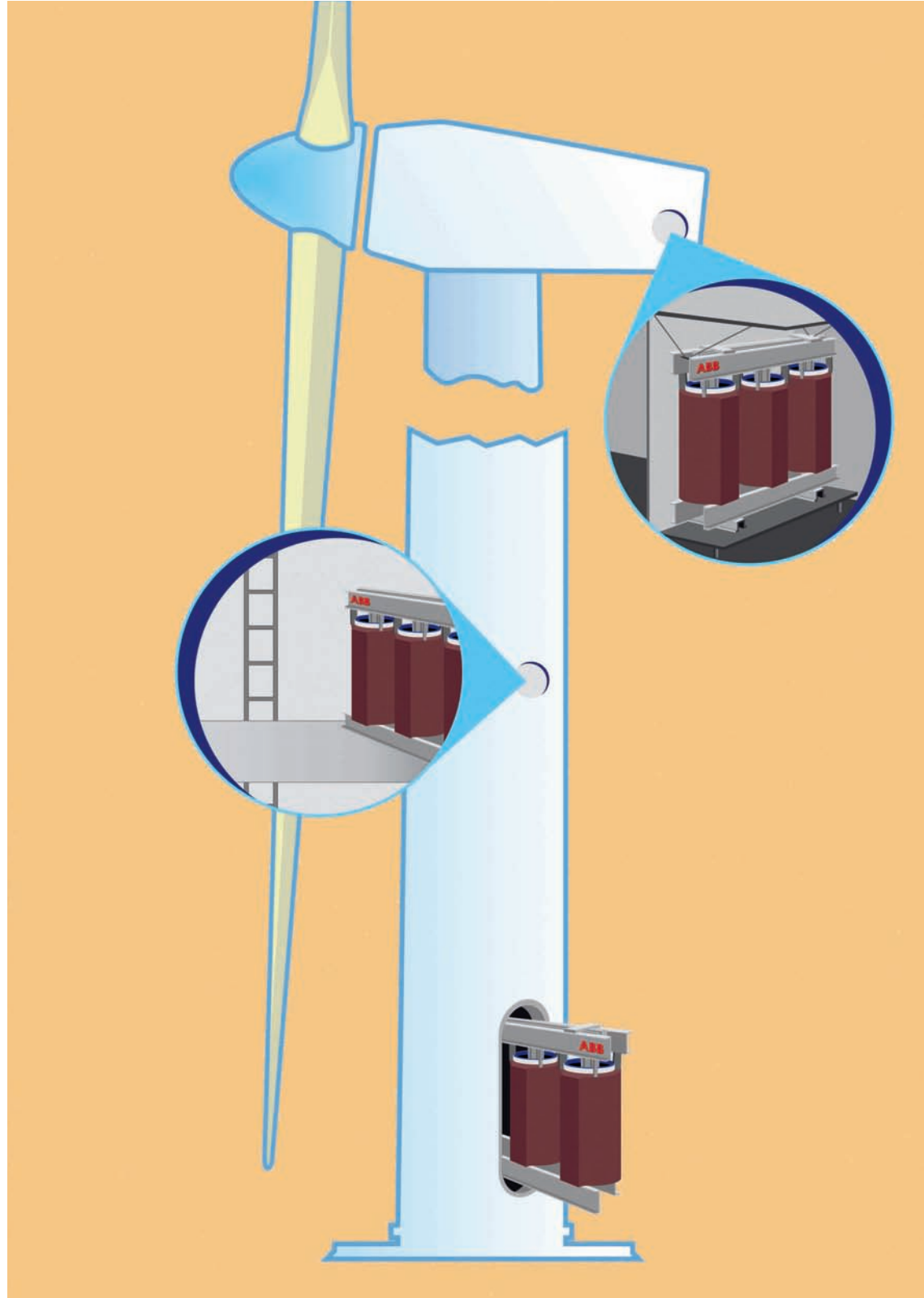


# ABB vacuum cast coil transformers

## Possible locations inside a wind turbine



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#### Note:

