

Power transformers

Shell transformers

Securing continuous supply through
innovation and experience

Shell transformers

Outstanding performance in high rating applications



Meeting the needs of the world's most demanding utilities

ABB shell transformers combine innovative design and manufacturing, extensive experience and a top qualified team to ensure high reliability, secure continuous power supply and reduced total cost of ownership.

Operating in the most demanding applications

ABB shell transformers offer excellent performance in the most demanding applications and in the harshest operating conditions. They are deployed at critical nodes in high voltage transmission networks and in all types of generating stations, including nuclear power plants with the strictest quality and reliability requirements.

Attending to the needs of users

ABB has more than 50 years of experience in dealing with very large shell transformers. Our highly qualified team meets all technical requirements and delivers state of the art transformers. Close cooperation with users and customers is key to delivering truly customized transformers adapted to their operative needs and particular requirements.

High efficiency and low losses

ABB shell transformers are renowned for their high thermal, dielectric and mechanical performance. They are characterized by high efficiency, low losses and controlled hot spot temperatures, ensuring long service life and low total cost of ownership. Advanced calculation tools ensure proper validation and control of leakage flux and hot spots.

Compact dimensions

In high rating applications, when transformers in general get close to design and transportation limits, ABB shell transformers offer additional performance and higher safety margins due to their compact and flexible design. Large and heavy transformers can be better optimized for capacity, losses, impedance and mechanical robustness. Their smaller footprint and lower amount of oil reduce the necessary installation space while simplifying engineering work.

Short circuit reliability and easy transportation

Due to their robust mechanical design and high mechanical safety margins, ABB shell transformers are built to withstand short circuits as well as high transport accelerations. Combined with their compact dimensions, this also makes them easy to transport safely. Our three phase units can be transported with a shipping cover and large single phase units transported horizontally to reduce the shipping height profile.

ABB shell transformers – your quality assurance

Shell transformers complement the extensive portfolio of ABB power transformers, drawing on ABB's vast experience and understanding of power transformers. Integrated in the global ABB power transformer network, our shell transformers benefit from synergies such as transformer physics and basic research and development, general design, components, manufacturing and quality processes, logistics and services. Modern and efficient manufacturing processes provide the highest level of quality.

Validated performance in every detail

Advanced design, a detailed calculation and verification process, and an extensive final design review allow ABB to deliver proven, yet highly innovative shell transformers with outstanding engineering value.

Compact dimensions and mechanical robustness

ABB shell transformers feature advanced and proven design, building on front-edge engineering skills, advanced calculation tools and modern manufacturing processes. Their compact dimensions and mechanical robustness are the result of their ingenious design with a reinforced form fit tank enclosing the active part made of rectangular windings surrounded by the core.

High level of operational safety

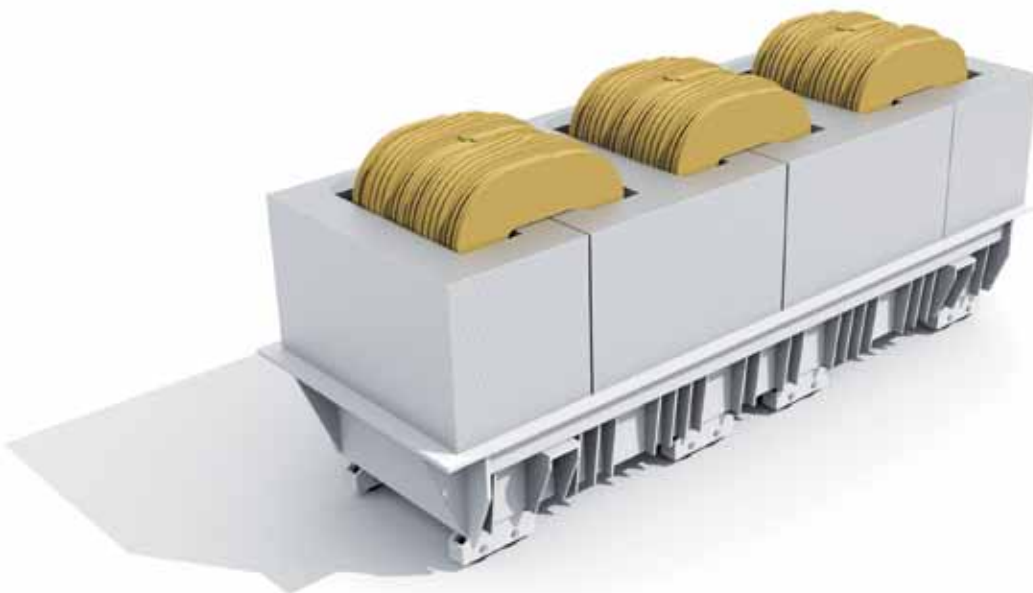
Customers enjoy a high level of safety in all dielectric, mechanical, thermal and magnetic aspects. ABB shell transformers have a strong insulation structure and a naturally smooth transient voltage distribution. Their mechanical robustness enables high safety factors for short circuit performance and transport acceleration. All service and testing conditions are verified using analytical and finite elements methods to guarantee a secure dielectric design.

