SEK TK 88 Annual Report 2012

Swedish participation in standardisation work in wind energy 2012

Elforsk rapport 13:08

Bengt Göransson

December 2012

Vindforsk
Energimyndigheten
ELFORSK

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Preface

The purpose of this project is to promote Swedish interests at development and revision of international standards in the wind energy sector.

The work has been carried out by members within the Swedish national committee of IEC/CENELEC, TK 88, which has met three times during 2012. The national body for this work is SEK Svensk Elstandard. Several of the TK 88 members participate in working groups in IEC and CENELEC.

The work has been carried out within the Swedish wind energy research programme Vindforsk III under the project number V-302. The activities are financed partly by this programme and partly by some of the participating members, namely SKF Sverige, Intertec Semko, SEK Svensk Elstandard and Arbetsmiljöverket whose delegates have participated in the work during 2012 on their own costs. Delegates from Vattenfall participate partly on their own cost.

Vindforsk III is funded by ABB, Arise Windpower, AQSystem, E.ON Elnät, E.ON Vind Sverige, Energi Norge, Falkenberg Energi, Fortum, Fred. Olsen Renewables, Gothia Wind, Göteborg Energi, Jämtkraft, Karlstads Energi, Luleå Energi, Mälarenergi, O2 Vindkompaniet, Rabbalshede Kraft, Skellefteå Kraft, Statkraft, Stena Renewable, Svenska Kraftnät, Tekniska verken i Linköping, Triventus, Wallenstam, Varberg Energi, Vattenfall Vindkraft, Vestas Northern Europe, Öresundskraft and the Swedish Energy Agency.

The work is supervised by a reference group consisting of:

Anders Björck, Vindforsk, chairman
Anton Andersson, E.ON Vind Sverige
Sven-Erik Thor, Vattenfall Vindkraft
Pär Larsson, Vestas
Bengt Göransson, Pöyry SwedPower, convener TK 88

Contributions to this report are given by:
Anders Andersson, SM Teknik
Anders Johnsson, Vattenfall R&D
Bengt Göransson, Pöyry SwedPower
Francesco Sottini, Eon Vind
Jan-Åke Dahlberg, Vattenfall Windpower
Petter Linderlöw-Marsden, Eon Vind
Pär Malmberg, SKF
Roger Larson, Intertek Semko
Åke Larsson, Vattenfall Windpower

Stockholm January 2013

Anders Björck

Elforsk, Electricity and Power Production

Vindforsk-III Programme manager

Sammanfattning

Det internationella standardiseringsarbetet inom vindkraftsområdet har under året drivits i ett stort antal arbetsgrupper inom IEC och CENELEC och svenska experter har varit aktiva i nio av dessa. Huvudman för det svenska standardiseringsarbetet är SEK Svensk Elstandard. De svenska intressenterna finns samlade i SEK:s tekniska kommitté TK 88. Verksamheten har under perioden delvis finansierats via Elforsks och Energimyndighetens program Vindforsk III. Övrig finansiering sker genom att vissa medlemmar deltar helt eller delvis på egen bekostnad. Projektet har sammanhållits av Bengt Göransson, Pöyry SwedPower, tillika ordförande i TK 88. Från verksamheten under året kan i första hand följande nämnas:

TK 88. Den svenska nationella kommittén har hållit tre möten under året.

CLC/TC 88. Arbetsmöte hölls i Delft främst för beslut om fortsättning med EN 50308 Committee Draft.

Konstruktionskrav. Revision av IEC 61400-1 utgåva 3, ”Design requirements”, till utgåva 4 pågår i maintenance team MT 01. Bl a nya lastfall och nya omgivningsparametrar ska läggas till, såsom tropiska stormar, starkt komplex terräng och kallt klimat.

Små vindturbiner. En uppgradering av IEC 61400-2: ”Design requirements for small wind turbines” från utgåva 2 till utgåva 3 pågår. En Committee Draft (CD) godkändes 2012 och en Committee Draft for Voting (CDV) är planerad för publicering tidigt 2013.

Växellådor. Utformning av standarden ”Design requirements for wind turbine gearboxes” bedrivs som ett samarbete mellan ISO TC 60 och IEC TC 88. ISO har godkänt dokumentet som standard och inom IEC har en Final Draft for International Standard (FDIS) skickats ut för omröstning.

Prestanda. Revisionsarbetet har varit uppdelat i tre delar. Svenskt deltagande endast i del 1.

IEC 61400-12-1, generella krav vid vind-effektmätning. En Committee Draft (CD) släpptes i november 2011 vilken resulterade i närmare 1200 kommentarer. En Committee Draft for Voting (CDV) väntas under 2013.

Sverige deltar inte i arbetsgrupp 2 och 3. Den tredje gruppen har lagts ner.

Kommunikation. Revision av IEC 61400-25-2 och -3 startade under 2012 och genomförs i en s k Joint Working Group (JWG 25). Inget arbete har ännu publicerats.

Tillgänglighet. Första delen IEC 61400-26-1 TS publicerades under 2011 som en Technical Specification. Andra delen planeras vara färdig under första halvåret 2013. Arbetet med del 3 har startat.

Elektriska simuleringsmodeller. Committee Draft (CD) för den första delen publicerades och röstades igenom under 2012. Arbetet med den andra delen har startat parallellt med att den första delen slutförs.

Personsäkerhet. Ett förslag till standard från arbetsgruppen skickades för behandling till CENELEC i början av 2012. Förslaget kunde inte accepteras som s k harmoniserad standard vid den granskning som företogs av en EU-konsult. Fortsättningen på arbetet är oklar.

Summary

The international standardisation work on wind turbines is under the responsibility of IEC and CENELEC and is carried out in the technical committee TC 88. The actual work is carried out in a number of working groups and Swedish experts have been participating in nine of these groups. National principal body for standardisation is SEK Svensk Elstandard. The Swedish stakeholders are organised in the parallel national committee TK 88 which has had three meetings during 2012. The work in TK 88 has been partly financed by Elforsk and Energimyndigheten through Vindforsk III. Remaining financing comes from some members' participation on their own cost. Bengt Göransson, Pöyry SwedPower, has been coordinating the work as chairman of TK88. The activities in the different working groups with Swedish participation are shortly presented below.

