



Dry-type transformers

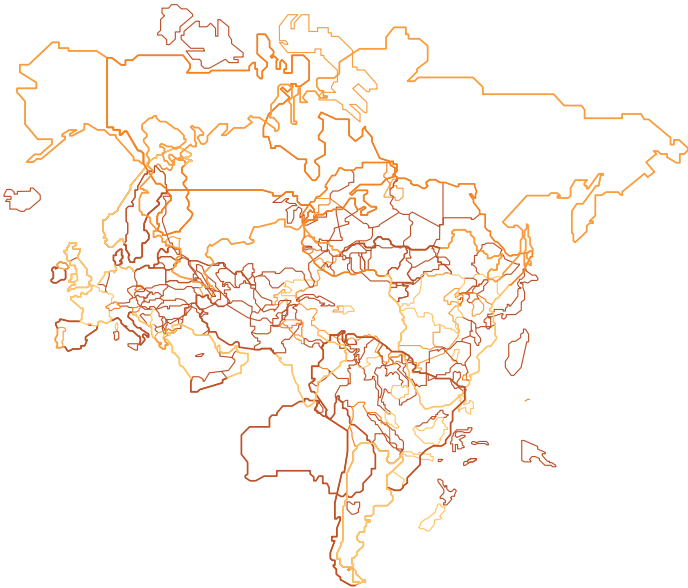
# Cast coil dry-type transformers

## Reliability at your hand

Power and productivity  
for a better world™



# ABB worldwide



In almost every place where people live and work you will find at least one transformer. But as long as it keeps working and supplying power to the escalator in the department store, the hotel lift, the office computer, the oven in the local bakery or the petrochemical plant, no one gives it a second thought. ABB is a global leader in power and automation technologies enabling utility and industry customers from around the world to improve performance while lowering environmental impact. As one of the world's leading engineering companies, ABB helps its customers to use electrical power effectively and to increase industrial productivity in a sustainable way.

## Why choose dry-type: safe and environmental friendly transformers

- Reduced environmental contamination
- Zero risk of leakage of flammable or contaminating substances
- Environmentally friendly production
- Well suited to dump and contaminated areas
- Non flammable and self-extinguishing
- High resistance to short circuits
- High capacity to support overloads
- High performance in dealing with seismic phenomenon
- Capable of withstanding the most severe rolling and vibrating conditions

## Latest developments: expanding the portfolio

HiDry<sup>72</sup>, able to reach 63 MVA and operating voltages up to 72.5 kV. This product offers savings on: civil works, fire systems, insurance fees, site installation, shorter cables, maintenance.

ABB hi-T Plus transformer is a superior product with upgraded thermal insulation level (class H: 180 °C). Giving you the benefits of an increased insulation lifetime and overloading capability which allows for a more optimised design.

EcoDry: the new ultra efficient dry-type transformers designed with reduced losses and superior efficiency, for customers evaluating environmental impact and total operational costs.

All these transformers can be designed, customised and supplied with a wide variety of accessories as required.



# Reliable solutions for all applications

A large variety of applications demand technologies which contribute to high safety performance, cost savings and environmental respect.

ABB has expertise in producing transformers for optimum space utilization, special requirements and the most demanding conditions.

ABB is the global leader in power technologies, providing the broadest experience in all applications, ranges and customized projects:

- Wind
- Solar
- Marine
- Railways
- Drives
- Power plants
- Utilities
- Buildings
- Chemical and pharmaceutical
- Metal and mining
- Pulp and paper
- Oil and gas
- Cement
- Water
- Industry
- Infrastructure
- Nuclear



# Our technology: what makes us different?

**ABB uses the most advanced production technologies and the most demanding control systems to guarantee the highest product quality and total product reliability.**