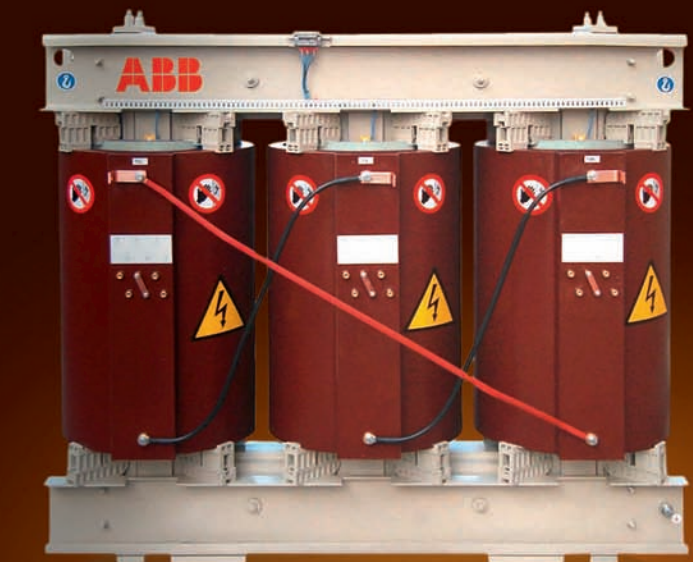
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## Vacuum cast coil dry type transformers

### Enabling the power of wind

# ABB vacuum cast coil transformers for windmill applications

ABB is one of the leading global manufacturer of distribution and power transformers delivering worldwide vacuum cast coil transformers for wind farm applications. ABB has more dry type transformers installed than any other competitor. All ABB transformers are produced in focused factories which are specialized plants for the production of a specific product family.

## A leader in wind

ABB is the technology leader providing the broadest experience and application range of vacuum cast coil dry type transformers for wind farm applications. Transformers are suitable for installation inside the turbine either in the ground floor, at a first level or in the most demanding location, the nacelle.

## Product range

The general range of ABB vacuum cast coil dry type transformers varies from 250 kVA to 30 MVA with operating voltages up to 52 kV. Today most typical ranges in wind applications cover up to 3150 kVA and 36 kV, but current developments lead to powers up to 5 MVA or higher and voltage levels up to 52 kV, which perfectly fits into ABB available range of concept, design, manufacturing and testing.

## Suitable in all environments

ABB vacuum cast coil transformers are designed to work under harsh environmental conditions, being most suitable for wind farm installations both onshore and offshore.

ABB vacuum cast coil transformers are certified C2, E2, and F1. Optionally can be designed to withstand ambient temperatures up to  $-40^{\circ}\text{C}$ .

Special tests performed such as saline fog chamber test and corrosion tests guarantee that ABB vacuum cast coil transformers are resilient to severe atmospheres of saline moisture and heavy dust without deterioration, making ABB the optimum choice for your wind farm installation.

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## The most advanced insulation materials at your hands

ABB is fully committed to innovation and therefore offers to his customers the best alternatives in terms of quality and reliability available in the market.

Apart from the thermal insulation class F, widely used in dry type transformers, recently ABB has introduced the hi-T concept, a vacuum cast coil transformer with a higher insulation class H suitable to work at higher temperatures than existing class F transformers.

This technical advantage allows a footprint reduction with same power rating making it the best choice for wind turbine installations with reduced space.

