Distribution transformers
Efficiency throughout life-cycle
ABB is a leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact.

The ABB Group of companies operates in around 100 countries and employs about 145,000 people.

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. 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.

Distribution transformers and grid losses

With their widespread application and continuously energized state, distribution transformer losses make up for a considerable portion of the total losses incurred in distribution systems.

Even a minor increase in transformer efficiency would lead to significant energy savings.

Two types of transformer losses are commonly evaluated for loss reduction: core or no-load losses and coil or load losses.

Transformer no-load losses can be reduced by using superior grade magnetic core steel materials or optimizing their geometries. However, this may increase load losses and vice versa.

Transformer loss reduction is therefore an optimization process involving physical, technological, and economical factors tempered by life-cycle performance analysis.

ABB transformers are designed to maximize efficiency after evaluating initial cost of transformer and life-cycle costs including losses.
ABB - the largest single manufacturer of distribution transformers

Across the world, ABB transformers provide over five decades of faultless service in solutions for urban, industrial and rural applications. In 23 facilities spread across the world, ABB manufactures oil type distribution transformers for indoor applications, outdoor applications, application in the wind and solar segment and BioTemp™ filled transformers for special applications.

Oil-filled, pole and plinth mounted distribution transformers

10 kVA, 6.35 kV/240 V, 1 phase distribution transformer
- Completely self-protected with HV expulsion fuse, LV MCCB and surge arrester
- Hermetically sealed
- Powder coating polyurethane liquid paint on tank

63 kVA, 11 kV/433 V, 3 phase distribution transformer
- Tank cover mounted core coil assembly
- Top mounted HV and LV bushings
- Conservator and pressed steel radiators
- Low loss and low temperature rise design
- Polyurethane liquid paint on tank and radiators
- With CSP devices

630 kVA, 11 kV/433 V, 3 phase distribution transformer
- Breather, Buchholz relay
- Pressed steel radiators
- Polyurethane liquid paint on tank and radiators

2,500 kVA, 33 kV/433 V, 3 phase distribution transformer
- Foil type LV winding
- Tap switch on HV side
- Breather, Buchholz relay
- Pressed steel radiators
- Polyurethane liquid paint on tank and radiators

Applicable standards: IS 1180 / IS 2026 / IEC 60076 / ANSI C57.12.20 or customer specific standards
Single phase round tank: 5, 10, 15 / 16, 25, 75 kVA pole mounted
Three phase rectangular tank: 10 to 2,500 kVA Pole / plinth mounted with tap changers

ABB distribution transformers

Ensure performance reliability
- Automated, state-of-the-art manufacturing processes with wound core design
- Short circuit proof - use of epoxy dotted paper and curing of coils in a special press
- Long life - special process of oil-filling under vacuum ensures void free core coil assembly
- Leak proof - 100 percent transformers tested for oil leakage test

Ensure performance efficiency with minimal losses
- Use of best-in-class materials - core made from prime grade imported CRGO
- Advanced technology - wound core design with single coil windings and step lap core construction
- Low magnetizing current
- Low no-load and load losses
- Low noise levels
State-of-the-art manufacturing facilities and processes

The ABB Savli facility for distribution transformers provides a clean and dust-free environment with ideal humidity and ventilation levels and standards and processes common to ABB facilities worldwide.

Transformer design
The transformers are designed on specialized software for:
- Cost optimization over lifetime, based on material cost and loss capitalization as specified by customers
- Verification of design for rated short circuit and impulse withstand strength carried out by design software

ABB’s technology lead centers at Poland and Vadodara are available to work for specific transformers requirements depending on customer needs.

Core design
The core for shell type transformers are manufactured using wound core design, while for the core type transformers the lamination stacking is done. The result is minimal core losses, low noise levels and increased automation in manufacturing processes.

Microprocessor controlled processes
The processes of wrapping, annealing, winding and pressing of the core are controlled by microprocessor controlled units, ensuring automation and accuracy in process and quick trouble shooting.
To eliminate induced stresses, the process of annealing is conducted in an inert atmosphere.

Windings and insulation
The windings are made of copper or aluminum and these are manufactured to withstand short circuit forces. State-of-the-art precision equipment is used for accurate dimension control and tightness. The winding coils are processed in a special purpose press developed by ABB, to cure the resin on the insulation paper for imparting high short circuit strength.

Core and coil assembly
Use of unique designs and special insulating materials make ABB distribution transformers reliable, efficient and compact.
The complete core coil assembly is dried in an oven to remove the moisture from insulation.

Transformer tank
Tanks are constructed from mild steel. Welded joints are tested for air pressure, ensuring leak-proof tank joints. Rollers can be provided and these are suitable for either longitudinal or transverse movement.

Accurate process control
The processes of wrapping, annealing, winding and pressing of the core are controlled by microprocessor controlled units, ensuring automation and accuracy in process and quick trouble shooting.

To eliminate induced stresses, the process of annealing is conducted in an inert atmosphere.

Tanks are filled with mineral oil in the vacuum chamber ensuring excellent dielectric properties. The oil filling system is controlled by programmable logic controllers for accurate process control. The electrical and chemical properties of mineral oil are checked for compliance with IS/IEC standards.
Technical data

Standard features
- Single-phase transformers - hermetically sealed oil filled transformers
- Three-phase transformers - hermetically sealed type or provided with conservator and breather
- High and low voltage bushings in accordance with IS 3347 standards / as per customer’s requirements
- Lifting lugs
- Earthing terminals
- Rating and terminal marking plate
- Air release plug
- Oil level indicator
- Filter valve

Options and accessories
- Completely self protected with expulsion fuse, LV breaker and surge arrestors
- Thermometer pocket
- Oil filling pipe and drain valve
- Conservators
- Oil level indicator
- Tap changer (on-load and off-load)
- Arcing horns
- Pressure release device
- Terminal connectors
- Cable boxes / bus ducts / disconnecting chambers
- Integrated pole mounting brackets / base channels on tank
- Skid base with rollers

ABB also offers customized transformers based on required dimensions and technical specifications.
- Dial type thermometer
- OTI and WTI
- MOG for oil level indication
- Marshalling box
- Buchholz relay
Testing

The transformers are individually tested in accordance with IS/IEC standards and routine tests include:

- Measurement of voltage ratio and check of vector group
- Measurement of winding resistance
- Measurement of insulation resistance
- Power frequency over voltage test and Induced over voltage test
- Measurement of impedance voltage and load losses
- Measurement of no load losses and no load current
- Type tests and special tests can be carried out on request
- ABB distribution transformers are practically leak proof. 100 percent transformers are pressure tested with advanced and fully automated set up
- Over 40 designs successfully type tested at NABL accredited laboratory
Quality and environment-friendly systems

All aspects of product quality are ensured by integrated quality systems in the manufacturing process. Environment friendly processes are followed to ensure minimum footprint. The manufacturing facilities are certified for ISO 9001-Quality Systems. Our aim is to deliver your distribution transformers fast, on time and conform to your specifications.

Choosing the right transformer

- Transformer size is determined by kVA of the load.
- Load voltage or secondary voltage is the voltage needed to operate the load.
- Line voltage or primary voltage is the voltage from the source.
- Single-phase has two lines of AC power.
- Three-phase has three lines of AC power, each line 120 degree out of phase with the other two.
- kVA is kilo voltage ampere.

To determine the size of transformer you need to use the following formulae:

Single-phase transformers
Volts x Amps = _____kVA

Three-phase transformers
Volts x Amps x 1.732 = _____kVA

The kVA of the transformer should be equal to or greater than the kVA of the load to handle present requirements and to account for future expansion.