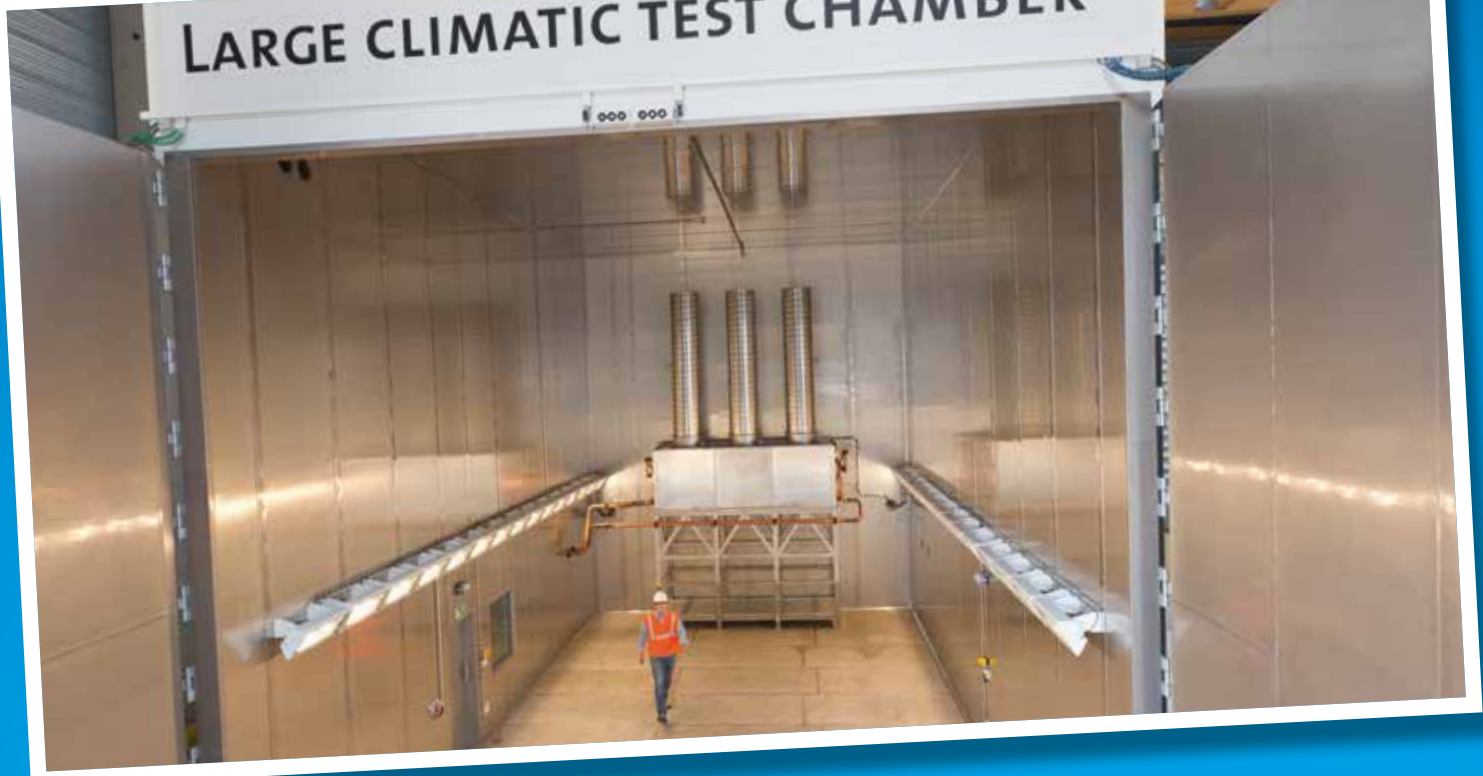


LARGE CLIMATIC TEST CHAMBER



Large climatic test chamber OWI-Lab Extreme temperature testing & wind turbine component validation

Wind industry is fast expanding in remote areas where the turbines need to work under extreme conditions. Usually onshore and offshore wind turbines are designed to operate in a temperature range from -10°C to $+40^{\circ}\text{C}$, but in some locations like for example Finland and Mongolia the temperature can even drop to -40°C . On the other hand, turbines located in for example India can suffer from extreme heat when located in deserts where temperature could reach up to $+60^{\circ}\text{C}$.

These inhospitable locations form a huge challenge for the machine itself and also for the maintenance and repair teams. In some cases repair works have to be postponed because of temperatures and thereby affects the turbine availability and its business case. This is why the industry needs robust and validated components capable of surviving in extreme conditions in order to be cost-effective.

To come to this necessity, the infrastructure should be available to test the behavior and performance of the machines in a wide range of temperatures. The Offshore Wind Infrastructure Application Lab (OWI-Lab) invested in such test infrastructure.

In the Port of Antwerp a large climatic chamber for wind turbine component testing in a wide range of temperatures has been built by OWI-Lab. Both mechanical, hydraulic and electrical turbine components like gearboxes or transformers up to 150 tones can be tested in a temperature range from -60°C to $+60^{\circ}\text{C}$. Typical prototype testing activities in the facility include design verification testing (DVT), and component validation. Dedicated R&D tests will be supported by providing the required auxiliaries like for example a flexible set of power supplies up to 2MVA and a drive to give speed to rotary parts.

Large climatic test chamber OWI-Lab

Extreme temperature testing & wind turbine component validation

Main focus

Intended to test and validate large and heavy wind turbine components in the field of extreme temperature testing: gearboxes, transformers, yaw-systems, hydraulic units, hydraulic drive trains,... Other components from different industries who deal with large machinery can be tested as well: heavy industry applications; aerospace components, power aggregates, radar systems, wave & tidal converters,...

Location

The large climatic test chamber is embedded in the OWI-Lab test facility which is located in the Port of Antwerp nearby the DP World breakbulk terminal. All logistics are available on site to handle large and heavy machinery, its quay has a load capacity of 45 ton/m².

Maximum dimensions test specimen

Length: 10m

Width: 7m

Height: 8m

Test area space: 560m³

Temperature test range -60°C till +60°C

Temperature accuracy $\pm 1K$ after stabilization time

Total installed electrical power of machinery 408kW

Air speed at the cooling outlets 5-7 m/s

Maximum weight test specimen 150 ton

Maximum floor load climate chamber 30 ton/m²

Cooling down rate $\pm 0,022K/min$

(+20°C to -60 °C in 60 hours for 100 ton steel)

(1 hour to cool down the empty chamber from +60°C to -40°C)

Heating up rate $\pm 0,028 K/min$

(-60°C to + 20°C in 48 hours for 100 ton steel)

Maximum cooling capacity at -60°C 40 kW (250 kW at -20°C)

Maximum cooling capacity at +60°C 150 kW

Main entrance test specimen 7m x 8m (width x height) double wing door

Entrance lock gate 0,9m x 2m (width x height)

Available

- Advanced temperature control & programmable temperature cycles
Surface heated operator window to follow up tests
- Adaptive cable penetration up to $\varnothing 90mm$ (multi-diameter module system)
- NI data-acquisition equipment
- Power supply inside test chamber: a flexible system is used to provide a different set of currents and voltages inside the test chamber. 230 volt single phase, 400 volt three phase and 690 volt three phase can be provided on request up to a maximum power of 2MVA.



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