The following is an unofficial translation of the exemption rules for certification of small wind turbines, carried out at Risø DTU's Wind Energy Division. Only the Danish document has legal validity.

Danish Energy Agency

Marts 19, 2010

Certification of wind turbines with a rated power of maximum 25 kW or less and a rotor area of 200 sq. m or less.

As an exemption to the present rules in the Executive Order no. 651 of the 26th of June, 2008 regarding the technical certification of design, manufacturing, installation, maintenance and service of wind turbines, the Danish Energy Agency has laid down that the below mentioned rules are applicable when certifying wind turbines with a rated power of maximum 25 kW or less and a rotor area of 200 sq m or less. The Order includes and replaces former exemption rules for certification of wind turbines with a rotor area of 40 sq. m.

(*Requirements are described in the left hand column and the appurtenant guidelines in the right hand column)*

The rules provide certification approval of wind turbines of 25 kW or less according to the requirements and procedures depending on the rotor area of the wind turbine. The maximum limits for using the rules are 200 sq. m, 40 sq. m and 5 sq. m respectively, according to section 1-5. Certification includes the individual wind turbine including the tower and its foundation or mounting devices.	If the manufacturer/supplier so wishes, certification may instead take place pursuant to the general rules in the Executive Order no. 651 of 26th June, 2008. Similarly, the certification of a wind turbine may at all times be carried out according to the requirements laid down for a wind turbine with a larger rotor area. The rotor area of a wind turbine is defined as the windswept area (perpendicular to the direction of the wind) as described by a rotor during one complete rotation. The rated power is defined as the electrical power produced by the wind turbine at the rated wind speed as specified by the manufacturer. Wind turbines transforming the power of the wind through a generator into another form of energy are defined as electrical power producing wind turbines. If other Danish or foreign documentation is present in part or in total in the form of calculations or measurements corresponding to the level of requirements provided, this documentation may be included in a Danish certification. It is the certifying company assessing the validity of the present documentation.

Companies performing maintenance and service on wind turbines subjected to the requirements are exempted from the rules laid down in § 15 section 2 and 3 of the Executive Order concerning certified quality control system. Wind turbines with a rotor area of 40 sq. m or less are exempted from the Executive Order's requirements concerning project approval, renovation, relocation, maintenance and service pursuant to §§ 6, 8, 10 and 15. Wind turbines with a rotor area of 40 sq. m or less: a) Erected off shore and on ships, b) Used for educational purposes, research, test or demonstration in designated areas. c) Constructed and built by the owner for his own use in a specifically defined area d) Without electrical output, producing mechanical energy for water pumping, heating etc. e) Including certain types of drag-based wind turbines which may be regarded as safe on the basis of a concrete assessment are exempted from the requirements laid down in sections 2 and 3 Other requirements in the Executive Order are still prevailing.	According to § 15 laid down in the Executive Order the owner has to ensure that maintenance and service are executed as dictated by the manufacturer. Companies performing maintenance on wind turbines may be certified by the Danish Energy Agency according to § 15 section 4 in the Executive Order. Maintenance on wind turbines with a rotor area of 5 sq. m or less is exempted from the requirements laid down in § 12 section 4 in the Executive Order. It is a prerequisite that documentation is available for the use of the wind turbine be it educational purposes, research, test or demonstration. Designated areas means areas where particular safety requirements are considered in relation to the surroundings and approved by the local authority for these particular objectives. Based on the documentation submitted, the Secretariat for the Danish Wind Turbine Certification Scheme assesses the safety of a specific type of wind turbine. The Secretariat for the Danish Wind Turbine Scheme submits to the Danish Energy Agency which according to § 1 section 7 laid down in the Executive Order may decide that the specific wind turbines are exempted from the Executive Order. Drag-based wind turbines do not use the lift of the wind (for example Savonius, anemometers etc.)

