

From: Frick, Robert J (GE Power & Water) [<mailto:robert.frick@ge.com>]

Sent: Friday, October 14, 2011 11:39 AM

To: Bachmann, Joanne

Cc: Rush, Mark (GE Power & Water); Brzezinski, Ronald J (GE Power & Water); Pyne, James (GE Power & Water); Olivier, Simon (GE Power & Water); Rostek, James R (GE Energy)

Subject: RE: NJCEP changes to the REIP Program for Wind and Small Wind Working Group - Tuesday Oct. 18 - 9:30am - 12:30pm

Joanne:

Thank you for including me on this e-mail.

As you may know, GE is the largest supplier of wind turbines in the US, and possibly the largest supplier in the world. We have over 17,000 turbines installed. The turbines that we currently offer range in nameplate rating from 1.5MW to 4.1MW. The smallest rotor diameter (i.e. swept area) is 77m (4656 square meters). The GE wind 1.5-77 wind turbine has by far the most MW installed in New Jersey, with a total of 7.5MW near Atlantic City and another 1.5MW to be erected imminently in Union Beach.

While I would not include GE Energy's wind turbines in the category of "Small Wind" turbines, I have noted there is a recommendation in the proposed changes that would impact our turbines from consideration in NJ. This is the proposed requirement that:

For turbines with a swept area of more than 200 square meters and therefore outside the scope of IEC 61400-2 or AWEA 9.1-2009, submission of:

- o Evidence of type certification by an entity that is accredited to provide product conformity certification to IEC Standard 61400-1, IEC Standard 61400-11 and IEC Standard 61400-12-1
- o Evidence that a power performance test conforming to IEC 61400-12-1 has been certified by a Nationally Recognized Testing Lab (NRTL) or independent certification body

GE certifies their WTGs per the IEC 61400-1 standard. However, we do not provide a 'Full Type Certification'. GE provides only an abridged 'A-Design Assessment'. The difference in the two approaches is predominantly around 'Manufacturing centers' certification. GE can provide manufacturing's ISO type programs if there's a real issue, which is rare.

I have attached the 1.6-XLE (82.5) A-DA as an example.

I would propose you adopt the abridged "A-design Assessment" as the standard, or you exclude turbines above a certain nameplate rating (ex: >1.0MW) from your classification of "Small Wind Turbines"

Bob

Robert J. Frick ("Bob")
Account Manager - Power & Water

GE Energy
475 Creamery Way
Exton, PA 19341

Office: 484-875-7054
Cell: 610-212-3856
e-mail: robert.frick@ge.com

Statement of Compliance for the A-Design Assessment

Registration-No.

44 222 10198463b-DA-GL, Rev. 0

Name und Anschrift
customer

GE Energy GmbH
Holsterfeld 16
48499 Salzbergen
GERMANY

Wind Turbine

**GE 1.6xle, 60 Hz, GE40xle2, HH 79.7m
Non-ESS and ESS Electrical Systems**

with the characteristic data given in the attached "Annex to Design Assessment"
has been assessed by TÜV NORD concerning the design.

WTGS Class IEC S / turbulence category B

Assessed acc. to

$V_{ave} = 8.5\text{m/s}$

Standard and Cold Climate Conditions

The design approval is based on the indicated documents as follows:

TÜV NORD Report No. 8000 198 463-1 EIV	Load assumptions 1.6xle, GE40xle2	Rev.0 dated June 2010
TÜV NORD Report No. 8000 198 463-1 EVII	Load Envelope	Rev.0 dated June 2010
TÜV NORD Report No. 8106 951 790-2-E	Safety Concept and Manuals	Rev.0 dated June 2010
TÜV NORD Report No. 8106 703 224-3 E II	Rotor Blade GE40xle2	Rev.0 dated Aug. 2010
TÜV NORD Report No. 8000 198 463-4 E	Machinery Components	Rev.0 dated June 2010
TÜV NORD Report No. 8000 198 463-5 E	Electrical Systems	Rev.0 dated June 2010
TÜV NORD Report No. 8000 198 463-6 E II	Tubular steel towers, hh79.7m	Rev.0 dated June 2010
TÜV NORD Report No. 8000 198 463-12 E	Nacelle Cover and Spinner	Rev.0 dated June 2010
TÜV NORD Report No. 8000 193 426-9 E	Commissioning "Windextend"	Rev.0 dated Oct. 2009
GL Report No. 72551-8	Commissioning	dated Feb. 2009



Normative references: Certification scheme:
Germanischer Lloyd WindEnergie GmbH "Guideline for the
Certification of Wind Turbines", Edition 2003 with Supplement
2004
in combination with
IEC 61400-1 "Wind turbine generator systems - part 1: Safety
requirements", Second Edition, 1999-02 and GL Wind - Technical
(only for loads) and Note 067, Certification of Wind Turbines for
Extreme temperature (here: Cold Climate), Scope of Assessment,
Ed. 2005, Rev. 2

Any change in the design is to be approved by TUV NORD. Without approval this Statement
loses its validity.

