

BWEA Small Systems Technical Sub Group Clarification Note #1

This is a compilation from the minutes of the BWEA small systems technical sub group meeting of 17th September 2008, 26th November 2008, 21st January 2009, and the sub group meeting of the BWEA small systems technical sub group of 13th November 2008.

It is being published as a separate note to provide clarification for test laboratories and certification authorities regarding interpretation of the BWEA Small Wind Turbine Performance and Safety Standard (rev 29 Feb 2008), and of how the BWEA standard interprets and applies the standards it references.

1. Power Performance – anemometer calibration

With reference to IEC 61400-12-1 (2006) section 6.2 (p15) the need for the cup-type anemometer to be calibrated before and after the power performance test (in accordance with MEASNET) can be relaxed provided that:

- a. Two anemometers are used, one of which must be a cup-type anemometer.
- b. The cup-type anemometer must be calibrated prior to the power performance test.

CAUTION: If tests are conducted in accordance with this relaxation then they would no longer be admissible in accordance with a strict interpretation of IEC 61400-12-1 (2006).

Suggested text for next edition of BWEA standard:

New item:

New text required to be developed at the next revision.

2. Power Performance – derivation of invalid sectors

CAUTION: With reference to IEC 61400-12-1 (2006) section 5.2.2 (p14) and Annexes A, B, and C (p32 through 37 inclusive) it is strongly recommended that heed is taken of the requirement to maintain an audit trail regarding the derivation of invalid sectors and that this audit trail be unique to each test stand and for each machine on test.

Suggested text for next edition of BWEA standard:

No new text required. This is a caution because we are concerned that not all tests are being conducted with sufficient rigour.

3. Power Performance – data rejection

CAUTION: With reference to IEC 61400-12-1 (2006) section 7.4 (p18) attention is drawn to the valid reasons for rejecting data. In particular please note the following situations and how they should be interpreted if testing in accordance with the BWEA standard:

a. Power production trips due to high/low grid voltage etc

If power production ceases because the inverter etc correctly trips due to an externally imposed power condition then this period should be correctly rejected from the record.

b. Power production trips due to inverter etc instability

If power production ceases because the inverter or other part of the turbine system incorrectly trips when there is no valid external reason for rejecting data then this period should not be rejected from the record.

c. Power production cessation due to acoustic testing etc

If power production ceases because of acoustic testing needs or some other valid testing need then this period should be correctly rejected from the record.

Suggested text for next edition of BWEA standard:

No new text required. This is a caution because we are concerned that not all tests are being conducted with sufficient rigour.

4. Acoustic testing – correct operating status

CAUTION: With reference to IEC 61400-11 (2003) this should only be measured with the turbine operating in its power production mode, i.e. the same mode as that for the generation of the power curve. Note that any reduced (or increased) noise modes may be measured but should be clearly marked as such in all literature.

Suggested text for next edition of BWEA standard:

New item:

New text required to be developed at the next revision.

5. Acoustic testing – use of method

CAUTION: With reference to section 3 of the BWEA standard attention is drawn to the fact that this method is extremely rigorous. At the current time only one test laboratory has conducted tests which are known to be in accordance with this standard. This laboratory has tested at least six turbines in this manner. In principle many other test laboratories can conduct testing and perform reporting in accordance with this standard. However it is possible that testing organisations who have not engaged in a peer review process with this test laboratory will produce results that will be open to challenge. Bona fide test laboratories and certification authorities are encouraged to contact BWEA who will facilitate a peer review (e.g. using a round robin test or some other manner).

Suggested text for next edition of BWEA standard:

No new text required. This is a caution because we are concerned that not all tests are being conducted with sufficient rigour.

6. Duration Test – datalogging requirements

It has been asked whether the expensive power meters and anemometers can be moved from one site to another once the power curve test is completed. In this context provided that the criteria referred to in BWEA standard section 5.2.2 for 25 hours at 15m/s or greater and IEC 61400-2: 2006 section 9.4.1, i.e. 250 hours at 1.2 Vave and 25 hours at 1.8Vave, have been completed, then the remainder of the duration test per BWEA standard section 5 could be conducted using instrumentation sufficient to demonstrate 2500 hours of power production. **However** there is also a requirement in IEC 61400-2: 2006 section 9.4.2.3 which is not relaxed in the BWEA standard to perform a monthly analysis of performance using binned data and **in practice this probably means that it is necessary to leave the full instrumentation suite in situ for the full duration, or a substantially equivalent instrumentation suite that suffices section 9.4.2.3.**

Suggested text for next edition of BWEA standard:

No new text required.