TK 88, Teknisk kommitte 88. The Swedish national committee has held three meetings during 2012.

CLC/TC 88, CENELEC Technical Committee 88. A meeting was held in Delft, the Netherlands in March for decision about EN 50308 Committee Draft.

Design requirements. The revision of 61400-1,"Design requirements", to Edition 4 started in 2011 through Maintenance Team, MT 01. The new work will incorporate new environmental issues like tropical storms, very complex terrain and cold climate.

Small wind turbines. Revision of IEC 61400-2: Design requirements for small wind turbines from Edition 2 till Edition 3 is underway. A Committee Draft (CD) for comments was acknowledged during 2012 and a Committee Draft for Voting (CDV) will be released in early 2013.

Gearboxes. The proposed standard "Design requirements for wind turbine gearboxes" is a joint project between ISO TC 60 and IEC TC 88. ISO has approved the standard and for IEC 61400-4 a Final Draft for International Standard (FDIS) was distributed in late 2012.

Performance. The revision has originally been divided into three parts with Swedish participation only in part 1:

IEC 61400-12-1, Power performance measurements of electricity producing wind turbines. A Committee Draft (CD) was published November 2011 which resulted in roughly 1200 comments. A Committee Draft for Voting is expected in early 2013.

There is no Swedish participation in the 2nd or 3rd maintenance teams and the 3rd team is closed down.

Communication. The revision of the communication standard IEC 61400-25-2 and -3 started in 2012. It is carried out as a Joint Working Group (JWG 25) between TC 88 and TC 57. There are no results published in 2012.

Availability. A first Technical Specification (TS) is published in 2011 as IEC 61400-26-1 TS. Part 2 is planned to be finalised before summer 2013. Work with part 3 has started.

Electrical simulation models. The work is split in two parts: Simulation models for single wind turbines and simulation models for windfarms. A Committee Draft (CD) for -27-1 was published in 2012.

Personal safety. A proposal for standard was sent to CENELEC in early 2012. The document was rejected as a harmonised standard at the review carried out by the authorised EU-consultant. The future work with the draft is unclear.

Valid IEC- and CENELEC-standards and Technical specifications with release date are shown in the table below.

Reference	Edition	Date	Title
IEC 61400-1	Edition 3.0	2005-08-31	Wind turbines - Part 1: Design requirements
IEC 61400-1-am1	Edition 3.0	2010-10-13	Amendment 1 - Wind turbines - Part 1: Design requirements
IEC 61400-2	Edition 2.0	2006-03-21	Wind turbines - Part 2: Design requirements for small wind turbines
IEC 61400-2	Edition 2.0	2006-03-21	Wind turbines - Part 2: Design requirements for small wind turbines
IEC 61400-3	Edition 1.0	2009-02-11	Wind turbines - Part 3: Design requirements for offshore wind turbines
IEC 61400-11	Edition 2.1	2006-11-28	Wind turbine generator systems - Part 11: Acoustic noise measurement techniques
IEC 61400-11	Edition 2.0	2002-12-10	Wind turbine generator systems - Part 11: Acoustic noise measurement techniques
IEC 61400-11-am1	Edition 2.0	2006-05-29	Amendment 1 - Wind turbine generator systems - Part 11: Acoustic noise measurement techniques
IEC 61400-12-1	Edition 1.0	2005-12-16	Wind turbines - Part 12-1: Power performance measurements of electricity producing wind turbines
IEC/TS 61400-13	Edition 1.0	2001-06-28	Wind turbine generator systems - Part 13: Measurement of mechanical loads
IEC/TS 61400-14	Edition 1.0	2005-03-22	Wind turbines - Part 14: Declaration of apparent sound power level and tonality values
IEC 61400-21	Edition 2.0	2008-08-13	Wind turbines - Part 21: Measurement and assessment of power quality characteristics of grid connected wind turbines
IEC 61400-22	Edition 1.0	2010-05-31	Wind turbines - Part 22: Conformity testing and certification

IEC/TS 61400-23	Edition 1.0	2001-04-26	Wind turbine generator systems - Part 23: Full-scale structural testing of rotor blades
IEC 61400-24	Edition 1.0	2010-06-16	Wind turbines - Part 24: Lightning protection
IEC 61400-25-1	Edition 1.0	2006-12-14	Wind turbines - Part 25-1: Communications for monitoring and control of wind power plants - Overall description of principles and models
IEC 61400-25-2	Edition 1.0	2006-12-14	Wind turbines - Part 25-2: Communications for monitoring and control of wind power plants - Information models
IEC 61400-25-3	Edition 1.0	2006-12-14	Wind turbines - Part 25-3: Communications for monitoring and control of wind power plants - Information exchange models
IEC 61400-25-4	Edition 1.0	2008-08-28	Wind turbines - Part 25-4: Communications for monitoring and control of wind power plants - Mapping to communication profile
IEC 61400-25-5	Edition 1.0	2006-12-14	Wind turbines - Part 25-5: Communications for monitoring and control of wind power plants - Conformance testing
IEC 61400-25-6	Edition 1.0	2010-11-29	Wind turbines - Part 25-6: Communications for monitoring and control of wind power plants - Logical node classes and data classes for condition monitoring
IEC/TS 61400-26-1	Edition 1.0	2011-11-14	Wind turbines - Part 26-1: Time-based availability for wind turbine generating systems
ISO 81400-4	Edition 1.0	2005-10-01	Wind turbines - Part 4: Design and specification of gearboxes
ISO 81400-4	Edition 1.0	2006-09-20	Corrigendum 1 - Wind turbines - Part 4: Design and specification of gearboxes

Ongoing development or revision work:

