

Power Transformers in Thailand
Built for reliability and efficiency

ABB's Vision

As one of the world's leading engineering companies, we help our customers to use electrical power efficiently, to increase industrial productivity and to lower environmental impact in a sustainable way.

ABB global

ABB is a global leader in power and automation technologies that enable utility and industry customers to improve performance while lowering environmental impact. The ABB Group operates in more than 100 countries.

As one of the world's leading engineering companies, we help our customers to use electrical power efficiently, to increase industrial productivity and to lower environmental impact in a sustainable way.

As a business-to-business supplier ABB knows that value creation grows out of close relationships with customers. That means the better we know our customer's business challenges, the better we can serve them. We strengthen our relationships by building trust as a socially responsible supplier of environmentally around products and services.



ABB advantages

- 120 years of technology and innovation
- Unparalleled domain competence
- Vast global experience
- Total solution provider
- Large installed base
- Environment friendly technologies.



Energy efficiency in transformers



ABB in Thailand

ABB has a long history of continuing association with the development of Thailand's utility and industry sectors development of more than 90 years since the first motor delivery to Siam Cement in 1913.

The firm's logo of the three letters ABB in red has always symbolized the highest quality, precision and the most advanced technology. The company has been present in Thailand for many years. It is not only synonymous with reliable equipment, but a firm that is friendly to both people and the environment.

Over these years we have become a part of the Thai economy, employing more than one thousand people forming a power and automation family. We have a large share of the market in products and services. We run a responsible business, ensuring safety and good working conditions, respecting professional ethics and never forgetting that achieving business goals cannot override the values of the natural environment around us.

ABB power transformers worldwide Customized solutions by dedicated people in focused factories



ABB power transformers group

ABB Transformer Group is the world's largest producer of transformers, with manufacturing facilities throughout the world. Producing a huge range of transformers from standard to special designs to suit various standard and various customer specifications

ABB's power transformers are key components in power networks. Their availability and longevity have a major impact on grid reliability and profitability. We do not compromise on quality. We ensure that every one of our power transformer delivered units has undergone rigorous full-acceptance testing.

Why ABB power transformer?

- Pioneering technology, ABB has best short circuit record in the industry.
- Industry leading, ABB has a good record of Mean Time Between Failure Rates (MTBF).
- We are able to offer a complete customer service package (from quotation to energization).

Undisputed global leader

ABB is the world's largest power transformer manufacturer with 1,000+ units delivered annually from 12 factories worldwide. ABB has more than 4,500 employees and references from more than 100 countries. We have the capacity to rapidly deliver customized power transformers, regardless of specification or international standard. Our global service support network delivers truly professional, local, 24/7 support to almost every corner of the earth.

Safe delivery

Customers can rely on ABB's consistent, high quality products. This is the result of our TrafoStar™ platform, a common design and manufacturing platform that is today implemented in all of our 12 power transformer plants worldwide. ABB has delivered more than 14,500 power transformers (over 17,000,000 MVA) based on TrafoStar™, including over twenty 800 kV UHVDC units and over five hundred 735–765 kV AC units to all major global markets.

ABB power transformer in Thailand

ABB power transformer factory in Thailand was established in 1990, 26 years experienced. We are using TrafoStar™ technology and focusing on medium power transformer.

Our facility and capability covers a diverse range of power transformer which are in range of 66 kV up to 275 kV and the rating power up to 300 MVA with an annual output of 10,000 MVA. We offer and comply IEC, ANSI/IEEE, BS, AS, NZ, and other international standards across the allocated markets both Thailand and Oversea.

Today, we employ 160 people throughout the factory in Thailand, firmly committed to supporting and assisting our customer. This is re-enforced through many training programs and customer focus activities to improve our responsiveness to the requirements of a rapidly changing market.

The management system implemented in the factory is also world-class and fully complies with ABB global standards. To date, the ABB power transformer factory in Thailand has successfully participated in the construction of many critical projects both Thailand and Oversea markets.

