



ENGLISH 

OTN, OTR, OTF Transformers

Power transformers for Network, Rectifiers, Furnace



TTR



TTO



OTN, OTR, OTF



REACTORS



TTH

TECHNOLOGY

Design

Our designers' experience combined with the best calculation tools provided by modern technology, enable our Engineering Department to design every type of transformer in details.

By using latest generation of 3D CAD we can study and view the machine way before manufacturing.

We can carry out computerized tests on the finished elements verifying accurately the performance of some electric or structural parts considered as critical (Finite Element Method).

Magnetic core

The core is made of grain oriented magnetic sheets, featuring high permeability and reduced specific losses separated by an inorganic insulation (carlite).

The special cutting and assembly of the core form the "STEP-LAP" joints which reduce the noise as well as the losses and no load current.

Magnetic sheets are pressed by robust core clamps and glass fiber or plastic tape bondings, free from bolts feeding through the magnetic core to reduce further losses and to avoid hot spots.

Suitable axial ducts are provided when necessary in order to obtain a uniform temperature field.

Low and Medium Voltage Windings

The LV winding is generally made of copper or aluminium conductor.

Type, shape and winding strictly depend on the current and voltage involved and are chosen from time to time. The "transposed conductors-cable with epoxy" is generally used for currents up to some thousands of amperes. It combines an excellent mechanic resistance to the reduction of the losses caused by eddy currents.

Higher currents and special applications require copper solid bar which from a mechanic point of view allows extremely strong windings and is able to support repeated short circuit stresses (e.g. furnace transformers or for test rooms).

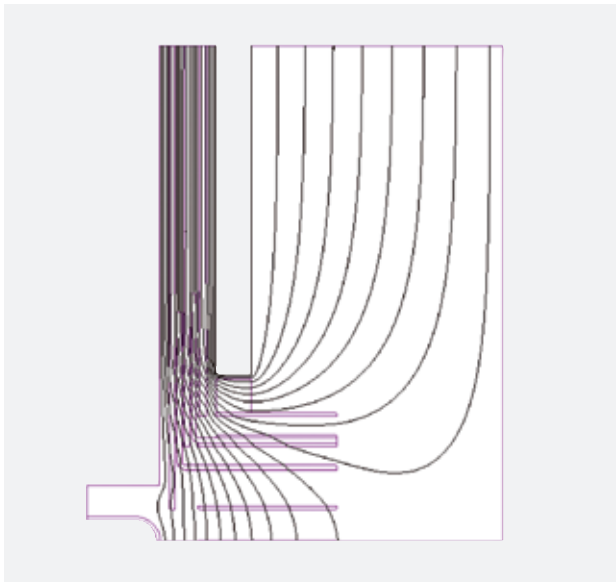
For conversion groups transformers, secondary winding (LV or MV) can be made of two or more independent sections axially or radially positioned one to the other.

HV windings

The HV winding is generally made of copper or aluminium strip insulated with pure cellulose paper. Once again (as for MV and LV windings) there are many types of conductors and windings tested from time to time to identify the most suitable one.

For voltages higher than 72,5 kV class, the interleaved disc is used to optimize the distribution of the steep-front overvoltages.

Voltage distribution



Electric Field Strength



Tapping

Tapping and corresponding windings for power and special transformers should be carried out with competence and care since it affects the main final characteristics of the transformer.

In detail:

- Distribution of the dielectric stresses
- Losses

- Heating
- Performance in case of short circuit

OTN, OTR and OTF transformers have been designed with SEA's experience and based a wide range of tests.

For special applications, generally dedicated to furnace or AC/DC converters, the adjustment may be obtained through an additional transformer (or an autotransformer) in the same tank.



No Load Tap Changer and On Load Tap Changer

Based on the customer's needs, transformers with different types of tap changer are available:

No load:

- No-load, with local control
Transformer shall be de-energized.
It's the most simple and cheap type. Control is obtained through a wheel situated on the transformer lid or on the wall of the tank at man height.
- No-load, with motor drive
Same as above, but also remotely controllable because the tap-changer shaft is connected to a motor drive unit.
- No-load, but under voltage, with motor drive
Used when the tap-changer operates directly on Low Voltage winding. It is a very special application which has to be analyzed from time to time together with our Engineering Department.

On Load:

It's the most complete version and allows adapting of transformer's nominal voltage to the actual voltage of the network within a prefixed field of supply without causing disturbances to the load.
Always supplied with a motor drive unit to enable manoeuvrability from the control room, manually or, more and more frequently, automatically through special voltage regulators.

Assembly of the active part

The final assembly is carried out carefully and accurately. The insulation materials are subject to great dimensional variations based on the tolerances and humidity quantities present in their fibers.

We can guarantee the reliability and sturdiness of our product versus the inevitable electric and electrodynamic stresses occurring within the network, thanks to our experience and great care that we put in assembling the active part.

Windings carefully pressed and dried in autoclave are mounted on the corresponding leg of the core, then we proceed with yoke assembly, lid locking, electrical connections and a new cycle of thermal treatments.

Before inserting them into the tank, all transformers are checked to test connection, turn ratio and vectorial group correctness.