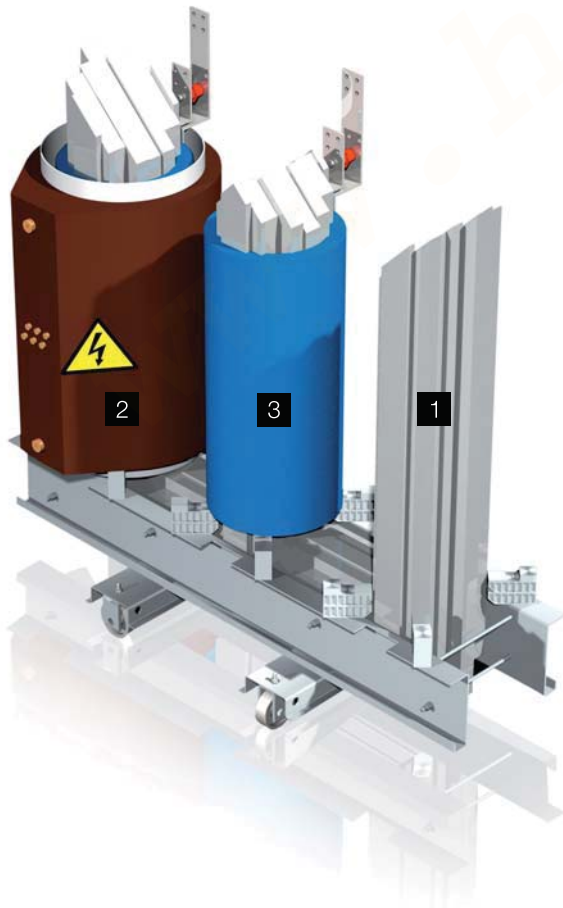
1) The magnetic core has a miter step joint to ensure optimum performance and minimum sound levels by using step lap technology. The magnetic steel is cut to length sequentially and automatically stacked. This ensures dimensional accuracy and single sheet interlacing within the full stack.

2) The high voltage winding has a continuous drop down disc with a strip conductor (aluminum or copper) and double layer insulation. Windings are cast under vacuum with epoxy resin. Transient analysis tests have been performed to verify the electrical stress distribution through the windings confirming the highest strength in our design.

3) The low voltage windings are made of conductor foil (aluminum or copper), and insulating foil pre-impregnated with epoxy resin. After the winding process the coil is cured into an oven resulting in an extremely compact winding which can withstand the dynamic stresses produced by a short-circuit.

The encapsulation process is a key stage within the manufacturing process. Encapsulation is carried out under the most rigorous conditions in order to ensure optimum insulating and mechanical characteristics. The resin mix is prepared in a continuously monitored mixing plant where all the components are mixed together just before the encapsulation process. Inside the vacuum casting chamber, the resin is introduced into the mould. The components are mixed together just before the encapsulation process, this ensures that the viscosity of the resin when poured in the moulds is very low, filling interstices and allowing the finished winding to reach the lowest level of partial discharge. Once the casting is finished the coils are placed into the curing oven for the resin gel to cure, and acquire the optimal final electrical and mechanical properties.

In ABB transformer factories the whole tendering, design and production process is controlled and planned with sophisticated software. This ensures the highest productivity and reduced production time while maintaining the highest quality standards.



