

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.

1st May 2009

Exemption rules for certification of small wind turbines

Certification of wind turbines with a rotor area of 40 sq. m or less and with a rated power of maximum 25 kW (household wind turbines)

As an exemption to present rules in the Executive Order no. 651 of 26th June, 2008 regarding the technical certification of construction, manufacturing, installation, maintenance and service of wind turbines, the Danish Energy Agency has laid down that the abovementioned wind turbines may be certified according to §§ 12 and 13 in the Executive Order and according to the following technical requirements replacing Annex 4 of the Executive Order and the appurtenant guidelines.

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

A wind turbine with a rotor area of 40 sq. m or less and with a rated power of maximum 25 kW may be approved by a certifying company according to § 16 based on the requirements and procedures laid down in sections 1-4. The certification shall cover the individual wind turbine, including the tower and its foundation or mounting devices.

The rotor area of a wind turbine is the area perpendicular to the axis, described by the rotor part furthest away from the axis during one complete rotation.

The rated power of a wind turbine is defined as the power produced by the wind turbine at the rated wind speed as specified by the manufacturer.

Specifically located wind turbines for educational purposes, research, test or demonstration etc. as well as offshore wind turbines and wind turbines on ships are exempt from the certification scheme.

For a traditionally designed wind turbine with a horizontal axis the rotor area is defined as the windswept area, whereas in the case of a vertical axis wind turbine it is the area limited by a full rotation of the part of the rotor furthest away from the axis.

Wind turbines with a rotor area of 40 sq. m or less may be certified by an accredited company or by a company special approved by the Danish Energy Agency pursuant to recommendation by the Secretariat for the Danish Wind Turbine Certification Scheme.

Application for approval must be submitted to a certifying company, complete with documentation that will facilitate the evaluation and testing of the wind turbine with regard to safety requirements etc.

If requested, a wind turbine with a rotor area of 5 sq. m or less may also be approved based on the requirements and procedures laid down in section 2, applicable

Wind turbines without electrical output, producing mechanical energy for water pumping, heating etc. are exempt from the Certification Scheme.

to wind turbines with rotor areas of up to 40 sq. m.

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 in sections 1-3, this documentation may be included in a Danish certification. It is the certifying company assessing the validity of present documentation.

1. Certification of wind turbines with a rotor area of 5 sq. m or less (rotor diameter less than 2.52 m)

1.1 Wind turbines with a rotor area of 1 sq. m (rotor diameter less than 1.13 m) and less are exempt from certification.

These wind turbines are not exempt from any other legal demands, according to section 3.

1.2 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 executive order no. 612 of 27th June, 2008 concerning the design of technical facilities.

These wind turbines do not require a specific certificate. The registration is based on the presence of documentation for CE labelling, according to executive order no. 612 of 27th June, 2008 (Danish Working Environment Authority). Documentation must include manuals for installation and service (user's manual) as well as a declaration showing 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.

Further conditions regarding safety, quality and energy do not require verification.

2. Certification of wind turbines with a rotor area of 40 sq. m or less (rotor diameter less than 7.14 m)

2.1 The wind turbine must be designed and constructed to be automatically protected against runaway operation. The protection system must be fail-safe in case of isolated breakdowns in the wind turbine.

Runaway operation means that the rotation speed the rotor exceeds the nominal value, and that the turbine is unable to brake by itself.

2.2 Type certification shall, as a minimum,

Verification must be carried out by the cer-

comprise the verification of a test of the strength of 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 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 root pulling in the direction of the flap.
- Testing the device preventing runaway operation of the wind turbine. The device shall be tested at minimum wind speeds of at least 25% above nominal wind speed, minimum 12 m/s. Guidelines shall be drawn up informing users of how the device works, recurrent inspections and testing.
- Operational tests on one type of the 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. Also, 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.

2.3 For installation purposes, the wind turbine's safety shall be evaluated with regard

to the certifying company, based on documentation provided by the manufacturer or supplier.

If several towers can be used, each individual type must be tested.

The specified loads are based on a typical horizontal axis wind turbine with three rotor blades attached to the axis. As for other designs, further evaluation of the loads may be necessary.

If other design types are used, a test must be carried out, loading the individual rotor elements proportionally in relation to the securing point (or points) of the rotor.

The manufacturer must verify that the wind turbine will bring itself to a standstill, or limit its rotational speed under load condition corresponding to the given minimum wind speeds at which the turbine is tested.

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 company must assess whether the recommended foundation de-

to the desired foundation structure.

2.4 A certificate may be granted for test and demonstration of a wind turbine at a specific site for a limited period of three years maximum. The certificate is granted based on an evaluation of the safety requirements in sections 2.1 - 2.3, but does not include quality, energy or operating conditions.

3. 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 (including CE labelling requirements) shall be documented to the respective official bodies on request.

signs, including mounting devices for houses etc., are sufficient to hold the wind turbine under all conditions.

The conducted evaluations must be specified in the installation manual from the manufacturer or supplier.

The Danish Working Environment Authority's Executive Order no. 612 concerning the design of technical facilities must be adhered to.

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.

Each wind turbine must be supplied with the following visible, easily read and non-removable information:

- The manufacturer's company name and address
- Designation of the engine
CE labelling
- Serial or type specification.
- Serial number, if such is available
- Year of production

Every wind turbine model must have a user's manual, including requirements regarding maintenance and emergency procedures as stated by the manufacturer. The manual must also include non-regular procedures for unforeseen maintenance. The manual must identify parts that are exposed to wear and define criteria for their replacement.

To the extent in which it is deemed rele-

vant, the manual must also include the following:

- 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.
- Descriptions of the wind turbines subsidiary systems and how they operate.
- The prescribed lubrication intervals and amount of lubrication as well as identification of types of lubricants or other specific fluids to be used.
- Maintenance inspection intervals and procedures.
- 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.

4. The certificate is issued to the manufacturer/supplier. The certificate must 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 certificate.