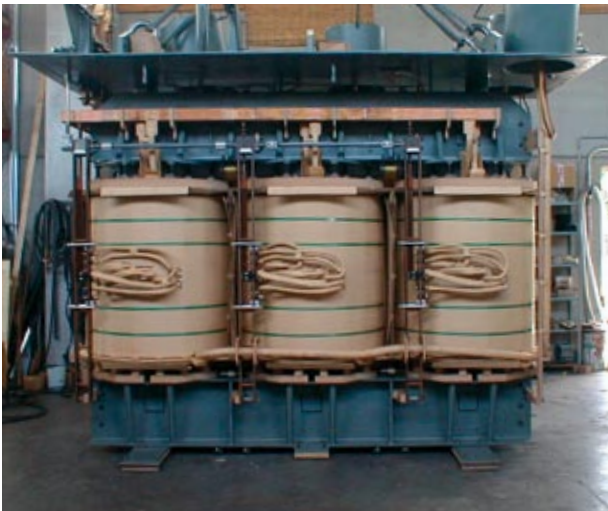
In special cases or on customer's request, we can carry out further tests and measurements on the active part, e.g. record with recurrent low voltage impulses and measurement of the tg- δ of insulation.

Final assembly

After an accurate drying cycle (with verification of the residue humidity) and a final control of the fixing torques, the entire active part is assembled inside the body and then filled with oil under vacuum.

After filling, all accessories provided for by the customer's specification are installed on transformer.





TESTING

All transformers are tested at our test room with routine tests, type tests and/or special tests based on the customer's instructions. The customer or the person in charge may witness the transformer testing.

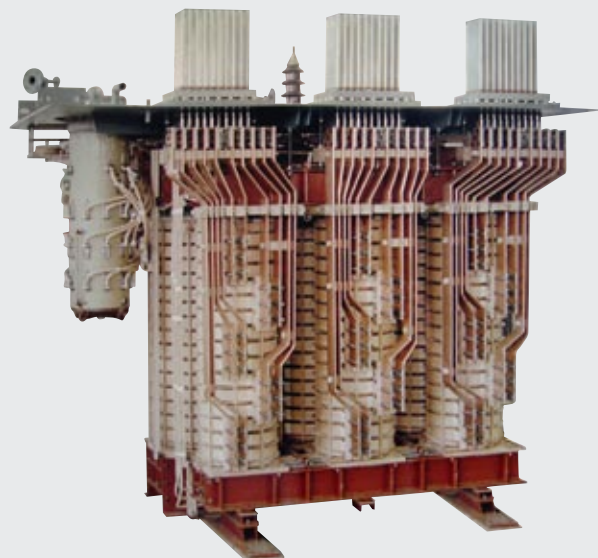
In addition to regular tests, at our plants we can carry out the following tests:

- Heat run test (also on transformers with water forced cooling)
- Impulse withstand test with full and chopped wave, thanks to the avant-garde 1000 kV installation
- Measurement of noise level
- Measurement of harmonic contents of the no load current
- Measurement of homopolar impedance
- Measurement of winding capacitance
- Measurement of oil dielectric strength and complete analysis of dissolved gases, also with samples repeated during heating test
- Measurement of transferred overvoltages
- Low voltage surge test
- Vacuum and overpressure test on tank and accessories
- Dynamic short circuit withstand test (in external laboratories)
- Other special test to be agreed with the customer

Archive of type tests

SEA has a large archive of type and special tests carried out on many power transformers delivered to customers worldwide.

The archive is available at all times for our customers to consult.



GENERAL FEATURES

It is wellknown that the transformer has to be adapted to the installation requirements in large industrial applications, not vice-versa.

The electric parameters, and often dimensions as well, should be defined to respect various restrictions. SEA complies with such needs with the OTN, OTR and OTF oil transformers and thanks to its Engineering Department equipped with avant-garde design tools and a life long production experience it

supplies the customer a machine fit for its needs.

STANDARDS REFERENCE AND SPECIFICATIONS

The SEA OTN, OTR and OTF transformers comply with Customer's requests and specifications as well as with international Standards provided for them.

Please contact our engineering or commercial departments for further information



RANGE

SEA's production capability covers most of medium-high voltage installations and industrial applications. Some examples:

- HV/MV Distribution transformers OTN type
Rated power from 5 up to 75 MVA and voltages up to 170 kV
- AC/DC rectifier transformers OTR type
Nominal power up to 40 MVA and voltages up to 132 kV,

LV double secondary, regulation of voltage by variable flux, by booster or by autotransformer. Transformers with phase shifters, interphasic reactors etc. available on request.

- Furnace transformers OTF type
Rated power up to 25 MVA, regulation of voltage by variable flux, by booster or by autotransformer.
LV outlet by pipes or copper plates.



TRANSPORTATION AND ASSEMBLY ON SITE

SEA can deliver the transformer "turn key" worldwide.

Thanks to an experience in the shipment sector gained in more than 30 years and to a highly qualified staff, we ship and reassemble on site agreeing with customer the most suitable shipment arrangement.

For shipments made to critical sites or on customer's request, we can install on board of our transformers a sophisticated impact recorder which enables us to monitor the quality of transportation.

CUSTOMER SERVICE

SEA SpA provides a highly qualified Customer Service to contact for any problem or need emerging during assembly or maintenance of the OTN, OTR and OTF transformers.

Telephone assistance

Contact our offices (mon-fri 09,00 a.m. ÷ 5,30 p.m.) at +39 0444 482100 or Email: info@seatrasformatori.it

On-site assistance

In case of problems and positive site conditions and if the type of problem allows it, one of our engineers will be sent to carry out repairs or supervision on-site so as to minimize the inactivity times of the installation.