Please also pay attention to the information stated overleaf

TUV NORD CERT GmbH
Certification Body for
Wind Turbines

Dipl.-Ing. Christian Hering



Essen, 19th August 2010

Langemarckstraße 20 • 45141 Essen • Fon +49 (0)40 8557-2417 • Fax +49 (0)40 8557-2552

Annex to A-Design Assessment

No. 44 222 10198463b-DA-GL, Rev. 0



Principle technical turbine data of the GE 1.6xle, 60 Hz, GE 40xle2, HH 79.7 m Non-ESS and ESS Electrical Systems

Main data GE1.6xle, GE40xle2	Type Horizontal axis wind turbine with variable rotor speed
	Rotor diameter 82.5 m
	Power regulation Independent electromechanical pitch system for each blade
	Rated power 1600 kW
	Hub height 79.7 m
	Rated rotational speed 17.7 rpm
	Operating range rotational speed 10.2 - 19.35 rpm
	Cut-in wind speed 3.0 m/s
	Rated wind speed 10.8 m/s
	Cut-out-wind speed (10 min mean) 25 m/s
	Extreme wind speed (50-year-gust) 56.0 m/s (STW), 52.5 m/s (CWE)
	Annual average wind speed 8.5 m/s
	Design life time 20 years
	IEC 61400-1, class S with turbulence category B
	Climatic conditions
	<ul style="list-style-type: none">• Standard weather -10 °C +40 °C (Operation) -20 °C +50 °C (Survival) +15 °C (Annual average)<ul style="list-style-type: none">• air density: 1.225 kg/m³• Cold climate -30 °C +40 °C (Operation) -40 °C +50 °C (Survival) +5 °C (Annual average),<ul style="list-style-type: none">• air density: 1.269 kg/m³ -30 °C (min. operating temperature),<ul style="list-style-type: none">• air density: 1.452 kg/m³ -40 °C (min. temperature per year), air density: 1.514 kg/m³
Nacelle	Manufacturer GE Energy
	Drawing No. 104 W 1942 (Nacelle B) 104 W 2615 (Nacelle C) 123 W 1196 (Modular Nacelle) 123 W 1296 (Modular Nacelle)
Rotor	Cone angle 1.5°
	Tilt 4.0°
	Blade pitch angle Variable
	Orientation Upwind
Blade	Type GE40xle2
	Material Glass fibre reinforced epoxy resin
	Blade length 40.3 m
	Number of Blades 3
	Drawing No. 103 W 2724 Rev.B

Annex to A-Design Assessment

No. 44 222 10198463b-DA-GL, Rev. 0



Pitch System	Design Drawing No.	GE Energy 151X1225BA01EL02
Pitch bearing	Manufacturer	Rothe Erde
	Type	Ball bearing slewing ring
	Designation	092 45 1910 110.68.1421 092 45 1910 111.68.1421 092 45 1910 112.68.1421
	<u>alternative:</u> Manufacturer	GE Energy
	Designation	115 W 2552 G001 115 W 2552 G002 115 W 2552 G003
	<u>alternative:</u> Manufacturer	Kaydon
	Designation	16532001 16533001 16534001 16535001 16233001
	<u>alternative:</u> Manufacturer	Liebherr
	Designation	KUD258VJ805-001 KUD258VJ805-002 KUD258VJ805-003
Pitch drive	Type	3-stage planetary gearbox
	Manufacturer	Liebherr
	Designation	DAT 250 / 1468
	<u>alternative:</u> Manufacturer	Carraro
	Designation	392651
	<u>alternative:</u> Manufacturer	Nanjing High Speed Gear Manufacturing Co., Ltd
	Designation	FDX102M-01-00R1
Hub	Design	GE Energy
	Type	Cast
	Material	EN-GJS-400-18U-LT
	Drawing No.	115 W 1807 Rev.A &B
Hub cover	Manufacturer	Jupiter Plast A/S
	Drawing No.	123W1241, Rev.A
Main shaft	Design	GE Energy
	Type	Forged
	Material	34CrNiMo6
	Drawing No.	103W2231
Main bearing	Type	Double row spherical roller bearing
	Manufacturer	FAG Schaeffler Group
	Designation	240/600B.MB.R220.360