7. Duration Test – reliable operation

The detailed inspection of the turbine system referred to in the last paragraph of IEC 61400-2:2006 section 9.4.2.1 is not required by the BWEA standard. This is because of the subjective nature of the examination is not compatible with the role of the certifying authority.

Suggested text for next edition of BWEA:

New item 5.3:

Except that the detailed inspection of the turbine system referred to in the final paragraph of IEC 61400-2: 2006 section 9.4.2.1 is not required.

8. Strength & Safety – design file review

The design file per BWEA standard section 4.1 shall be submitted to the certifying authority by the manufacturer. The certifying authority's sole role in respect of this file is to note that it exists.

Suggested text for next edition of BWEA:

Add new sentence to end of para 4.1:

The manufacturer shall prepare this design file and submit it to the certifying authority. The certifying authority's sole role in respect of this file is to note that it exists.

9. Strength & Safety; Duration Test – turbine class implications

The minimum duration test requirements cited in BWEA standard section 5.1 are derived from those for a class II turbine per section 6.2 of IEC 61400-2: 2006. The intention of the BWEA standard is that even class III, and class IV turbines must complete this **minimum** duration test requirement even where it is more onerous than the IEC standard applicable to the relevant class. With respect to class I turbines then they will have to complete the **minimum** duration test requirements as described in BWEA, and **additional** duration test requirements as described in IEC 61400-2: 2006 section 9.4.1. With respect to class S turbines the same principles will apply depending on whether they are intended for situations of less than class IV or greater than class I. Consideration of this issue has highlighted how important it is that the class of a turbine be correctly described in marketing etc literature especially as a turbine may be designed for e.g. class I but only tested to class II because of commercial and/or testing duration realities. Therefore the following text is recommended in the duration test report:

- *Turbine design complies with class X for average wind speeds (V_{ave}) of XX and reference wind speeds (V_{ref}) of XX.*
- *Turbine duration test complies with class Y for average wind speeds (V_{ave}) of YY and reference wind speeds (V_{ref}) of YY.*

Suggested text for next edition of BWEA:

Add clause in documentation section:

To be decided at next revision.

COMMENT: The practical effect of these duration test requirements as described in IEC 61400-2 and reinforced in the BWEA standard is that it will ordinarily not be cost-effective to conduct a commercial duration test of a (e.g.) Class I turbine at a Class II windspeed test site (etc) because of the cost implications of the length of time for which it would be necessary to occupy an instrumented test facility. Given the scarcity of commercial Class I windspeed test sites this poses a commercial challenge to manufacturers of Class I wind turbines. The BWEA technical sub-committee intends to approach NREL with a view to understanding the intent of the IEC 61400-2 (2006) committee so as to identify if an alternative testing approach would satisfy the same intent.

10. Errata

In section 4.1 of the BWEA standard it refers to "the aerolastic modelling methods in Section 7.9" of IEC 61400-2:2006. This should read "the aerolastic modelling methods in Section 7.5"

11. MCS - factory production control

CAUTION: Attention is drawn to IEC 61400-2:2006 section 5.3 and the BWEA standard section 8 which call for quality control measures. The Microgeneration Certification Scheme is not directly

part of the BWEA remit but it also has very stringent factory production control criteria that will require at least an annual factory inspection if an ISO 9000 system is not in place.

Suggested text for next edition of BWEA standard:

No new text required. This is a caution because of the implications for manufacturers.

12. Testing at remote sites

CAUTION: Testing is possible at sites which are not ordinarily under the direct control of the testing laboratories. Manufacturers are advised to contact their test laboratory early in this respect as testing on uncontrolled sites may not be as cost-effective.

Suggested text for next edition of BWEA standard:

No new text required. This is a caution because of the implications for manufacturers.

13. Uncertainty analysis

CAUTION: Attention is drawn to 3.4.14 of BWEA standard which refers to IEC 61400-14: 2005 and which deals with the analysis of uncertainty in acoustic measurements. This has considerable implications, especially for testing using uncalibrated or out of calibration equipment; and for testing by testing authorities who are not well versed in working with certification authorities.

Suggested text for next edition of BWEA standard:

No new text required. This is a caution because of the implications for manufacturers.

14. Other guidance

Bona fide test laboratories and certification authorities who encounter difficulty in interpreting the BWEA standard are encouraged to contact BWEA who will pass the request to the technical sub group. BWEA members may also seek guidance in this manner.

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