Project Reference	Title	Stage	Working Group	Forecast Publication Date
IEC 61400-1 Ed. 4	Wind turbines – Part 1: Design requirements	AMW	MT 1	
IEC 61400-3 Ed. 3	Wind turbines – Part 3: Design requirements for offshore wind turbines	AMW	MT 3-1	
IEC 61400-11 Ed. 3.0	Wind turbines - Part 11: Acoustic noise measurement techniques	CDIS	MT 11	2012-12
IEC 61400-12-1 Ed. 2.0	Wind turbines - Part 12-1: Power performance measurements of electricity producing wind turbines	1CD	MT 12-1	2013-07
IEC 61400-12-2 Ed. 1.0	Wind turbines - Part 12-2: Power performance of electricity producing wind turbines based on nacelle anemometry	RDIS	PT 61400-12-2	2013-03
IEC 61400-12-3 Ed. 1.0	Wind turbines - Part 12 - 3: Wind farm power performance testing	PWI	PT 61400-12-3	
IEC 61400-13 Ed. 1.0	Wind turbines - Part 13: Measurement of mechanical loads	AMW	MT 13	2013-01
IEC 61400-2 Ed. 3.0	Wind turbines - Part 2: Small wind turbines	CCDV	MT 2	2013-10
IEC 61400-21 Ed. 3.0	Wind turbines - Part 21: Measurement and assessment of power quality characteristics of grid connected wind turbines	AMW	MT 21	2014-12
IEC 61400-23 Ed. 1.0	Wind turbines - Part 23: Full-scale structural testing of rotor blades	CCDV	MT 23	2013-03
IEC 61400-25-2 Ed. 2.0	Review Report on IEC 61400-25-2 Ed.1: Wind turbines - Part 25-2: Communications for monitoring and control of wind power plants - Information models	AMW	JWG 25	2013-04

IEC 61400-25-3 Ed. 2.0	Wind turbines - Part 25-3: Communications for monitoring and control of wind power plants - Information exchange models	AMW	JWG 25	2013-12
IEC 61400-27-1 Ed. 1.0	Wind turbines - Part 27-1: Electrical simulation models for wind power generation	1CD	WG 27	2012-04
IEC 61400-4 Ed. 1.0	Wind turbines - Part 4: Design requirements for wind turbine gearboxes	CDIS	JWG 1	2012-12
IEC 61400-5 Ed. 1.0	Wind turbines - Part 5: Rotor blades	PWI	PT 61400-5	
IEC 61400-6 Ed. 1.0	Wind Turbines: Tower and foundation design	ANW	PT 61400-6	2015-12
IEC/TS 61400-26-2 Ed. 1.0	Wind turbines - Part 26-2: Production based availability for wind turbines	ANW	PT 61400-26	2013-04
IEC/TS 61400-3-2 Ed. 1.0	Wind turbines - Part 3-2: Design requirements for floating offshore wind turbines	ANW	PT 61400-3-2	2013-04
PNW 88-431 Ed. 1.0	Future 61400-27-2: Wind turbines - Part 27-2: Electrical simulation models for wind power generation - Wind power plants	PNW		2014-12

Abbreviations

ACDV	Draft approved for Committee Draft with Vote
ADIS	Approved for FDIS circulation
AMW	Approved Maintenance Work
ANW	Approved New Work
CCDV	Circulated Committee Draft with Vote
CD	Committee Draft
1CD	1st Committee Draft
CDIS	Draft circulated as FDIS
CLC	CENELEC

DTS	Draft, Technical Specification
FDIS	Final Draft international Standard
JWG	Joint Working Group
MT	Maintenance Team
PNW	Proposed New Work
PWI	Potential new work item
RDIS	Text for FDIS received and registered
TC	Technical Committee
TS	Technical Specification
WD	Working Draft
WG	Working Group
UAP	Unique Acceptance Procedure

Content

1 Background

Founded in 1906, the IEC (International Electrotechnical Commission) is the world's leading organization for preparation and publication of International Standards for all electrical, electronic and related technologies.

IEC provided a platform to companies, industries and governments for meeting, discussion and developing the international standards they require.

All IEC standards are fully consensus-based and represent the needs of key stakeholders of every nation participating in IEC work. IEC has today 60 full members and 22 associated members. Every full member state has voting rights with one vote each. Sweden is a full member. Associated members have no voting rights.

The work is organised in technical committees (TC) for specific areas in the electro-technical environment. Within each TC development of new standards is taking place in working groups (WG), project teams (PT) and maintenance teams (MT). Liaisons between different TCs or between IEC and ISO can result in work being carried out in Joint Working Groups (JWG). Each member state organises a national committee to guide its participation into IEC and technical committees for participation in a TC. The Swedish national body is SEK Svensk Elstandard. The technical committee for wind energy in IEC is TC 88.

The national committee of a country decides about its interest in participation in TCs. SEK Svensk Elstandard has organised a number of advisory groups to be able to fulfil its undertakings to IEC. These are the Swedish technical committees (Tekniska Kommittéerna, TK), which have been numbered conformingly as the corresponding IEC TCs. The members of a Swedish TK are generally those experts participating in the international working groups within the IEC TC.

CENELEC is the European standardisation body within electro-technology. The member states of CENELEC are the EU countries plus Switzerland, Iceland and Norway. The member states have committed themselves to automatically adopt CENELEC standards (EN, European Norm) as national standards. Most of the practical work to develop standards takes place within IEC with parallel voting to CENELEC, and this in line with the ambitions of CENELEC, but an IEC-standard has not automatically the same status within Europe.

IEC TC 88 develops international standards for wind energy applications in the IEC 61400 series. The standards cover all subsystems of a wind turbine and not only electrical matters. Standards cover requirements for design, testing and measurement methods, verifications procedures etc., in order to create a basis for design work, quality assurance and verification. One part of the standards regulates the procedures for certification of turbines and projects.

The wind standardisation process started in 1987 and the first standard, IEC 61400-1, was published in 1995. The scope of TC 88 was last reformulated in 2002 as: "To prepare international standards for wind turbines that convert wind energy into electrical energy. These standards address design requirements, engineering integrity, measurement techniques and test procedures. Their purpose is to provide a basis for design, quality assurance and certification. The standards are concerned with all subsystems of wind turbines, such as mechanical and internal electrical systems, support structures and control and protection systems. They are intended to be used together with appropriate IEC/ISO standards."