1. Requirements and procedures for wind turbines with a rotor area of 200 sq. m or less (rotor diameter of up to 15.96 m)

1.1	The wind turbine must be designed in accordance with the requirements determined in recognized national and international regulations and standards set up for the design of wind turbines. The chosen load and safety regulation or standard has to be completely complied with when issuing the documentation of the design of the wind turbine.	DS/EN 61400-2: "Wind Turbines – Part 2. Design Requirements for Small Wind Turbines" or annex 1 Load and safety regulations for household wind turbines, April 1999 revision of the formerly used regulations for household wind turbines may be regarded as renowned regulations and standards. The Danish Energy Agency of the Secretariat for the Danish Wind Turbine Certification Scheme determines if the applied regulations are satisfying according to the

	recommendations of the certifying company. Special constructions deviating from the rules may be certified based on concrete assessment, testing or calculation if documented justifiable.
1.2 The certifying company carries out the technical certification based on assessment and test of the manufacturer's or supplier's documentation supplemented by tests of the specific wind turbine with regard to the conditions listed below:	The certifying company assesses if the documentation submitted is satisfying.

1.3 Documentation for the design of the wind turbine must comprise as a minimum:
• Climate conditions, other installations and operating conditions representative of the specific test site in Denmark.
• Design drawings, calculations and applied design prerequisite such as applied standards, regulations, parameters and lifetime etc. comprising the following components:
    • The control and protection system of the wind turbine.
    • Loads on the wind turbine and specified load cases.
    • Structural, mechanical and electrical components including lifetime.
    • Tower design.
    • Foundation structure etc.
    • Documentation of the source of noise
    • Documentation of lightning protection and electrical installations
    • Documentation of the compliance with the requirements of the Machinery Directive concerning personal safety.
	The classification of wind in Denmark may be carried out according to DS 472 and DS 410.
	
	A wind turbine has to be equipped with control and protection systems in order to control the energy production and protection against unwanted operation. In the event of a failure or breakdown of the wind turbine the control system, the protection system must be able to keep the wind turbine (or bring it back) into a safe position.
	
	All relevant load cases have to be described and it has to be documented that they are observed during the estimated lifetime of the wind turbine.
	
	The documentation of the structural and mechanical safety of tower and foundation must secure that the types of foundation potentially used for this specific type of wind turbine are calculated according to the specifications laid down for this particular type of wind turbine.
	
	The Executive Order no. 1518 of the 14th of December 2006, from the Danish Ministry of the Environment, concerning noise from wind turbines specifies the calculation and measurement methods to be used for documentation of noise emission.
	
	The lightning protection of the wind turbine may be documented by applying IEC/TR 61400-24. The observance of requirements to the electrical quality should be documented in accordance with the High Voltage Executive Order section 204-1/EN 60204-1.

1.4 As a minimum, the test procedure must include and prove: • Safety and operational tests and testing of protection systems including the device of	The objective of test procedures is to compile measurement results as supplementary documentation of stability and safety performance. The type certifying body may for the verification of the documentation of the wind

the wind turbine preventing runaway operation, yawing, cut-in, braking and maximum rotation. • Measurements of electrical power and power production. • Measurements of loads, vibrations and natural frequency of the wind turbine (Measurements of loads may be replaced by a duration test according to section 9.4 in IEC62400-2) • Static testing of blades, edgewise and flapwise. • Measurements of noise emission or level of source noise according to section 4.1. • Measurements of the electrical quality according to the regulations of the responsible TSO's technical specifications referring to section 4.1.	turbine request further tests for the verification of the documentation of the wind turbine where documentation is considered unreliable or unusual calculation procedures have been used. When measuring power performance relevant parts of the following standard may be used: IEC 61400-12-1, "Wind turbines – Part 12-2. Power performance measurements of electricity producing wind turbines". When measuring loads relevant parts of the following standard may be used: IEC 61400-13, Wind turbine generator systems – Part 13 Measurements and mechanical loads. When using static testing of edges and flaps of blades relevant parts of the following standard may be used: IEC 61400-23, Wind turbines- part 23 Full-scale structural testing of rotor blades.