**Metallic enclosure available**



# Our values

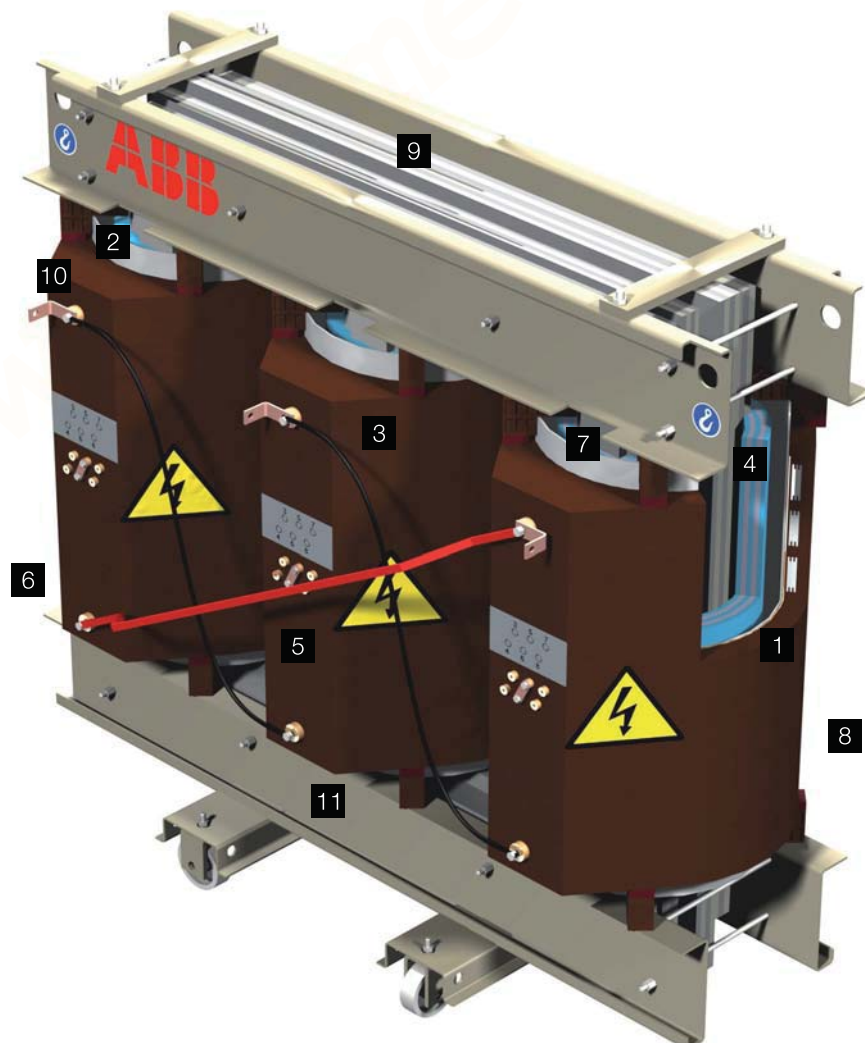
All this process is certified under the strictest quality standards.

## Design

- Guarantee of accurate temperature rise in windings; in case of enclosure IP/NEMA there is no de-rating
- Low working temperatures down to -25 °C
- Possibility to include any kind of accessories
- Insulation class F, H (option)

## Technology

- 1) Aluminum or copper foil disk in high voltage winding
- 2) Aluminum or copper foil full width in low voltage winding
- 3) Casting under vacuum
- 4) Low partial discharge values <10 pC
- 5) Smooth surface
- 6) Self extinguishing
- 7) Dust resistance thanks to sealed coils (option)
- 8) Silicon free (option)
- 9) Low induction level and step lap configuration granting lower noise level
- 10) High impulse voltage withstand
- 11) High short circuit withstand (radial and axial)



# Customized solutions

## Design options

- Reduced loss transformers
- Copper windings
- Low voltage transformers
- Class H transformers
- Reduced temperature rise
- Multiple primary voltage
- Multiple secondary windings
- Multi winding transformers (two, three, four or five on the same core)
- Encapsulated low voltage windings
- Sealed or casted low voltage winding
- Impregnated high voltage windings
- Different location of high and low voltage connection terminals: top and bottom, both on the same side
- Special connection groups
- Autotransformer
- Variable speed drives (VSD), rectifiers and excitation
- transformers for six, 12, 18 and 24 pulses
- Different coupling factors from 0.15 up to 0.9
- Earthing transformers
- Seismic and vibration reinforcement system
- Outdoor operation

