

Transformers POWER

Transforming energy. Adding value.

Tubos Trans Electric has more than 50 years of experience in manufacturing power transformers and autotransformers, whether these work with off circuit or on load tap changer and with any of the cooling systems alternatives known in the industry (ONAN, ONAF, OFAF, ODAF, amongst others). There are several design alternatives for these transformers; they can be manufactured with an oil conservator or with a nitrogen chamber.

Design Alternatives

Step Up Transformers | Necessary to increase voltage in power generation stations to higher levels for transmission. They are a key component of the power system. Although step up transformers are usually provided with off-circuit tap changer, they can also be manufactured with on load tap changer (OLTC). For units of larger power they can be manufactured with single or double primary winding.

Power: up to 300 MVA
Voltage: up to 230 kV
Standards: IEC 60076 / ANSI C57.12.00

Step Down Transformers | Necessary to take the voltage from transmission levels to proper levels for power sub transmission. It is also a common practice to have high energy consumption industries connected directly to the transmission network; in these cases a step down transformer is required.

Power: up to 300 MVA
Voltage: up to 230 kV
Standards: IEC 60076 / ANSI C57.12.00

Furnace Transformers | Commonly used in the steel and metallurgic industry to feed arc or induction furnaces. They are characterized by a high current and a low secondary voltage. The secondary voltage is normally regulated by an on-load tap changer (OLTC) located in the high voltage winding. The robustness in our design enables the right operation of the transformers under the strong electrodynamic stresses to which they are usually exposed to.

Power: up to 75 MVA
Voltage: up to 132 kV
Standards: IEC 60076 / ANSI C57.12.00

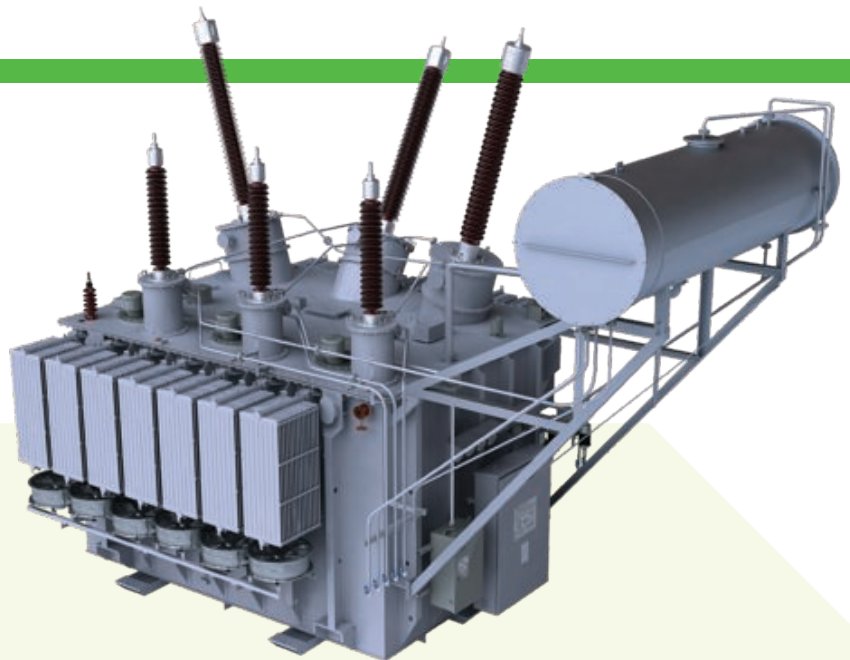
Traction Transformers | Used for the electrification of railway lines, specifically designed to bear important load variations and high harmonic content both in voltage and current, caused by the operation of the railway system.

Power: up to 15 MVA
Voltage: according to IEC 60850
Standards: IEC 60076 / 60850

Customized Transformers | Designed under customer's specific requirements. Examples of such transformers are: transformers to operate in highly contaminated areas; to work in corrosive atmospheres; with high harmonic charges; extreme temperatures; space limitations and / or special connection arrangements.

Power: on demand
Tensión: up to 230 kV
Normas: On demand based on IEC / ANSI





Construction Features

- Cores** Manufactured with high quality, cold-rolled, grain-oriented silicon steel coated with magnesium-silicate-phosphate. TTE's standard core construction is the "core form type" having a three leg core or a five leg core for three phase transformers, and a two leg core or a three leg core for single phase transformers. Magnetic steel is cut with 45° angles to minimize the magnetic flux paths. The step lap lamination technique is used to reduce exciting current, noise level and no load losses.
- Windings** Windings are manufactured using copper conductors manufactured in-house in a special sector dedicated to that end. The process includes the casting and drawing of copper wire, its heat treatment and stripping, where the conductor is covered with several layers of insulation paper known as "kraft paper" characterized by its high dielectric strength and aging resistance. The most optimized conductor is selected after considering the voltage and power of the transformer. When required the continuously transposed conductor (CTC) is used. This is composed of several wires individually covered with enamel and this entire wire unit is covered with several layers of insulation material. The most suitable winding method is employed according to the voltage, nominal current, number of turns, and tap range of each transformer.
- Tap Changer** Used to adjust the transformation ratio maintaining voltage levels in the secondary winding within certain limits. It can be achieved automatically when operated with an on load tap changer or manually by using an off-circuit tap changer. This last is commonly connected on the HV side with the handle located on the cover and should be operated only when the transformer is not energized.
- Insulating Liquid** Mineral oil is used as cooling liquid with its electrical and chemical characteristics according to IEC or ANSI standards. The insulating liquid may also contain antioxidant inhibitors. When necessary other cooling liquids can be used such as vegetable oil or silicon fluids commonly used for transformers installed inside buildings, due to their higher inflammable points in comparison with mineral fluids.
- Tank and Cover** Both are manufactured using steel type SAE 1010. In conventional transformers the cover is bolted to the tank frame and is hermetically sealed by means of a continuous joint made from rubber cords. When specified, the top can be welded to the tank instead; this is generally applied to hermetically sealed transformers. In larger transformers, sometimes the "bell type" tank is used, where the tank is welded to the tank bottom.