Annex to A-Design Assessment

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	<i>alternative:</i>	
	Manufacturer	SKF
	Designation	240/600 ECA/HM 2C 2HW33
	<i>alternative:</i>	
	Manufacturer	Koyo Seiko Co. Ltd
	Designation	240/600 RW 33TCS 280
	<i>alternative:</i>	
	Manufacturer	NTN corporation
	Designation	240/600BL1CS312S30
Main bearing housing	Design	GE Energy
	Type	Cast
	Material	EN-GJS-400-18U-LT
	Drawing No.	115W7044
Main gearbox	Type	Planetary helical gearbox
	Manufacturer	Winergy AG
	Designation	PEAB 4419
	Ratio	85.86
Main gearbox elastic foundation	Manufacturer	ESM GmbH
	Drawing No.	Ultrabuchse ML 97/003
Rotor brakes	Type	Hydraulik braking system
	No of callipers	1
	Position	High speed shaft of main gearbox
	Manufacturer	Svendborg Brakes
	Designation	BSAK 3000-MS 40S-103
Rotor lock	Design	GE Energy
	Drawing No.	115W2413
Generator coupling	Manufacturer	KTR Kupplungstechnik
	Designation	Radex N-165
	<i>alternative:</i>	
	Manufacturer	ATEC Weiss GmbH & Co. KG
	Designation	ARPEX ARS-4 KRZK 479-4
Main frame	Design	GE Energy
	Type	Cast
	Material	EN-GJS-400-18U-LT
	Drawing No.	115 W 6053 Rev. D 104 W 2032 Rev. C



Annex to A-Design Assessment

No. 44 222 10198463b-DA-GL, Rev. 0



Generator frame	Design	GE Energy
	Type	Welded part
	Material	ASTM A 572/A 572M
	Drawing No.	115 W 7274 115 W 2684 Rev.B
Yaw system	Type	Active, with yaw drives and hydraulic brakes with yaw bearing slewing ring
Yaw gear	Type	4-stage planetary gearbox
	Manufacturer	Carraro
	Designation	CA388829
	<u>alternative:</u>	
Manufacturer	Nabtesco	
Designation	RGS50B	
<u>alternative:</u>		
Manufacturer	Nanjing High Speed Gear Manufacturing Co., Ltd.	
Designation	FDX205G-00R3	
<u>alternative:</u>		
Manufacturer	Liebherr	
Designation	DAT 400/1474	
Yaw bearing	Type	Ball bearing slewing ring
	Manufacturer	Rothe Erde
	Designation	091 45 2334 006 64 1522
	<u>alternative:</u>	
Manufacturer	Liebherr	
Designation	KIJD 478 VA 804-000	
<u>alternative:</u>		
Manufacturer	Kaydon	
Designation	16531001 & 16232001	
<u>alternative:</u>		
Manufacturer	GE Energy	
Designation	115 W 6873	
Yaw brake	Type	Mechanical with spring washers
	Manufacturer	GE Energy
	Designation	Permanent yaw brake system
	Drawing No.	115 W 6389
Top Box	Design	GE ENERGY
	Designation	107W5345 P001
Generator (60 Hz)	Manufacturer	Winergy
	Designation	IFEC-500SS-06A
	<u>alternative:</u>	
	Manufacturer	Winergy
Designation	IFEC-500SS-06A (ESS)	
<u>alternative:</u>		
Manufacturer	Hitachi	
Designation	TFF-OAN-DQ (ESS)	

Annex to A-Design Assessment


No. 44 222 10198463b-DA-GL, Rev. 0



	Rated Power	1545 kW/1645kW
	Rated speed	1800 rpm/1915rpm
	Isolation class	F
	Degree of protection	IP54
Converter	Design	GE Energy
	Designation	151X1230KA01SA03 (ESS)
	<i>alternative:</i>	
	Design	GE Energy
	Designation	151X1228KA02SA01 (Non-ESS)
Tower	Design	Tubular steel tower with 3 sections
	Length	77.3m
	Drawing No.	123W1554 Rev. A (STW 1.6x1e) 123W1550 Rev. A (CWE 1.6x1e)
Control and safety system	Manufacturer	GE Energy
	Type	Mark VIe (ESS) Bachmann (NonESS)

End of Annex

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