This work has created a comprehensive tool for the players on the market, with the possibility to compare equipment, sites and projects.

2 Activities

At present the TC 88 have 25 active so called P-members including Sweden. TC 88 has released 17 different standards for wind energy and has currently 16 active development projects. Sweden has 13 experts involved in standard development and maintenance in 10 different groups. Two of these experts are conveners.

For the Swedish utilities, which have an increased share of wind energy in their production portfolio, it is of great importance to being able to refer to relevant standards when they are acting as buyers and developers of wind technology. The most adequate areas at present, when installing wind turbines, are power performance and noise emission.

The communication with turbine suppliers has been simplified through the classification of sites and turbines as in IEC 61400-1.

Power companies with wind turbines of different brands in their production can use one communication protocol for the operation if the standard IEC 61400-25 is implemented. Standardised parameters can be used when defining the interface to the grid. Design levels and measurement methods are defined in IEC 61400-21. Standardised simulation models will be developed in the ongoing work to issue the IEC 61400-27. This standard is of particular interest for TSO's such as Svenska Kraftnät.

Good examples of the engagement from the industry is the SKF participation in the JWG on gearboxes, Skanska's new engagement in the development of a standard for foundations as well as the participation from AQ Systems, a manufacturer of sodar equipment, in the Power Performance working group. At the end of 2012 the foundation standard group will be joined by concrete expertise from Vattenfall.

For SKF it has been important to be able to influence the process for standardisation of gearbox design where bearings play a significant role.

Through participation in working groups Swedish representatives have had possibilities to influence the content of standards with regard of Swedish conditions. Examples are the standard for communication IEC 61400-25, where the starting point was communication protocols promoted by Vattenfall, and the offshore standard IEC 61400-3 where sea ice conditions have been included with Swedish research work as a base. This will also be the case for the revision of IEC 61400-1 when cold climate conditions will be added to the environmental conditions.

The Swedish group members and experts will also have the possibility to inform about and promote the standard work to Swedish stakeholders.

For future work TK 88 should be strengthened with one expert in acoustics and one taking part in the electrical power quality standardisation. The latter should be of particular interest for developers and TSOs.

TK 88 has had three meetings during 2012. This is the regular meeting frequency. A lot of work and exchange of information is carried out electronically. This is e.g. the case for voting on documents and distribution of information from IEC/CENELEC.

It is encouraging that a growing engagement form industrial partners is taking place. Swedish suppliers on the wind market have realised the possibility to influence the standard development through participation in working groups and maintenance teams. This can strengthen both the committee work and the Swedish suppliers on their European market. During 2012 the following changes have taken place in the committee:

- Karl Lundstedt, Skanska, has joined the committee. Karl is engaged in the sub-committee on geotechnical issues in PT 6, the project team for Standardisation of tower and foundation design.
- Lasse Johansson, AQ Systems, has joined the committee. Lasse is expert on acoustic wind measurement systems, SODAR and will join the MT 12-2, Power performance maintenance team.
- Manouchehr Hassanzadeh, Vattenfall Research & Development, has joined the committee. Manouchehr is a concrete expert and will also join PT 6

The 14 members of TK 88 during 2012 have been:

Bengt Göransson	Pöyry SwedPower	Chairman, Safety
Petter Lindelöw-Marsden	E.ON Vind Sverige	Secretary, Power performance
Jan-Åke Dahlberg	Vattenfall Vindkraft	Power performance
Anders Johnsson	Vattenfall Research & Development	Member, Standardised communication
Manoucher Hassanzadeh	Vattenfall Research & Development	Member, Foundations
Anders Andersson	SM Teknik	Member, Availability
Roger Larsson	Intertek Semko	Member, Small wind turbines
Henrik Lagerström	SEK Svensk Elstandard	Member
Ingvar Eriksson	SEK Svensk Elstandard	Member
Pär Malmberg	SKF Sverige	Member, Gearboxes
Bel Bergenwall	Arbetsmiljöverket	Member, Safety
Lasse Johansson	AQ Systems	Member, Power Performance
Roger Johansson	LO/SEKO	Member
Karl Lundstedt	Skanska	Member, Foundations

Work in expert groups within the IEC is also carried out by Francesco Sottini, Eon, MT 01, and by Åke Larsson, Vattenfall, WG 27. Below is a review of the work in working groups with Swedish participation within TC 88.

The composition of TK 88 is as in Figure 1.