Long lifetime due to excellent thermal performance

The outstanding thermal performance is the result of three main factors. The directed oil flow cooling of multiple windings with large flat surfaces, a carefully optimized design that minimizes winding losses and advanced calculations in order to control the hot spot temperatures. This validated thermal performance contributes strongly to the long lifetime and high reliability of ABB shell transformers.

Eliminating the risk of hot spots

Leakage flux is examined using 3D magnetic field calculations. This way, ABB is able to properly arrange and dimension stray flux shielding, thus eliminating the risk of hot spots occurring in the core, tank or other metallic parts – while reducing overall losses.



The active part of a three phase transformer with its rectangular windings surrounded by the core, which is enclosed within a reinforced form fit tank, offers inherent mechanical robustness and compact dimensions.



1. 400 kV, 500 MVA single phase generator transformer in operation in a Nuclear power plant | 2. Three phase 550 MVA generator transformer in a combined cycle power plant | 3. 400 kV, 570 MVA single phase generator transformer ready for installation in a Nuclear power plant | 4. 600 MVA bank of 400 kV single phase autotransformers at the substation | 5. 1120 MVA bank of 500 MVA autotransformers at the substation | 6. 800 MVA three phase 345 kV autotransformer during factory testing | 7. Multivoltage polytransformer at the substation | 8. Fast deployable 400 kV mobile transformers in operation | 9. Phase shifter 750 MVA, 230 kV, $\pm 30^\circ$ during factory testing

Power plants

ABB shell transformers are used in nuclear power plants worldwide, meeting the most demanding requirements of the largest nuclear utilities. They also operate in conventional, combined cycle and hydro power plants.

Substations

ABB shell transformers offer excellent performance and service in substations for high voltage transmission, either as three phase units or single phase banks of autotransformers, in all type of environments including the most demanding ambient temperature conditions.

Contingency planning

ABB offers a full range of solutions to address transformer contingencies for both generation and transmission. These include multifunctional units such as polytransformers, universal generator transformers and mobile transformers. The fast deployable mobile transformers for high voltage transmission react rapidly to reduce the response time during contingencies of 345, 400 or 550 kV transformers.

Replacement and upgrading of existing units

When it comes to replacing or upgrading existing transformers, the compact and flexible design of ABB shell transformers helps to match existing characteristics and dimensions. A new optimized design shell transformer can increase efficiency through reduced losses or power upgrades, while maintaining the same mechanical arrangement.

A complete range of shell transformers

ABB has delivered several hundreds of shell transformers to some of the world's largest projects. Our shell transformers are renowned for their robustness and compact design based on proven technology.



Generator step-up transformers

Unit ratings	up to 1300 MVA 3ph, 750 MVA 1ph
System voltages	up to 765 kV

Example of customer delivery, North America

Unit ratings	1100 MVA, 3ph
System voltages	345 kV

Example of customer delivery, Europe

Unit ratings	570 MVA, 1ph
System voltages	400 kV



Autotransformers

Unit ratings	up to 1000 MVA 3ph, 650 MVA 1ph
System voltages	up to 765 kV

Example of customer delivery, North America

Unit ratings	800 MVA, 3ph
System voltages	345 kV

Example of customer delivery, North America

Unit ratings	500 MVA, 1ph
System voltages	550 kV



HV mobile transformers

Mobile concept for 345, 400 and 550kV systems.

Example of customer delivery, Europe

Unit ratings	117 MVA, 1ph
System voltages	400 kV



Polytransformers

Multivoltage autotransformers. Multifunctional and system spares.

Example of customer delivery, Europe

Unit ratings	500 MVA, 3ph
System voltages	400 – 230 – 132 – 110 – 107 kV



Universal generator transformers

Multifunctional generator transformer for several power plants.

Example of customer delivery, North America

Unit ratings	800 MVA, 3ph
System voltages	145 kV
Multigenerator	20 – 22 – 24 kV

Full support from transport to training

ABB transformer services ensure that your shell transformers operate at optimal performance throughout their lifetime. Our services range from transportation and basic maintenance to advanced diagnostic assessments and onsite repairs.



Service

Each ABB power transformer comes with a technical guarantee and full backup, including field support and global after-sales services delivered by local branch offices, agencies and representatives throughout the world. Diagnostic assessment, onsite repairs, upgrades and spare parts deliveries for all types of existing shell transformers are available worldwide.

Transportation

Reliable transportation is key to successful power transformer installation. Moving an object the size and weight of a large transformer requires planning, know-how and a global network of contacts. ABB has long experience in delivering transformers by rail, road and sea worldwide. Our skilled staff will ensure a fast and efficient transport process.

Installation

ABB engineers will be on site to supervise installation and startup. They will prepare the transformer by reassembling all parts dismantled for transit, refill it with oil and run the necessary tests to ensure trouble-free operation. Users can choose between a supervisory or full-installation agreement.

Training

The user's local operations and service personnel will be trained during installation and commissioning on site. Comprehensive training programs are available – contact your local ABB representative for more information.

Contact us

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