2. Requirements and procedures for wind turbines with a rotor area of 40 sq. m or less (rotor diameter of less than 7.14 m.)

2.1 Wind turbines must be designed to under all conditions to be automatically protected against runaway operations. The protection system must be fail-safe in case of isolated breakdowns in the wind turbine.	Runaway operation means that the rotation of speed of the rotor exceeds the nominal value, and that the turbine is designed for.
2.2 Type certification shall, as a minimum, comprise the verification of a test of the strength of the tower and rotor components (blades) and a verification of a subsequent functional test. Furthermore, a calculation of rotors and towers with the loads used for testing must be verified. As a minimum, the test procedure shall include: • Testing the strength of the installed wind turbine tower exposed to horizontal pulls of at least 300 Newton/Sq. m of rotor area at hub height. • Testing the static loads on the individual rotor components mounted in a test stand with at least 300 Newton/sq. m of rotor area/number of rotor components. The rotor components are loaded at a 2/3 radius from the foot pulling in the	Verification must be carried out by the certifying body, based on documentation provided by the manufacturer or supplier. If several types of towers are to be used, each individual type must be tested. The certifying body decides the applied loads in cooperation with the manufacturer. For particular designs specific assessment of the applied loads may be necessary

direction of the flap. Vertical axis wind turbines are to be loaded on the individual rotor components proportionally in relation to the securing points of the axis plus the calculated centripetal force of the rotor component.	
• Testing the device preventing runaway operation of the wind turbine. The device shall be tested at minimum wind speed of at least 25% above the nominal wind speed, minimum 12 m/s. Guidelines shall be prepared informing users of how the device works, recurrent inspections and testing.	Testing of the device preventing the runaway operation of the wind turbine must verify that the turbine is able to bring itself to a standstill, or limit its rotational speed under load conditions corresponding to the given minimum wind speed.
• Operational test of one specimen of a wind turbine installed in open countryside under Danish wind conditions or equivalent overseas wind conditions achieving a power production corresponding to no less than 500 full-load hours. The test period shall be at least three months including at least two periods of mean wind speed exceeding 12 m/s for a continuous period of six hours. Measurements shall be carried out for wind speed, electrical power and energy output as a minimum.	During the operational test the wind turbine must be operating continuously for at least 80% of the time. The electricity production (kWh) corresponding to 500 full load hours equals the wind turbine's rated power (kW) at a nominal wind speed multiplied by 500 hours (h). Under normal operating conditions, the wind turbine is expected to operate at an air temperature between -10°C and 30°C. The certifying body may accept a duration test as documentation of an operational test according to section 9.4 in IEC 62400-2.
2.3 For installation purposes, the safety of the wind turbine shall be assessed with regard to the desired foundation structure.	The certifying body must assess whether the recommended foundation designs including mounting devices for houses etc., are sufficient to hold the wind turbine under all conditions.
2.4 An acceptance may be granted for test and demonstration of a wind turbine at a specific site for a limited period of three years maximum. The acceptance is granted based on an assessment of the safety requirements in sections 2.1-2.3, but does not include quality, power yield or operating conditions.	

3. Requirements and procedures for wind turbines with a rotor area of 5 sq. m or less (rotor diameter of less than 2.52 m)

3.1	Wind turbines with a rotor area of 1 sq. m to 5 sq. m shall be notified to the Secretariat for the Danish Wind Turbine Certification Scheme for registration based on documentation for CE labelling pursuant to the Danish Working Environment Authority's Executive Order no. 612 of 26th June, 2008 concerning the design of technical facilities.	Application for registration on the basis of documentation for CE labelling should be addressed to the Secretariat for the Danish Wind Turbines Certification Scheme at Risø DTU. According to the Danish Working Environment Authority's Executive Order no. 612 of the 26th of June, 2008 it is a prerequisite that documentation must include Danish manuals for installation and user's manual (including a service manual) and a declaration stating that a risk assessment has been carried out, establishing the safety requirements for the wind turbine, and that the wind turbine is designed and manufactured in accordance with the results of this assessment. Please see to section 4.
3.2	Wind turbines with a rotor area of 1 sq. m (rotor diameter less than 1.13 m) and less are exempt from registration in the Secretariat for the Danish Wind Turbines Certification Scheme.	