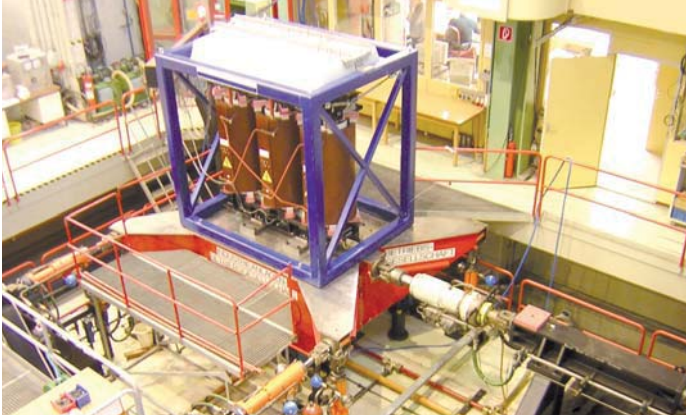
## Accessories

- Temperature monitor
- Antivibration pads
- Space heaters
- Electrostatic screen (copper)
- Current transformers on primary and secondary windings
- Plug in bushings
- High voltage earthing switch
- Surge arrestors (for high and low voltage)
- Cooling fans with up to 50 percent power increase
- On load tap changers (OLTC)
- Flexible terminals
- Connection box
- Bidirectional wheels
- Different IP/NEMA enclosures with cable or bus-duct connection
- Earthing bullets
- Lifting and pulling lugs
- Voltage detectors
- Voltage automatic regulator (VAR)
- Special packings
- Hydrocoolers
- Cable boxes
- Skids



# Testing and logistics

According to the relative IEC, EN and/or IEEE/ANSI standards and GOST (\*)



All transformers are manufactured to the most stringent quality control standards in order to guarantee the full reliability of the product.

## Routine test

All transformers are 100 percent routine tested:

- Voltage ratio measurement and check of phase displacement
- Separate source voltage-withstand test
- Induced over voltage withstand test
- Partial discharge measurements
- No load loss and current measurement
- Measurements of windings resistances
- Load loss and short circuit impedance measurements

## Type tests

Performed upon customer requirements:

- Temperature rise test
- Lightning impulse test
- Noise level test

## Special tests

Also performed according to customer request:

- Measuring zero-sequence impedance
- Measuring insulation resistance
- Measuring of harmonics of the no-load current
- Measuring of the parallel capacity of windings and tag  $\partial$
- Anti-corrosion protection checking
- Short circuit test

Additionally, our transformers have the following certificates:

- The class F1 “Fire behavior” certificate
- The class C1 and C2 “Climatic” certificate
- The class E2 “Condensation and humidity” certificate
- “Qualified to perform in the most severe environmental conditions”

ABB has one certified test laboratory according to the standard UNE-EN-ISO/IEC 17025:2000. This accreditation gives the authority to the certified company to act as an independent official laboratory to test and issue the corresponding test reports as an independent third party.

## Logistic and service

Once the transformer is successfully tested; the product is ready for shipping either by truck or sea-freight.

As a manufacturer, ABB understands the relevance that logistics represents to our customers; this is one of the reasons why ABB has developed a large and qualified network of suppliers that have the same values and targets.

ABB takes care of all official documentation, depending on final destinations and delivery terms.

## Different packaging for special applications or conditions

- Standard packing
- Crate packing
- Seaworthy packing

With a global factory footprint ABB can produce close to your installation site. ABB also has a long experience in arranging special transport as an when it is required.

In addition, ABB’s global presence ensures the best, local, after-sales service.

Working with us, you have access to a worldwide network of factories and facilities, serving you locally with a full range of products and solutions. Our warranty provides “One Simple ABB” quality and service. Working together gives you access to production facilities using the most up to date technologies, providing the highest quality for standard and specially products and solutions.

(\*) IEC: International Electrotechnical Commission.

EN: European Standards, harmonizes all relevant European Standards NF, BS, VDE, DIN, CEI, UNE.

## Contact us

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