Currently ABB power transformer factory in Thailand has supplied more than 1,000 units from 1990 till 2016 for more than 24 countries across the world.



>1000 Power Transformers supplied by ABB Thailand to 24 countries across the globe



Engineering

Electrical design

The design rules are based on the combined knowledge gained from the extensive R&D work performed by the ABB Group companies over many years. Continuous trials and experiments verify the transformers short-circuit strength. They also result in extensive design rules and acceptance criteria to evaluate the stresses each winding design can sustain.

Core design

The core design is a direct result of each customer's evaluation of factors such as losses, noise and weight. For demanding applications, only top quality steel is used. All designs utilize mitred 45-degree-conventional or step-lap-joints. Rigid clamping using "Ascecond", a semi-conducting tape, keeps the core sheets of our large units together and gives the core a smoother, more efficient electrode shape.

Mechanical design

ABB mechanical design rules are built on well-developed calculation models that at the design phase already allow us to define factors such as noise level, losses and short-circuit strength.

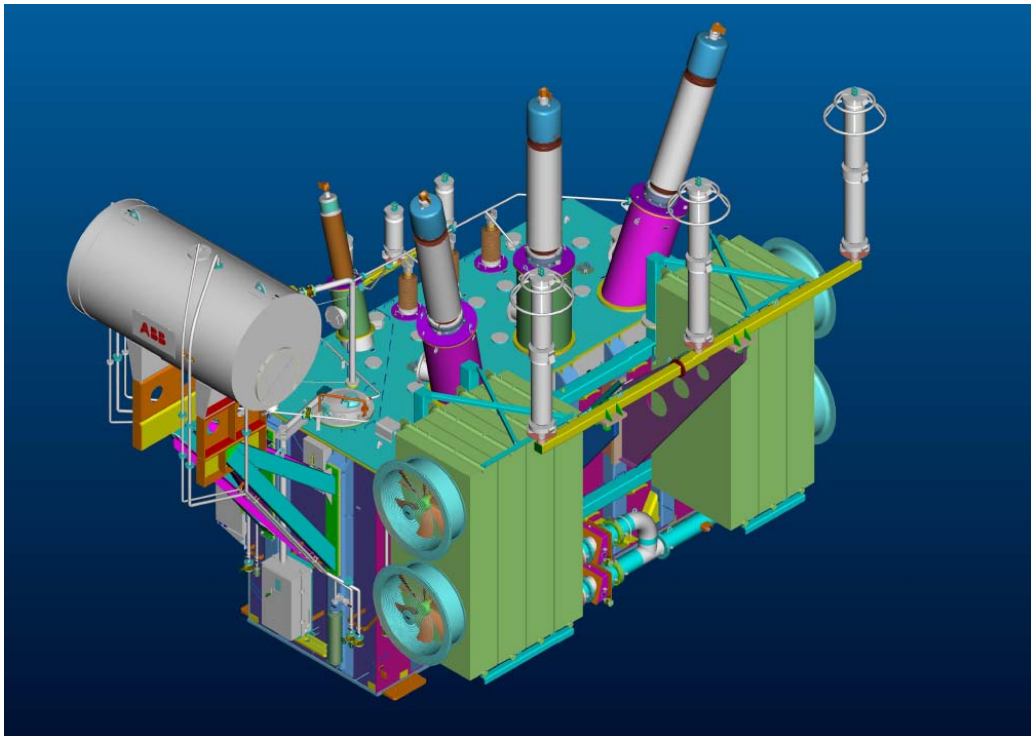
Winding design

Sophisticated calculation models give very accurate winding dimensions for optimal electrical stress distribution and thermal performance. Together with precise manufacturing tolerances this ensures mechanical and dielectric stability as well as predictable temperature distribution.

