-current-rated for

changing under no load. Include externally-mounted handle for tap- changer.

F. Acceptable Manufacturers
1. ABB
2. Cooper
3. Square D
4. GE

G. Installation
1. Design a concrete foundation for the transformer. If required, provide an oil-containment system integral to the foundation in accordance with EPA regulations.
2. Install in accordance with the NEC® and the Factory Mutual Insurance Company Loss Prevention Data Sheet 5-412.

H. Determining Transformer Capacity
1. Use the following loading factors to determine transformer capacity:
   a. Average 24-hour ambient temperature
      i Use the highest historical average (mean) daily temperature recorded at the University campus or at a location nearest the campus for which accurate data are available, such as the nearest airport or city. This data may be obtained from the National Weather Service at http://www.nws.noaa.gov or other source with similar reliable and/or official data. Refer to the appropriate sections in the ANSI/IEEE standards referenced above for further guidance concerning the determination of ambient temperature for use in the selection of the "Peak Load Per Unit" or peak load factor presented in the series of tables in both publications.
      ii According to Weather.com, the highest 24-hour average temperature for College Station, TX (zip code 77843) is 30°C and occurred on August 4 and 5.
   b. Elevation: Determine actual site elevation according to the United States Geological Survey (USGS) 1:25000 topographic map. The USGS website is at http://www.usgs.gov
   c. Rated average winding temperature rise: 65°C per IEEE Standard C57.12.00-2006, Paragraph 5.11.1.1.
   d. Transformers serving facilities having a significant daily load cycle may be operated with the peak load above the transformer nameplate rating as long as normal transformer life expectancy is maintained; refer to the IEEE transformer-loading guides listed above.
2. For single-ended services, the calculated load using the NEC® plus future load growth shall not exceed the calculated transformer self-cooled peak loading capability.
   Example 1 – For building or facility located on a campus in College Station with a significant daily load cycle: 685kVA calculated load per the NEC® plus 137kVA

future load growth of 20% = 822kVA.

3. Select a pad-mounted transformer with a standard base rating equal to or greater than
822kVA /1.68* = 489kVA, or 500kVA, and a 2-hour peak loading capability of approximately 500kVA X 1.68* = 840kVA based on Table 6 in IEEE C57.91-1981
   a. The peak load factor (per unit) assuming an ambient temperature of 30°C.
   b. Base the secondary service conductors on the 822kVA calculated load.
4. For double-ended services, the calculated closed-tie load using the NEC® plus future load growth shall not exceed the calculated forced-air cooled peak loading capability of either transformer.

PART 8 TESTING

8.1 All equipment shall be undergo a full NETA acceptance test. Test values of gear shall come from manufacture of equipment. Exceptions and alterations to test noted in this Standard shall apply.

A. Existing Cable – Where projects receive permission from UES to reuse existing primary cables, cable must be pass a retesting. See UES cable splicing SOP for further details.

B. Existing transformers – Where projects receive permission from UES to reuse existing transformers. Transformer must undergo full NETA test with no exceptions. If transformer is moved, even temporarily. a power factor test shall be perform prior to move and again before being reenergized.

C. Gear with buswork – All gear contain buss work, such as bus duct, switchgear, panelboards, resister and capacitor banks, etc. Shall at minimum have receive a 10% spot check of torque on all bolts of buss work. This is in addition to using the resistive test spelled out in NETA to verify buswork.