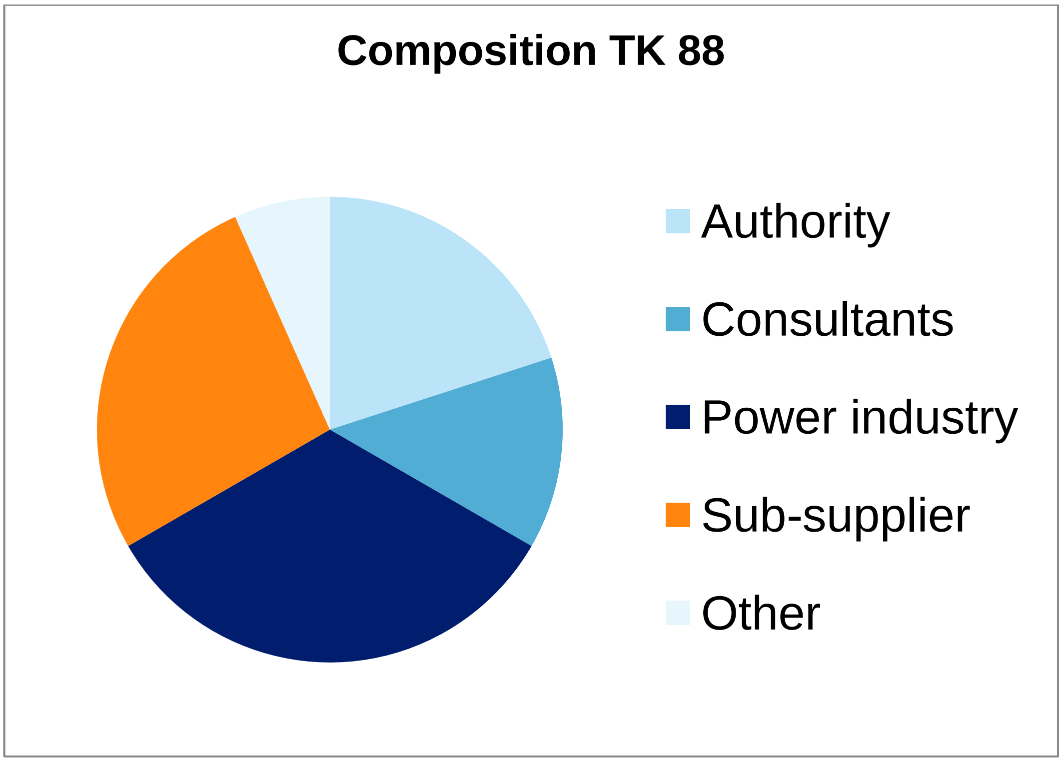

Figure 1 Composition of TK 88

2.1 IEC and CENELEC TC 88

2.1.1 Swedish participation

Bengt Göransson, Pöyry SwedPower, as chairman of TK 88

Anders Johnsson, Vattenfall Research & Development, as convener of JWG 25

2.1.2 Results during 2012

A meeting of CLC/TC 88, i.e. the European part of TC 88 was held in Delft, the Netherlands in March 2012. The main issue at the meeting was to decide about how to proceed with the Committee Draft of EN 50308. The meeting decided to promote the publication of the draft by seeking for a Unique Acceptance Procedure (UAP) through CENELEC. See also 2.3.

IEC/TC 88 has had limited activity during 2012. Next plenary meeting in TC 88 will be held in Kyoto spring 2013. TK 88 has nominated Bengt Göransson and Anders Johnsson to participate.

2.2 Design requirements

2.2.1 Standard and working group

IEC 61400-1, Design requirements, maintenance team MT 1.

2.2.2 Swedish participation

Francesco Sottini, Eon Vind Sverige

2.2.3 Purpose of the work

The revision of the 3rd edition of IEC 61400-1 started in 2011. The project includes new environmental conditions such as tropical storms and cold climate, simplified methods of load extrapolation and integration with construction codes.

2.2.4 Value of Swedish participation

Swedish input to the cold climate issue is important as this topic is not fully understood by “non-cold climate” participants of the maintenance team. Therefore the parameters of the environmental condition “cold climate” have to be checked and verified by Scandinavian experts. One very important issue is ice loads and throw of ice from ice covered wind turbines.

2.2.5 Results during 2012

Francesco has participated in the Cold Climate sub-committee. Now focus is on measurements of icing occurrence. A call for finding measurements and recorded data for icing situations and ice throw has gone out to the participants. With participation here Swedish windfarm operators can learn more about operation and maintenance in cold climate. Issues on ice throw, detection and measurement are tabled and discussed.

2.2.6 Remaining work

A first Committee Draft is expected in 2013. Francesco does not participate in the MT 1 plenary meetings.

2.3 Personal safety (CENELEC)

2.3.1 Standard and working group

EN 50308, Health and safety requirements, CLC WG 3.

2.3.2 Swedish participation

Bengt Göransson, Pöyry SwedPower, convener

Bel Bergenwall, Arbetsmiljöverket, secretary

2.3.3 Purpose of the work

To revise the existing standard EN 50308 and to have it harmonised with the Machinery Directive of 2006. This includes introduction of risk assessment, rules for lifts and lifting equipment and increased demands on information for use. As this is regarded as a purely European matter the work is carried out with a mandate from CENELEC. The work is pursued by the European Commission in line with the “New approach”, namely for the industry to refer to European standards as a method to fulfil the requirements of the European Directives.

2.3.4 Value of Swedish participation

This project is conducted from Sweden with Bengt Göransson as convener and Bel Bergenwall as secretary. Much of the experience from Arbetsmiljöverket (Swedish Work Environment Authority) has been tabled in the working group and issued in the working draft.

Bengt and Bel also participate in a working group under guidance of Energi-myndigheten (Swedish Energy Agency) addressing safety issues for the Swedish wind energy sector. This work is led by Karin Linnasaari at the wind centre in Strömsund.

Bengt has also reported the ongoing work at a seminar at Svensk Vindenergi (Swedish Wind Energy Association) and to a number of other Swedish stakeholders. This gives the possibility for the Swedish wind sector to have an early insight into the work.

2.3.5 Results during 2012

The working group WG 3 presented a final working draft at the end of 2011. This document had been sent out to the national committees of the participants in the working group and a number of comments were taken into the draft. At a meeting held in Delft in CENELEC_TC 88 in March 2012 it was sent for approval at CENELEC. The choice was to use a Unique Acceptance Procedure (UAP) which is a fast track to getting a standard published within a year. The process for approval is different from what is used in IEC. The common rule is that a harmonised standard proposal has to be reviewed by a consultant appointed by the EU. Unfortunately the proposed standard was refused by the EU Consultant revising it with respect to harmonisation with the Machinery Directive. A meeting with the Machinery Directive consultant Mr Borzetti from Italy, was held at the Dutch standard institute in Delft in September, where the comments and the possible way forward was discussed. The working group is divided in the view on how to proceed.

2.3.6 Remaining work

After the meeting with the Machinery Directive consultant, chairman and secretary of CLC/TC 88 and members of WG 3, two alternatives have derived from the continued discussion in the working group: Either to revise the document according to the EU Consultant’s directives or to try to issue the standard as a revision of the present EN 50308 but without harmonisation as a first step and then carry on with the harmonisation path. The first alternative involves a considerable amount of work for at least another year. On the other hand national authorities may not be interested in supporting a non-harmonised standard any more. CENELEC in Brussels is asked for support for any of the alternatives.

2.4 Small wind turbines

2.4.1 Standard and working group

IEC 61400-2, Design requirements for small wind turbines, MT 2.