4. Requirements and procedures according to other legislation

4.1	Requirements placed in accordance with other legislation, including requirements pursuant to building legislation, environmental protection acts (noise), health and safety at work acts as well as electro-technical requirements pursuant to the Danish Electricity Supply Act and the High Voltage Executive Order and requirements in EU directives – shall be documented to the respective official bodies on request. Observance of EU's Machinery Directive EU has to be documented to the certifying company or to the Secretariat for the Danish Wind Turbines Certification Scheme.	When performing source noise measurements of wind speed and requirements to the location of a reference point and a reflecting measuring board the guidelines laid down in DS/EN 61400-11 may be used. In order to ensure the usability of source noise measurement as documentation vis-á-vis the authorities, they must be performed as accredited technical tests by accredited laboratories or persons accredited according to the Danish Ministry of the Environment's executive order concerning quality requirements for environmental measurements performed by accredited laboratories, certified persons etc. Measurement of the effect of power quality on the grid, including voltage fluctuations, flicker and harmonics are carried out according to the instructions TF 3.2.1 or 3.2.6 of the transmission system operator (TSO). At the time of erection of the wind turbines for the test and demonstration, a time for control of the power quality is agreed upon with the transmission system operator. EU's Machinery Directive is implemented in Denmark in The Danish Working Environment Authority's Executive Order no. 612 of the 27th of June, 2008.

4.2 The installation and user's manuals have to include the established requirements of EU's Machinery Directive as a minimum. The user's manual has to be in Danish and include maintenance requirements and emergency procedures as stated by the wind turbine manufacturer.	This means that each wind turbine must be equipped with an original declaration of compliance or a Danish translation thereof in order to document agreement with the safety requirements in the executive order. Every single wind turbine must be supplied with the following visible, easily readable and non-removable information: • The manufacturer's company name and address • Designation of the engine • CE labelling • Serial or type specification • Serial number, if available • Year of production To the extend it is found relevant, the manuals must include the following: • Information on transportation, packaging and unpacking, handling on site, component identification and weight, reception control. • Information on construction, erection and commissioning including procedure for bolt pre-tensioning and testing. • All requirements to education and instruction of staff carrying out inspection and maintenance with intervals as specified in the service manual and according to the instructions of this manual. • Description of the wind turbines subsidiary systems and how they operate. • Identification of components subjected to wear and criteria for replacement. • The prescribed lubrication intervals and amount of lubrication as well as identification of types of lubricants or other specific fluids to be used. • Inspection intervals and procedures for maintenance. • Procedures for functional inspection of subsidiary systems. • Complete chart of cords and their connections. • Time schedule for inspection and tightening-up of wires and bolts, including programmes for tightening and specifications of moments of stress and torque. • Guidelines for troubleshooting and correction of failures. • List of recommended spare parts • Drawings or illustrations relevant to mounting and

	installation. • Tool list.

5. Requirements and procedures for issuing certificates

5.1 A certificate is issued according to item 1 and 2 to the manufacturer or the supplier. The certifying company shall make a certification report containing documentation for the assessment of the manufacturer's documentation and the tests carried out. The report shall include as a minimum: • A reference list of all documents used for the type certification • An assessment of the validity of the documentation • An assessment of whether the tests carried out confirm the applied conditions for design. • Documentation of inspections carried out. The certificate shall include: • Name and address of the certifying company. Accreditation number and accrediting company shall be specified, if the certifying company is accredited. • References to the documentation used to comply with the requirements. • A certification number consisting of an identification of the certifying company and a serial number. • Period of validity • Date of issue of the certificate.	