Risø DTU
Technical University of Denmark
National Laboratory for Sustainable Energy

30 May 2011
J.nr. 1120399-03

Approval of Risø DTU 2011-4 UK translation: Viking 25. HSWind

Issued to:	HSWind ApS Clausholmvej 24, DK-8960 Randers CVR: DK 32 15 27 91
Valid for:	Viking 25kW erected on 18 m guyded and tiltable tubular tower.
Approval number:	Risø DTU 2011-4 (Danish/UK translation)
Date of issue :	30 May 2011
Valid until:	30 May 2014
Pending points:	Duration test finished and approved.

Validity and preconditions
The approval is in accordance with "The Danish Energy Agency's Executive order on the technical certification scheme for the design, manufacture, installation, maintenance and service of wind turbines, June 28 2008 no. 651" and **"**Certification of wind turbines with a rated power of maximum 25 kW or less and a rotor area of 200 sq. m or less**.**", and "Energinet.dk's technical specification TF 3.2.5 for wind electrical power stations larger than 11 kW, dated 30 September 2010".

Pending points
Duration test has commenced 8 March 2011 and is completed 8 September 2011 or until the below stated conditions to IEC 61400-2:2006 are met and approved:
- at least 6 months in automatic running and at least 90 % availability
- at least 2500 hours with energy production
- at least 250 hours with production in wind above 9 meter per second
- at least 25 hours with production in wind above 13.5 meter per second

The turbine's technical data
The technical data for Viking 25 are stated in Appendix 1.

Manuals and documents
List of manuals, calculations, drawings and documents for Viking 25 are found in Appendix 2.

Peggy Friis

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Appendix 1: The turbine's technical data.

Type of turbine	[-]	HSWind 25 kW
Appellation	[-]	Viking 25
Rotor diameter	[m]	13
Rotor area	[m2]	133
Number of blades	[-]	3
Effect (Nominal)	[kW]	25
Effect regulation	[-]	Stall
Rotor location	[-]	Upwind
Tilt	[^{0}]	5
Conicity	[^{0}]	3
Rotational speed (Nominal)	[rpm]	65,6
Output (AC/DV)	[V]	AC
Hub height	[m]	18
Total height	[m]	24,5
Start wind speed	[m/s]	4
Nominel wind speed	[m/s]	13
Stop wind speed	[m/s]	25
Maximum wind speed	[m/s]	37,5
Tower type	[-]	Guyded tiltable tubular tower
IEC61400-2 design wind class	[-]	Class III.
Break drive	[-]	Electro mechanical break
Safety feature against over speed	[-]	Tip brake
Blades	[-]	OLW 601 LO1
Generator	[-]	Assynkron
Yawing mechanism	[-]	Active yawing
Scada	[-]	Mita teknik IC1100

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Risø DTU is approved by the Danish Energy Agency to conduct technical certifications of wind turbines of 25 kW and below in accordance with The Danish Energy Agency's Executive order on the technical certification scheme for the design, manufacture, installation, maintenance and service of wind turbines, June 28 2008 nr. 651 cf. the Danish Energy Agency's certification no. 4 of non-accredited companies for execution of certification of wind turbines.

Appendix 2: Manuals and documents for Viking 25.

Document Description	Date
Specifications Viking 25. Ver 1.02 DA	28-03-2011
User manual Viking 25 version 1.02	29-05-2011
Installation manual Viking 25 version 1.01	
Service manual Viking 25 version 1.02	29-05-2011
Service report annual inspection 1.01	
Power Quality Report. Viking 25kW. HSWind	Feb. 2011
Acoustic Noise Emission, IEC61400-11 ed 2. Viking 25, Report P6.001.11. Bo Søndergaard. Grontmij.	10-02-2011
Design Calculations (Results). HSWind 25 kW Wind Turbine. Rev 01	20-01-2011
A1.Load calculations on HSWind 25. According to IEC61400-2	19-01-2011
A2.Calculations for Viking 25 wind turbine. STAAD analysis. Rev 01	22-12-2010
A3.Calculation for Viking 25. Mathcad structural calculations, Rev 01	
A4.Calculation for Viking 25. FEM Analysis of the rotor hub. Rev 01	22-12-2010
A5.Calculation for Viking 25. FEM Analysis of the frame. Rev 01	22-12-2010
A.7.Determination of brake torque	04-01-2011
Foundation calculations on clay. Case no. 43965. Viggo Madsen. Højbjerg	13-01-2011
Foundation Plan. Viggo Madsen. Højbjerg	11-01-2011
As3867. CSM, KISSsoft Reports for 100727-526-As3867, Bearings, Gears, Shafts	
Drawing overview Viking 25 rev.03	30-03-2011
Duration Test Measurements. HSWind	Ongoing
Power Curve Measuremets. HSWind	Ongoing
Risø DTU 2011-4: Viking 25. HSWind. Certification report. Risø DTU. Peggy Friis	Ongoing

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Risø DTU is approved by the Danish Energy Agency to conduct technical certifications of wind turbines of 25 kW and below in accordance with Proclamation no. 651, dated 26 June 2008, on technical certification scheme concerning construction, erection, maintenance and service of wind turbines cf. the Danish Energy Agency's certification no. 4 of non-accredited companies for execution of certification of wind turbines.