2.4.2 Swedish participation

Roger Larson, Intertek Semko

2.4.3 Purpose of the work

The revision of IEC 61400-2, Design Requirements for small wind turbines, started in the end of 2008 and deals with an upgrading to Ed.3. Main target has been to revise load calculation methods and to reach a higher safety level as well as finding a possibility to incorporate the requirements from AWEA and BWEA in to the standard. This is also a liaison with IEA wind R&D Task 27 to achieve an acknowledged certification process for small wind turbines.

2.4.4 Value of Swedish participation

There are a few manufacturers of small wind turbines in Sweden. The safety of small turbines is promoted by a representative from the quality assurance and inspection business, such as Intertek. The experience from Roger's participation in the working group is that Sweden stands for the highest level of safety thinking for small turbines. It will benefit the whole industry if the safety is raised to a higher level than state-of-the-art.

2.4.5 Results during 2012

The comments generated from the Committee Draft (CD) have been compiled and a Committee Draft for Voting (CDV) was released in October which is due for voting in January 2013. TK 88 will support this CDV. Six out of seven Swedish comments to the CD were acknowledged.

2.4.6 Remaining work

A Final Draft for International Standard (FDIS) is scheduled for April 2013 and a revised standard for October 2013.

2.5 Offshore wind turbines

2.5.1 Standard and working group

IEC 61400-3, Design requirements for offshore wind turbines, MT 3.

2.5.2 Swedish participation

Bengt Göransson, Pöyry SwedPower, during 2012.

2.5.3 Purpose of the work

The standard IEC 61400-3 Ed.1, Design requirements for offshore wind turbines, was first published in February 2009. Revision work started in 2011. The work will take into consideration comments left from the premier development phase as well as experience from application of the standard. There will also be new environmental conditions added, e.g. tropical storms.

2.5.4 Value of Swedish participation

Bengt Göransson was editor for the annex for ice loads during the development of the 1st edition. It is important to include experience from implementation of the Ed. 1 and Swedish developers, together with Danish, are but few in the world with experience from development of wind turbine structures in a sea ice environment. A development of the standard considering sea ice is of great importance both to developers and builders of offshore windfarms in the Baltic Sea.

2.5.5 Results during 2012

Three maintenance team meetings have taken place whereof two in 2012. Bengt had no possibility to participate in the first two meetings. The ice issue was addressed at the 2nd meeting through a pm from Bengt, proposing involvement of well-reputed ice experts from Denmark and Finland. Bengt initiated a telecom-meeting that revealed that a subgroup with mainly Danish members has taken action together with these ice experts and earlier involved consultants and the revision of the ice loading part of the standard will take place without direct participation from Bengt. This is a good example of that involvement in the standardisation work on distance is also possible.

2.5.6 Remaining work

The time target for a Committee Draft (CD) is Q4 2012 but this is probably delayed until spring 2013. Bengt will participate in review of the tabled documents and follow the work closely, especially in the ice domain. There is no physical participation in the MT foreseen.

2.6 Gearboxes

2.6.1 Standard and working group

IEC 61400-4, Design requirements for wind turbine gearboxes, WG 4.

2.6.2 Swedish participation

Pär Malmberg, SKF

2.6.3 Purpose of the work

Edition 1 of the standard for gearboxes was published as ISO 81400-4:Ed.1. The ongoing revision is performed in a Joint Working Group (JWG) between IEC TC 88 and ISO TC 60 and will produce also an IEC standard in the 61400 series, i.e. a common standard.

2.6.4 Value of Swedish participation

Bearings are vital components in wind turbine gearboxes and there have been repeated bearing failures. As SKF is one of the leading suppliers of bearings for wind turbine gearboxes it is a key issue to participate in the standardisation of such equipment.

2.6.5 Results during 2012

A Committee Draft for Voting (CDV) was published in late 2010 and commenting was closed in May 2011. TK 88 supplied several comments. ISO has approved the standard and IEC voted to proceed with a Final Draft for International Standard (FDIS). IEC editor’s has requested clarifications and edits on the IEC/ISO 61400-4 FDIS. This has been done and the FDIS has been circulated for ballot closing early November. Sweden supports the FDIS.

2.6.6 Remaining work

The standard was planned will be issued as the IEC document IEC 61400-4 in 2012. However, IEC received many comments to the CDV and there have been errors in the handling of the comments from Germany and Denmark resulting in that comments were not received by IEC in time. IEC Germany has made formal complaints. Nevertheless, the standard is anticipated to be approved at the balloting ending in beginning of November.

2.7 Towers and foundations

2.7.1 Standard and working group

The IEC 61400-6 Tower and foundation design is developed in a project team PT 61400-6.

2.7.2 Swedish participation

Karl Lundstedt, Skanska

Manoucher Hassanzadeh, Vattenfall R&D

2.7.3 Purpose of the work

The purpose of this part of IEC 61400-6 is to provide a complete set of technical requirements for the structural and geotechnical design of onshore wind turbine towers and foundations. It will later be followed by the corresponding document for offshore applications.

2.7.4 Value of Swedish participation

Skanska is an important player in the foundation business. Participation in the work means, in addition to the necessary contribution with own knowledge to international work, that it also gives the opportunity for Swedish representatives to acquire knowledge from leading experts from other countries. Skanska has unique experience from building foundations in cold climate which is important to integrate into a standard. Manoucher Hassanzadeh from Vattenfall is a well-known concrete expert with considerable experience from concrete foundation studies. He can transmit important issues from Vattenfall, the world's 2nd largest offshore wind developer, into the standardisation work.

2.7.5 Results during 2012

The start of the work was delayed due to administrative errors and the first meeting of the Project Team (PT) was held in Denmark in August 2012. Karl is member of one of three subgroups, the geotechnical group. The other two sub-groups are handling concrete and steel. Manoucher has yet not participated in any meeting.

2.7.6 Remaining work

The plan is a Committee Draft (CD) in October 2013 for land applications. The project team will later also address offshore installations.

2.8 Power performance

The task with revision of IEC 61400-12 Power performance is split in two groups. There is active Swedish participation only in group 1.

