

Wind Turbine Power Performance Testing

Supplementary requirements for the application of IEC 61400-12 under the Danish Approval Scheme for Wind Turbines.

7 March 2000

Danish Energy Agency

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Introduction

This document contains guidelines for the use of "IEC 61400-12: Wind Turbine Generator Systems, Part 12" in relation to type approval under the Danish Approval Scheme for Wind Turbines.

The power curve measurements can be carried out according to the international standard IEC 61400-12, provided the requirements given in the present document are fulfilled.

Terms and abbreviations as defined in the IEC standard are adopted here.

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Further Requirements and Clarifications

Definitions

1.3.10 Hub height

A 'local hill' or tower extension shall be considered rather as an extension of the tower than a variation of the terrain. Therefore, the hub height to be used for determining anemometer height shall include the local hill or similar.

2. Test Conditions

Equipment, test site, other test conditions and so on shall be selected so that the combined uncertainty expressed as the standard uncertainty of the AEP (annual energy production) does not exceed 7.0 % when using the Raleigh Distribution with a mean wind speed of 7.0 m/s.

2.2.1 Distance of meteorological mast

2.2.2 Measurement sector

The distance between the wind turbine and the meteorological mast shall be $2,5D \pm 5\%$.

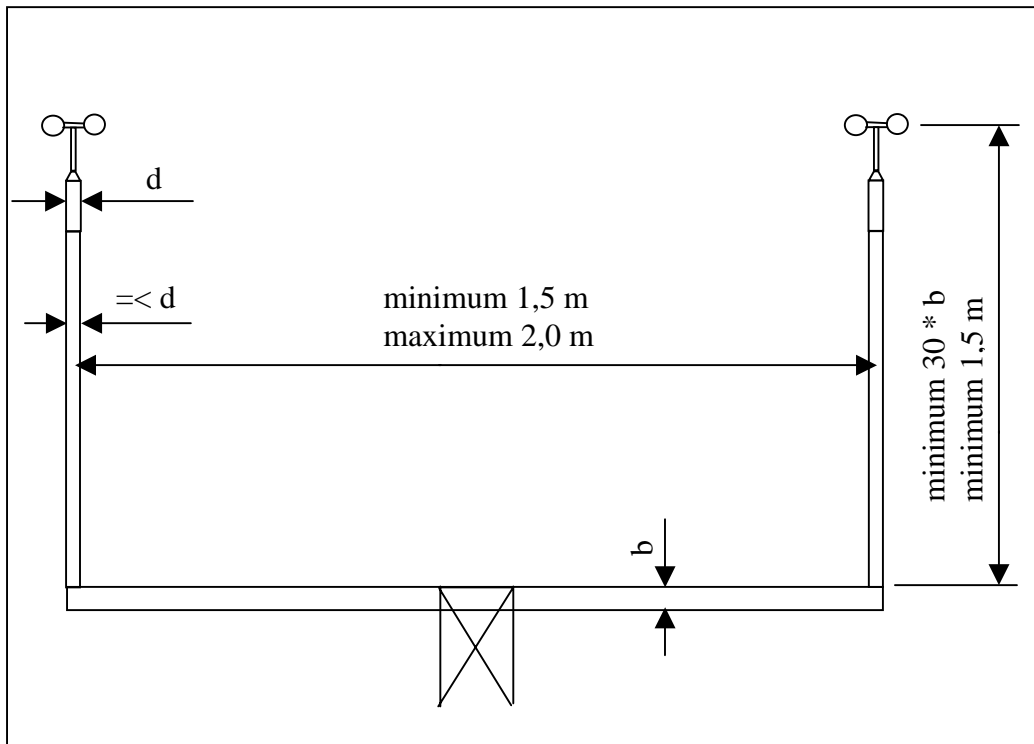
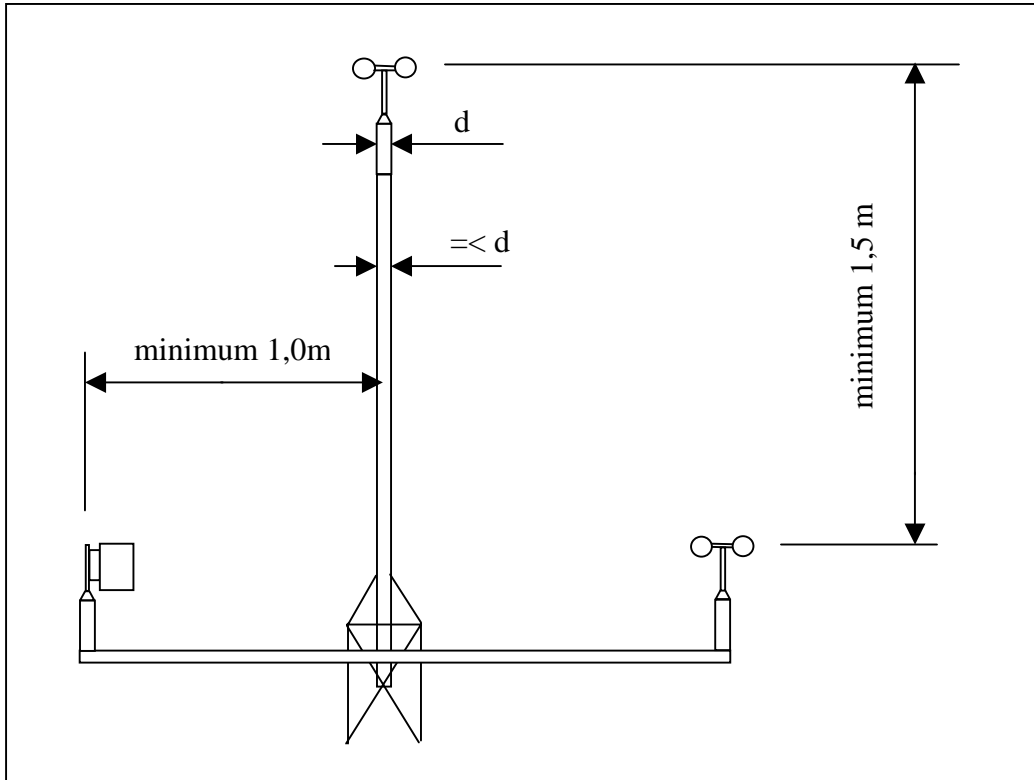
The measurement sector shall be $\pm 45^\circ$.

If the distance or the sector chosen differs from the above, there shall be given a quantification and justification of the influence of the deviation.

2.2.3 Correction factors and uncertainty due to flow distortion at the test site

The test site must comply with the requirements described in annex A. Test site calibration may only be used aiming at reducing the uncertainty related to the terrain to below 2.0 %.

3.2 Wind Speed



Anemometer must be placed in either of the two configurations shown above.
The boom shall be perpendicular to the line between the mast and the wind turbine.

5.1 Data normalisation

The normalisation procedure for WTGS with active power control should be applied to all other WTGS than stall-regulated WTGS with constant pitch and constant rotational speed.

6. Reporting format

- verified rotor diameter. The rotor diameter shall be measured. (Uncertainty <10 cm).
- blade data. The tip angle on a fixed pitch WTGS shall be measured. (Uncertainty < 0,2 degree).

Annex A, Assessment of test site

'Base of tower' is the intersection between the vertical axis of the tower and the surrounding terrain as described in 'hub height'.

Annex C, Evaluation of uncertainty in measurement

Total combined uncertainty.

At a Rayleigh distributed mean wind speed of 7.0 m/s the uncertainty of the annual power production must not exceed 7.0 %.