A Well Proven Design

As proof of our capability to deliver short circuit safe transformers, the ABB transformer factory in Thailand have successfully carried out full short circuit testing on one of our power transformers. The test was made on a transformer for EGAT (Electricity Generating Authority of Thailand) designed and tested according to the EGAT specification, and the ANSI/IEEE standard for short circuit testing. The transformer was transported from Thailand all the way to Italy to be short circuit tested at CESI, one of the leading laboratories in the world for short circuit testing.

CESI in Milan, Italy is a state of the art independent laboratory with a huge experience in short circuit testing.



Production

Core

Core is critical to determining such important factors as iron losses, vibration, sound levels and thermal stability, from a mechanical point of view it is important to design the core to take into consideration, heavy lifts in the workshop, clamping impacts during transport and stresses due to disturbances in the network resulting in short circuit current.

All cores are manufactured from cold-rolled grain-oriented electrical sheet steel coated with oil resistant inorganic material. Normal-oriented or laser treated super-oriented electrical steel may be selected depending on sound level requirement and evaluation of losses.

The lamination of large cores is held together by means of fiberglass type which has been wound under tension and cured to form a homogeneous cylinder.



Winding

ABB power transformer are of core-type design. Their windings are arranged concentrically around a cylindrical core. The heart of every transformer, both from an electrical and mechanical point of view are the windings.

In order to ensure low stray losses and to minimize the mechanical stresses occurring in the event of short circuit, it is necessary to achieve and maintain both overall and local ampere-turn balance between the windings and throughout the entire height of the winding.

ABB normally uses copper conductors which are available in a large variety of sizes, from single to multi conductors with rectangular profiles and also multi-strand transposed cables. Copper in different tensile strengths is available for all conductor shapes to cope with different mechanical stresses during short-circuit and normal operation.



Insulation

The spacers between coils and turns are made of pre-compressed pressboard, which has accurate measurements. Also the axial spacers installed under the windings are made of high quality pressboard intended for use in transformers.

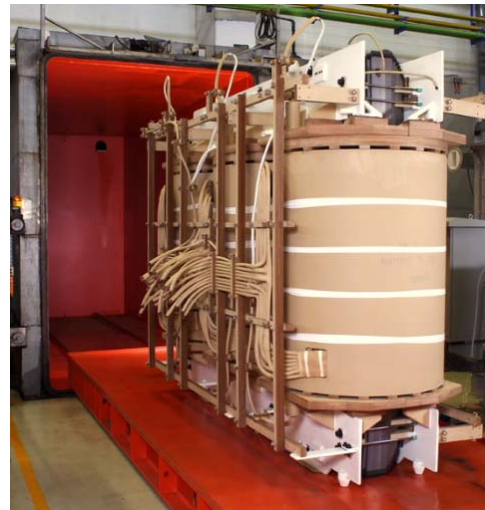
The insulation between the windings and that between the inside winding and the core is of the oil-pressboard barrier type. The oil duct is divided into part channels by means of cylinders and strips. The voltage strength of such a structure is much better than that of one large oil duct.

At low voltages the end insulation of the winding, i.e. the insulation between the winding and the yoke, is made of pressboard spacers and pressboard rings. At high voltages, the end insulation is formed by collar pieces connected to the duct insulation. The collar pieces are formed of pressboard so that they, together with the stress ring at the end of the winding, form a structure whose voltage strength, in the direction of the adjacent winding and yoke, is high in comparison to the voltage stress.

Drying process (Vapor phase)

ABB pays particular attention to the drying process since excessive moisture in the active part can jeopardize the performance of a transformer. Moisture degrades the dielectric strength of the cellulose based insulation system.

Two main drying processes are therefore performed. The first is carried out on the complete windings, which are dried and then subjected to alternate cycles of pressure and release to establish their final design, which removes any elastic strain in their internal insulation. The dried windings are then assembled with together on the core. The entire active part is then moved into a vapor-phase chamber for the final drying process.



