



AMBIENT TEMPERATURES

A standard transformer with 220°C insulation and a 150°C temperature rise, will be rated to run full load in an average 30°C ambient environment over 24 hours with a maximum 40°C ambient temperature. Other magnetics may have lower or higher ambient ratings depending on the design and application. Please consult the magnetics specification to determine what the ambient operating temperatures are.

Low Ambient Temperatures

Generally low ambient temperatures do not affect an energized transformer. No-load losses on an energized transformer typically generate enough heat to operate effectively in temperatures to -20°C or lower. The main issue with lower temperatures is when the unit is not energized. Extremely low temperatures or if the transformer heats up too quickly may cause welds and insulation to become brittle and crack, especially if the transformer experiences any mechanical stresses. More importantly, low temperatures can cause moisture (dew, frost) to form on the unit. This can be absorbed into the insulation system and not be apparent. If ambient goes below -30°C, special designs and cold start procedures may be necessary. Care should be taken to store transformers in dry areas with temperature control. Installation manuals typically suggest that transformers be tested once brought above 0°C and/or go through a dry-out process if moisture is suspected to be present. Damage and injury can result from energizing a transformer which has had its insulation system compromised by moisture.

High Ambient Temperatures

Temperatures which exceed the rated ambient temperatures for which the insulation system is designed can cause insulation damage and premature failure. This can often occur in hotter environments or in rooms which have inadequate ventilation. Care should be taken in installing stacked transformers because the top transformer may use air that has been heated by the lower unit. Damage from high ambient temperatures often does not cause an immediate failure but can cause damage that results in a failure weeks, months or years later. High ambient temperatures can be mitigated several ways:

- Order a transformer designed with a lower temperature rise.
- Use fan cooling, this is typically an economical solution when a unit exceeds 500-1500kVA.
- Place the transformer in a temperature controlled location.
- Properly ventilate the location that the transformer is located in.

Never try to use cooling fans directly on a transformer or blow across a transformer's windings. Manufacturers use special fans, specific locations, and cooling patterns to cool transformers. Improper placement of airflow could cause disruption of the convection airflow and cause the transformer to over-heat.