

WIND ENERGY

TUV NEL has made significant contributions to the development of renewable energy technology. These have included the development and testing of large-scale hydroelectric equipment, pioneering research in wave energy systems and performance evaluation of modern wind-energy conversion systems. Wind energy systems are an area of particular expertise where TUV NEL can not only offer a range of design and consultancy services but also has the capability to test or model complete systems or individual components.

Test Facility

Since 1984 TUV NEL has operated a remote wind turbine test site at Myres Hill approximately 10 km south west of East Kilbride. Myres Hill enjoys excellent exposure to prevailing south westerly winds.



The site is covered in grass and heather and has low surface roughness. Some large areas of forestry are situated approximately 2 km from the Myres Hill summit. Key features of the site are:

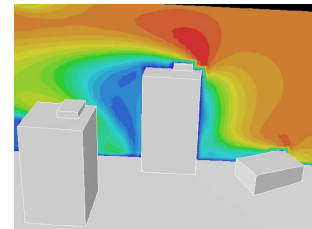
- Clean wind flow conditions allowing all operating modes to be tested
- Close proximity to TUV NEL providing easy access by staff
- Test laboratory buildings available
- Unpopulated area permitting research and development and prototype testing of wind turbines
- Long-term annual mean wind speed of 7.7 m/s at an elevation of 10 m above ground

The site is serviced with 11 kV grid connections and can accommodate generated power levels of up to 1800 kW.

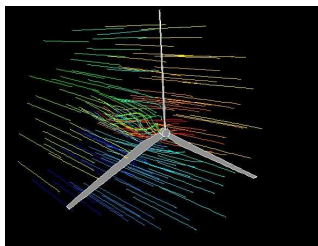
Consultancy Services

Sound mechanical engineering knowledge coupled with practical experience enables TUV NEL to provide clients with technical consultancy in:

- Blade design including aerodynamic and aeroelastic modelling
- Structural analysis
- Vibration characterisation
- Audible noise characterisation
- Wind resource assessment
- Failure investigation
- Technical due diligence



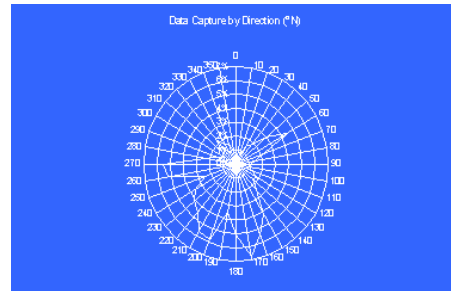
The application of powerful computational fluid dynamics and finite element stress analysis codes in conjunction with in-house software provides support for manufacturers to develop and improve the design of components and address in-service problems or failures. TUV NEL can also advise local authorities on proposed wind turbine installations to ensure that all necessary safety criteria are addressed.



Measurement and Testing Services for Small Wind Turbines

A comprehensive measurement and testing capability can be accessed by designers, manufacturers, researchers, technology developers and end users of small wind turbine systems.

- Wind turbine performance evaluation
- Wind speed measurement and site assessment
- Noise measurement
- Vibration measurement
- Strain measurement
- Power quality
- Electromagnetic compatibility
- Environmental exposure



Conformity Assessment



TUV NEL can assist manufacturers with the assessment of conformity to IEC Standards for proposed wind turbine designs. Having contributed to the development of many of these standards, TUV NEL can offer authoritative advice and guidance to manufacturers on compliance with standards.

Key standards include:

- BS EN 61400-2: 1996 Safety of Small Wind Turbines
- BS EN 61400-11: 2003 Acoustic Noise Measurement Techniques
- BS EN 61400-12: 1998 Wind Turbine Power Performance Testing
- DD IEC TS 61400-13: Measurement of Mechanical Loads
- BS EN 61400-21: 2002 Measurement and Assessment of Power Quality Characteristics of Grid-Connected Wind Turbines
- IEC WT 01—Ed. 1.0 IEC System for Conformity and Certification of Wind Turbines—Rules & Procedures
- IEC 61400—Part 22: Safety and Function Tests
- DD IEC TS 61400-23: Full Scale Structural Testing of Rotor Blades
- PD IEC/TR 61400-24: Lightning Protection
- IEC 61000 Series: Electromagnetic Compatibility

Guidance on CE compliance and assistance with the formulation of technical files can be provided.

Designs for specific turbine tower and mounting arrangements can be evaluated to verify system integrity.

Field Testing of Small Wind Turbines

TUV NEL provides a field testing service for developers, utilities, operators and other end users of small wind turbine systems, and finance lenders. Typical services include:

- Wind monitoring campaigns to establish the typical wind regime for sites
- In-situ wind turbine measurement and testing
- Troubleshooting in-service problems such as noise, vibration or unexpected failures
- Concerns with blade loading

Specialists from TUV NEL acquire and analyse all the necessary data and advise clients on optimum solutions.