Tanking and final assembly

To meet the specific requirements regarding transformer tanks, our designer has at his disposal a series of ready-made tank design elements. For each individual tank, these well proven design elements are combined to fulfill the individual requirements of the customer, thus providing a high degree of flexibility. This will also result in a design which guarantees great reliability and a long life.

The production is closely supervised by our qualified inspectors and the entire operation is fully integrated into our quality assurance program.

The assembly area is where the detailed care, skill and experience for the various parts of an ABB transformer all come together. This assembly process is accompanied by the collection of all the quality assurance cards into a single binder to provide a detailed record of the transformer's construction.

The proven technology of our comprehensive range of parts and accessories means an ABB transformer can have ABB quality built-in throughout. At the same time, our flexible manufacturing operations enable ABB to accommodate whatever specific accessories a customer requires.



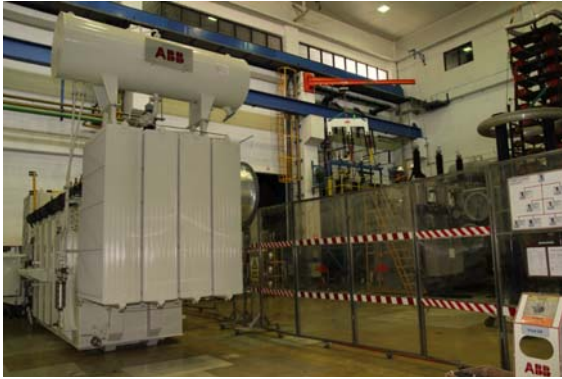
Testing

ABB Transformers are routine tested to verify the quality and the design in accordance with both customer specifications and international standards. All test procedures are in accordance with international standards and the design criteria specified. We test transformers according to IEC, ANSI/IEEE, BS, AS, NZ and other international standards.

Our high voltage test laboratory at ABB in Thailand has been accredited to ISO/IEC17025.

Routine tests shall be performed for all units.

- Winding resistance
- Voltage ratio and vector group check
- Short circuit impedance and load loss
- No-load loss and no-load current
- Lightning Impulse and dielectric routine tests
- Induced over voltage test
- Partial discharge measurement
- On-load tap changer test
- Auxiliary equipment function test & insulation test



Type tests and special tests can be performed upon customer request.

- Temperature rise test
- Switching impulse test
- Measurement of zero-sequence impedance
- Sound level measurement
- Measurement of insulation resistance
- Polarization index (PI)
- Harmonics of the no-load current
- Dielectric dissipation factor
- Frequency response analysis (FRA)

Oil laboratory in our factory can be performed as follows

- Dissolved Gas in oil Analysis (DGA)
- Acid neutralization number
- Breakdown voltage
- Interfacial tension
- Dielectric dissipation factor
- Inhibitor content
- Water content
- Color
- Corrosive Sulphur Cu_2S
- Furan analysis
- PCB content

Packing

In the design stage, a thorough assessment and review will be made with focus on transportation, details depend on the products will be transported in Thailand or seaworthy packing is required for Oversea. Some (but not necessarily all) of the issues to be considered are as follows:

- Unit weight, dimensions and center of gravity
- Design for transport shocks (g-forces),
- Vibrations and humps during different conveyance.
- Unit sensitivity / susceptibility to moisture
- Fragile / protruding integral and non-integral components that are susceptible to damage
- Unit lifting / lashing points

This activity is the responsibility of the transport coordinator along with the engineer responsible. The transport coordinator shall ensure all the packaging design requirements indicated above, along with further generic requirements.



Excellent quality management system

ABB pursues outstanding quality. Quality is an attitude, a standard, a culture, and an endeavor to walk an extra mile in pursuing for the best in class. Quality is a requirement in every job we do in the company, including designing, material sourcing, manufacturing, quality control, customer service, sales and marketing, project management, brand promotion and communication.

Strict material purchasing and supplier selection, a full range of quality management systems, project management with customer focus, prompt and convenient customer's service help to achieve our quality target

ABB has made a long-term commitment to maintaining production records and to use this information to continually improve our products and services. ABB have a comprehensive program of quality assurance with accredited to the ISO9001.

