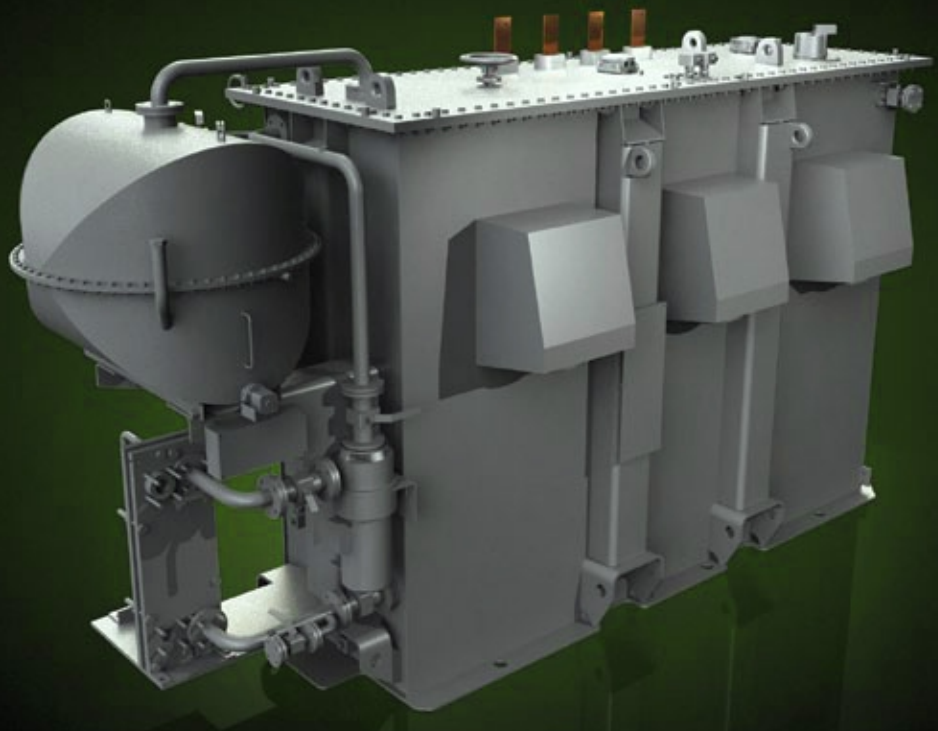

Power Products

Special transformers
Liquid Immersed transformers for wind applications

Power and productivity
for a better world™

ABB transformers are made for land based and offshore wind applications. The compact construction is well suited for installation in wind turbine towers.

The compact, easy to assemble design fits well into the limited space found in wind turbine towers and nacelles. For service purposes, the transformer can be easily replaced through the slim entrance space.

Transformer tank

Transformers for wind turbines are all hermetically sealed with rigid tank designed expansion tank. The tank is filled with oil, without a gas cushion, and the oil volume variation is permitted by the expansion tank.

Reliable and salt mist resistant

The wind turbine nacelle is commonly regarded as one of the most harsh operating environments for a transformer, especially in an offshore installation. The painted tank surface of this transformer is resistant to salt mist, while the hermetically sealed tank construction ensures that the transformers active part is safe and secured from humidity and other environmental stresses.

Slender transformer with integrated fuse load break switch

ABB's long experience in offshore and sub-sea installations is a guarantee for the best possible knowledge of requirements in challenging and demanding installations.

Personal safety

With plug-in bushings on , this transformer is touch protected for personal safety and also resistant against harm caused by humidity.

Working inside the tower or nacelle in close proximity to the transformer is safe and no additional protective safe distance is needed.

Liquids for insulation and cooling

Several different liquids can be used for insulation and cooling:

- inhibited mineral transformer oil
- silicone oil
- synthetic ester
- natural ester

Silicone oil, synthetic and natural esters have excellent fire resistant and heat dissipation dielectric qualities. These liquids have improved environmental safety and minimized fire risks.

Both synthetic and natural esters are fully biodegradable within 28 days according to standards. The characteristics of these liquids make them environmentally safe to be used in offshore applications.

Design temperatures

To cover the widest possible market requirements, this series of transformers has been designed to be delivered with two different working temperatures for oil and winding:

Normal winding temperature rise 65 K

- For this solution, standard proven paper isolation material is used for isolation. Mineral oil can be used as an insulation liquid.

High winding temperature rise 115 K

- utilized by high temperature insulation aramid, polyester resins and glass fibre.

Wind turbine transformers

66kV water cooled wind turbine transformer

Low losses – more energy to sell

By using only highest available quality of materials for the core and winding, a reduction of losses has been achieved.

For the end-user this means that with lower losses, there is more energy to sell, which makes the payback time of the investment shorter. The lifetime of the transformer is also extended.

Voltage and power ratings

The voltage range of the wind turbine transformers up to 72.5 kV is proven technology from oil gas platforms. This higher voltage allows increased wind farm power levels without need for separate step-up transformer platform installations. The power rating range of the transformers is typically up to 10 MVA with a possibility to go even higher in power.
For ratings above 5 MVA forced cooling is normally required. The solution can be liquid to air or liquid to water cooling.

Standards

ABB transformers are fullfilling the relevant existing IEC-standards and are specificly strenghtened for windmill duty. The fullfillment of these standards as such, without special measures, does not necessarily ensure that the transformers in the long term can withstand windmill application duty. Therefore, a specific standard for windmill transformers IEC 60076-16 has been published. ABB is actively participating in this work and will be in the forefront adopting any new requirements in transformer design.

Special options

Different types of special applications, eg, auxiliary windings, 12-pulse applications, tertiary windings and water-cooled solutions are possible.

Typical characteristics, turbine transformers

Design		Liquid-immersed transformer
Rated Power	[MVA]	0,5-10
Cooling		ONAN / KNAN / KFAF / KFWF…
High Voltage	[kV]	6-72,5
Primary Tappings		±2x2.5%
Low Voltage	[kV]	0,4-4
Temperature Class		A / 220 °C (Aramid insulation)
Standards		IEC60076-16, ANSI C57.12.00
		IEC60076-14, IEEE PC57.154

Type of design

Tank Construction	(Nitrogen sealed) conservator type,
	vacuumproof tank / Hermetically
	sealed corrugated tank -
"Slender" design	
Insulation Liquid	Synthetic ester/
Natural ester/	
Silicon oil/	
	Inhibited mineral transformer oil
Environmental class	C3 / C4 / C5-I / C5-M
Termination type	Touch protected plug-in bushings
Installation	Windmill nacelle or tower,
offshore or onshore	

Typical characteristics, wind park grid connection

Design		Liquid-immersed transformer
Rated Power	[MVA]	10-63
Cooling		ONAN / ONAF / OFAF…
High Voltage	[kV]	33-170
Primary Tappings		±2x2.5% off circuit / ±9x1.67% OLTC
Low Voltage	[kV]	11-72,5
Temperature Class		A
Standards		IEC60076, ANSI C57.12.00

Type of design

Tank Construction	Conservator type, vacuumproof tank
Insulation Liquid	Synthetic ester/
Natural ester/	
Silicon oil/	
	Inhibited mineral transformer oil
Environmental class	C3 / C4 / C5-I / C5-M
Termination type	Touch protected plug-in bushings/
Open bushings/	
	Integrated connection to switchgear
Installation	Platform mounted for offshore /
	Transformer cell mounted for
onshore installation	

Other products for wind parks

- Shunt reactors
- Variable shunt reactors
- Adjustable arc-suppression coil

Grid transformer with air to oil cooler (OFAF)

Contact us

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