2.8.1 Standard and working group

The IEC 61400-12 Power performance is split in two separate standards. There is active Swedish participation in IEC 61400-12-1, Power performance measurements of electricity producing wind turbines, MT 12-1. MT 12-2 is dealing with verification of power performance for single wind turbines.

Originally there was a 3rd working group dealing with verification for windfarms, but it is closed down due to lack of participants.

2.8.2 Swedish participation

Jan-Åke Dahlberg, Vattenfall Vindkraft

Petter Lindelöw-Marsden, Eon Vind Sverige

Lasse Johansson, AQ Systems

2.8.3 Purpose of the work

The purpose of this part of IEC 61400 is to provide a uniform methodology that will ensure consistency, accuracy and reproducibility in the measurement and analysis of power performance by wind turbines. The standard has been prepared with the anticipation that it would be applied by:

- a wind turbine manufacturer striving to meet well-defined power performance requirements and/or a possible declaration system;
- a wind turbine purchaser in specifying such performance requirements;
- a wind turbine operator who may be required to verify that stated, or required, power performance specifications are met for new or refurbished units;
- a wind turbine planner or regulator who must be able to accurately and fairly define power performance characteristics of wind turbines in response to regulations or permit requirements for new or modified installations.

The revision of the standard proposes to include and classify alternative measurement methods such as sonic, sodar and lidar anemometry. It introduces power curve measurements in cold climate. The standard aims at reducing the uncertainty in turbine performance by adjusting for the impact of varying shear and turbulence effects, both. It also aims at reducing the biases observed between different calibration wind tunnels.

The revision follows essentially the plan that was established during the first meeting in October 2007.

The main identified issues were:

1. Generic or site specific power curve.
2. The use of remote sensing wind measuring devices like sodar and lidar.
3. Allow other wind measuring devices than cup anemometers such as ultrasonic instruments.
4. Density correction of the power curve.
5. Correct or filter out the effects of turbulence and gradients.
6. Impose restrictions on the allowable slope of the terrain.
7. Site calibration, requirements and uncertainties.

2.8.4 Value of Swedish participation

Participation in the work means, in addition to the necessary contribution with own knowledge to international work, that it also gives the opportunity for Swedish representatives to acquire knowledge from leading experts from other countries.

Knowledge of power performance testing of wind turbines is essential and may have a strong impact on our ability to be successful in our development work. For Swedish stakeholders this may result in enhanced knowledge for turbine operation in typical Swedish forest terrain and in cold climate.

It will also give us the possibility to influence the requirements which will be included in the new standard.

2.8.5 Results during 2012

In 2012, three meetings with full participation of the working group have been held in addition to a number of sub-group meetings. The maintenance team MT 12-1 is now working on the revision of the existing Committee Draft (CD) and addressing the many national comments. The target is to finalise a draft Committee Draft for Voting (CDV) this year.

The maintenance team MT 12-2, Verification of power performance on single turbines, published a CDV. The members of TK 88 did not reach consensus on comments to the document and therefore Sweden abstained from voting. The CDV was acknowledged and a Final Draft for International Standard (FDIS) will be published at the end of 2012.

2.8.6 Remaining work

After the national voting and new comments being collected, the work continues during 2013 to compile the final standard.

2.9 Communication

2.9.1 Standard and working group

IEC 61400-25, Communications for monitoring and control of wind power plants, USE 61400-25, JWG 25

2.9.2 Swedish participation

Anders Johnsson, Vattenfall Research & Development, convener

2.9.3 Purpose of the work

It describes data and communication interfaces for monitoring and control of wind power plants and provides a way to connect systems from different manufacturer without extra gateways and expensive intermediate software. Furthermore the standardised and vendor independent names, structure and semantics for data provide means to process data from different wind turbines in a standardised way for operation, maintenance and evaluation. The standard is based on IEC 61850 which is a standard used for many domains such as substations, hydro power plants, distributed generation and others. Thus solutions, products and knowledge can be reused. As an example, tools to specify, configure and document communications for monitoring and control can be used for all parts of a wind power plants such as substation automation system, wind turbine monitoring and control systems, condition monitoring systems and meteorological stations. Any problems discovered are collected by the IEC 61400-25 users group USE 61400-25 and fed into the maintenance of the standard.

2.9.4 Value of Swedish participation

Sweden has been very active and driving the development of the first edition of the IEC 61400-25 series of standards. It describes data and communication interfaces for monitoring and control of wind power plants and provides a way to connect systems from different manufacturer without extra gateways and expensive intermediate software. Furthermore the standardised and vendor independent names, structure and semantics for data provide means to process data from different wind turbines in a standardised way for operation, maintenance and evaluation.

2.9.5 Results during 2012

A revision of the parts –2 and –3 has begun and the work is done in a joint working group (JWG 25) between TC88 and TC 57. Convener for this JWG 25 is Anders Johnsson. There is also a proposal to start work with Guidelines for users of IEC 61400–25. The revisions will take into consideration comments from the earlier development as well as experience from users collected in the Usergroup forum. Through the joint working group there is a harmonisation between 61400-25 and 61850-7 regarding Information models, extension of data object for operation of smart grids and transformation to Unified

Modelling Language (UML). A complete harmonisation and a stringent implementation in UML will require a more extensive reorganisation of the IEC 61400-25-2 standard. The group therefore plan for an intermediate solution in Edition 2 and a fully harmonised model in Edition 3.

There are no immediate results for 2012. The discussion about structure and how deep the revision should go, has not yet settled.

2.9.6 Remaining work

Future work during 2013 includes maintenance of the complete series of standards with special focus on harmonisation with related communication standards for utility automation, and to provide necessary input and requirements on configuration management to TC 57 WG 10, on IT security to TC 57 WG 15 and on common cross-domain solutions.

2.10 Availability

2.10.1 Standard and working group

IEC 61400-26, Availability for wind turbine generating systems, WG 26.

2.10.2 Swedish participation

Anders Andersson, SM Teknik.

2.10.3 Purpose of the work

The work with the Technical Specification (TS) for availability is split into three parts identified as:

1. TS 61400-26-1 Specify terms for time-based availability of a wind turbine generating system.
2. TS 61400-26-2 Specify terms for production-based availability of a wind turbine generating system.
3. TS 61400-26-3 Specify terms for time and production based availability of a wind power plant.