We are implementing the following methodologies.

- Problem solving 4Q analysis
- Six-sigma DPMO summary
- Total quality management (TQM)
- Supply chain development



Environment Health and Safety

Our factory also have been accredited and certified to ISO 14001 and OHSAS18001.



Customer Complaint Resolution Process (CCRP)

Customer Complaint Resolution Process is the ABB standard tool that we are using to ensure that all customer complaints are analyzed and effectively handled with fastest responses to the complaints.

This process is to ensure the cause of the complaint will lead to the best corrective and preventive action.

Some selected of successful reference of units supplied by ABB factory Thailand
These power transformers are currently in satisfactory operation

Since its establishment 1990, the ABB power transformer factory in Thailand has been involved in many key international projects both Utilities and industries, which more than 1,000 power transformer have been delivered to 24 countries across the globe.

Our products have been successfully exported to oversea markets such as Australia, Chile, Congo, China, Cambodia, Costa-Rica, East-Timor, Honduras, Indonesia, Laos, Malaysia, Myanmar, New Caledonia, New-Zealand, Papua-New-Guinea, Philippines, Qatar, Singapore, Syria, Sakhalin, Uruguay, USA and Vietnam.

Country	Project name	MVA	HV	LV	Delivery
Thailand	EGAT - TS11-TX-03	300	230	121	Aug-09
Thailand	EGAT - RIP-S1	200	230	121	Feb-97
Thailand	SIPCO 160 MW CCPP COGENERATION	150	230	15	Sep-09
Thailand	Glow	200	230	121	Aug-11
Thailand	SOLAR - Phitsanulok 90 MW	100	230	22	Oct-15
Thailand	MEA - MP5-8918-WGA_Vibhavadi S/S	300	230	115	Feb-14
Australia	HEC - Bastyan & Tribute (Re-connectable)	120	240	18-13.8-11	Dec-02
Australia	AGL Hallet Windfarm	105	275	33.0	Jun-07
Australia	Davenport S/S Contract No.A797	160	275	132	Jan-09
Australia	Rio Tinto - Tom Price	90	220	33	May-11
Australia	SP Ausnet ITT2008/T28 - Thomastown	150	220	66	Nov-09
Australia	ElectraNet - Cultana TF1 &TF2	200	275	132	Jun-12
Australia	Hydro Tasmania (Re-connectable)	80	220	11-13.8-16	Apr-13
Australia	SP Ausnet - Heatherton Terminal Station	150	220	66	Jan-15
Cambodia	Kampong Cham and Kratie Transmission	200	230	115	Mar-16
Chile	Wind Power - Parque Eolico Arrayan	130	220	33	Aug-13
Chile	Minera Antucoya	100	220	23	Feb-14
Congo	Karavia SVC	95	220	17.9	Feb-12
Indonesia	Indocement repeat 501042	80	150	33.0	Nov-10
Indonesia	Gunung Garuda Steel	144	150	33	Jul-11
Indonesia	Perawang TG 25	200	150	13.8	Jan-12
Malaysia	SESCO - Oya-Bukit Lima	240	275	143	Jun-04
Malaysia	REMACO TNB (Temenggor SS)	120	295	13.8	Jun-14
Honduras	SunEdison - SOLAR - Choluteca	120	230	34.5	Apr-15
New Zealand	Transpower - Penrose Substation	250	220	110	Nov-09
Philippines	NGCP Leyte-Cebu Interconnection	150	230	138	Mar-05
Vietnam	EVN - Vinh Yen 220kV S/S	125	225	115	Jul-06
USA	Golden Pass LNG	70	230	35	Jan-08
USA	Dry Fork S/S	110	230	13.8	Aug-09

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Power Transformer



Distribution Transformer



Transformer Component



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Note

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Power and productivity
for a better world™