When space is not a major problem, but overloads are present, class H transformers provide the best solution both technical and economical since they can be continuously overloaded under normal operation without ageing impact even at full rated power

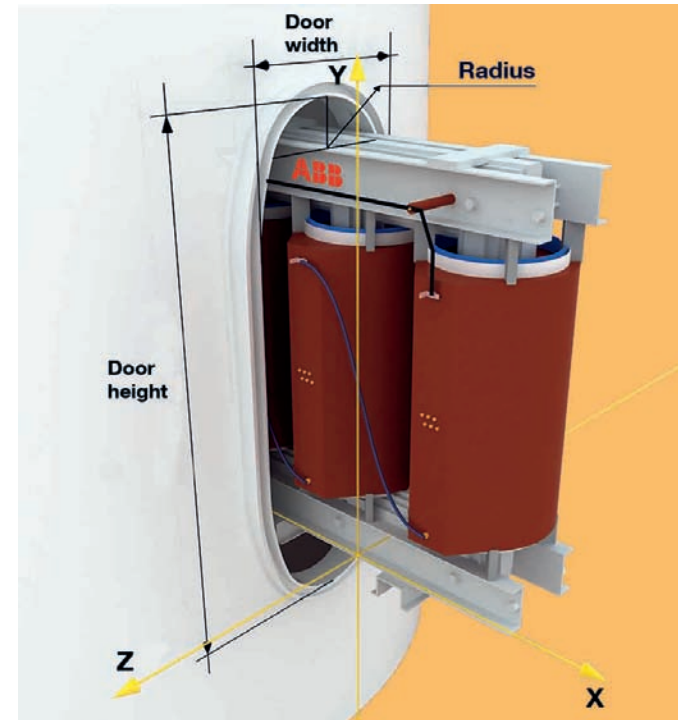
## ABB special and customized designs developed for the windmill applications

### All kind of customized designs:

- Transformers for both on and off shore environments.
- Reduced transformer dimensions able to pass through the tower door.
- Optimized design transformer to be mounted on the nacelle platform.
- Transformers with reduced dimension enclosure. Specially designed to fit into the limited space available inside the tower.
- Reduced losses transformers.
- Transformers with tertiary for auxiliary services.
- Insulation class F and H.

### Manufacturing options and accessories:

- Copper windings.
- Electrostatic screen.
- No frame at the bottom.
- Top or bottom voltage connections.
- Sealed low voltage windings.
- Other accessories under customer request.



3D modelling to grant clearance through tower door, a critical aspect for transformer design

## Vibrations proof – transformer inside the nacelle

Nowadays it is the most used design for the large wind power turbines. The transformer is mounted on a platform, and assembled in the nacelle with the rest of the equipment.

Since the transformer is located in the nacelle, at a height of about 80 meters, it is exposed to a vibration environment which can seriously damage all devices inside it.

The vibration to which the transformer is exposed to during its lifetime, was summarized in an acceleration spectrum with the simulation of its life cycle loads. Multi-axis vibration endurance and shock tests were performed according to IEC 68-2-6/59, German edition EN 60068 parts 2-6 and 2-59 and particular customer requirements.

Extreme accelerations due to handling or harsh vibrations were also considered.

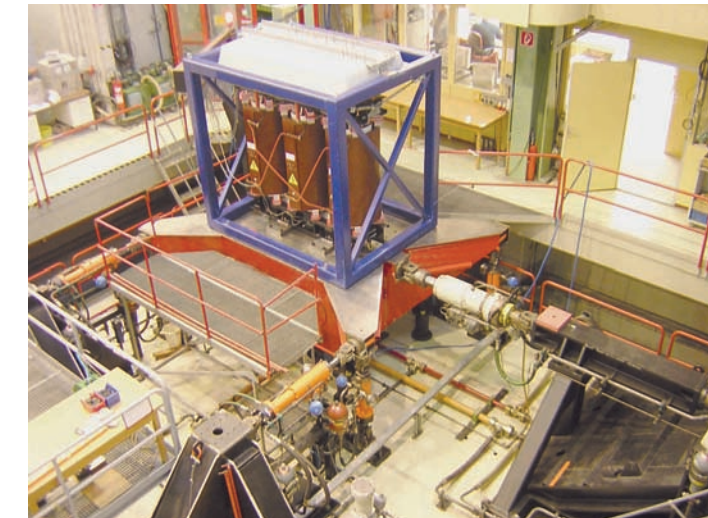


ABB vacuum cast coil transformer in vibration test area

## Vacuum cast coil dry type transformers inside the nacelle