This standardisation work will fill an important information gap: Unified definitions of availability between different manufacturers and users.

The unified definitions of availability are highly requested by manufacturers, investors, owners and operators who wish to make contractual issues more comparable. Also requested by groups working with benchmarking where unified definitions is a prerequisite for comparable results.

2.10.4 Value of Swedish participation

There is a benefit also for Swedish wind plant owners and operators to have a more unified definition of availability. This issue was considered early in the

Swedish wind exploration as there was a need of conforming statistical data from the reporting turbines in the statistical system today called Vindstat. Anders Andersson built up this system in the 1980s and has large experience in this field.

2.10.5 Results during 2012

Three meetings were held during 2012. Part 2 of the Technical Specification is on-going and expected to be finalised in the next 6 months. The work on part 3 is initiated during 2012.

2.10.6 Remaining work

Part 3 will take another 18 months. This part is by far the most complex and also the most useful specification. This is due to the complexity of availability calculation for a complete wind plant. After a few years as Technical Specifications it will be considered to raise the status of the documents to International Standard.

2.11 Electrical simulation models

2.11.1 Standard and working group

IEC 61400-27-1, Electrical simulation models for wind power generation – Wind turbines

IEC 61400-27-2, Electrical simulation models for wind power generation – Wind power plants

2.11.2 Swedish participation

Åke Larsson, Vattenfall Vindkraft

2.11.3 Purpose of the work

The work is split into two different parts identified as:

1. IEC 61400-27-1: “Electrical simulation models for wind power generation-Wind turbines” specifies dynamic models for generic wind turbine concepts on the market, i.e. turbines with various types of electrical drive trains, such as directly connected asynchronous generators, DFIG of full power converters.
2. IEC 61400-27-2: “Electrical simulation models for wind power generation-Wind power plants” will specify dynamic models for complete wind farms including wind farm control and auxiliary equipment.

Today there are no verified standard models of wind turbines for electrical simulations, there are no standardised evaluation methods for models and there are no standardised methods for performing simulations. The consequence of this is that turbine manufacturers have made their own models and simulation routines, not possible to combine or compare in different software. This standard will develop verified generic simulation models overlapping this gap.

As both the number of wind turbines and their rated power increases, it becomes more and more important to study the impact of wind turbines on the grid. For the purpose of clarifying this both SvK and other TSOs have established Grid Codes. Dynamic simulations, with verified dynamic models, are necessary in order to decide whether a wind farm can meet the grid codes or not.

2.11.4 Value of Swedish participation

This work is important for developers, TSOs and other players designing and building windfarms and operating grids. For e.g. Vattenfall this is important for their engagement in their Swedish onland projects and their offshore projects in the UK. Åke Larsson has considerable experience in this field and is also working directly with the electrical connections of offshore wind farms. It is also important that the developed models really meet the requirements of e.g. SvK's grid codes for Sweden. This can best be achieved by Swedish participation directly in the working group. It is important that Swedish stakeholders communicate with Åke so that Scandinavian experience from windfarm operation is considered in the working group. This is assured with Åke's background in Vattenfall.

2.11.5 Results during 2012

The work during 2012 has been split between considering and incorporating comments from national committees to the Committee Draft (CD) for part 1 but also start up the work with part 2. Four meetings took place during 2012.

A first CD for -27-1 was published in January 2012. Swedish TK 88 supplied comments to the draft.

A proposal to start with -27-2 vas voted in IEC and the new work was approved. Åke was appointed expert from Sweden.

2.11.6 Remaining work

For part 1, comments to the CD have been collected and then been reviewed and processed by the working group. The work with part 2, Dynamic modelling for wind farms, was initialised during 2012.

2.12 Other activities

Bengt Göransson is pursuing the information activity about standardisation in Sweden. The participation in the CLC/TC 88 WG 3 has given opportunities to present the work in different forums and in this way increased the understanding of the necessity of safety at wind turbine erection and maintenance. In January 2012 the standardisation work was reported at

Vindforsk/Chalmers seminar in Göteborg. In March 2012 Svensk Vindenergi hosted a seminar on Health and Safety issues for the wind sector where Bengt will present the new standard proposal.

Bengt is also member of the Health and Safety forum at Svensk Vindenergi, chaired by Mattias Wondollek but no action has taken place during 2012.

Bengt has had a halfday seminar with Skellefteå Underhåll AB about the new standard proposal for personal safety.

Anders Johnsson has informed about the standardisation work of TK 88 on the SEK/ISO standardisation day in November in Stockholm.

A IEA-group for small wind turbines on buildings has started and two persons from Intertek will participate.

3 Conclusion

The standardisation of wind technology has been in process for about 20 years and the first standard was published 1995. The standards now available have created a platform for the actors in the wind energy sector, simplifying design work, testing, procurement and evaluation. Partners can use unison and well-defined parameters and terms in their language. The performance of the products and their applications can be analysed and compared.

It would not have been possible to be where we are today in wind utilisation and development without the standardised interfaces for power performance, noise emissions, turbine classes and electrical system performance.

It is important that this work can continue in areas still in the “grey zone”. Examples of such areas are tower and foundation design, availability definitions, power performance validations for complete windfarms.

The participation of Swedish experts in this development process is very important. Swedish experts have the possibility to influence the forming of the documents and in that way take Swedish interests into account. It gives an advantage when implementation of the standards takes place and they shall be communicated with the business. Swedish participation also gives the participating experts a professional understanding of the issued standards, which they directly can transfer to the Swedish wind sector.

The Swedish national committee has a reasonable composition of members even if a number of working groups in TC 88 are not represented. The main areas where Swedish stakeholders benefit from engagement in the standardisation work are design criteria on/offshore, bearing and gear design, power performance, communication, health and safety and electrical system simulation. It is encouraging that TK 88 has received two new members during 2012 willing to take active part in working groups for foundation design and power performance.

During 2013 maintenance activities in some teams in the IEC will cease. This also means that the structure of TK 88 may change.

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