

Certificazione SWT, rumorosità e compatibilità elettromagnetica

Hi-VAWT Technology Corp., Taiwan

Contenuti



Certificazione per piccole turbine eoliche



Test di piccole turbine eoliche, resistenza e sicurezza e audit di fabbrica



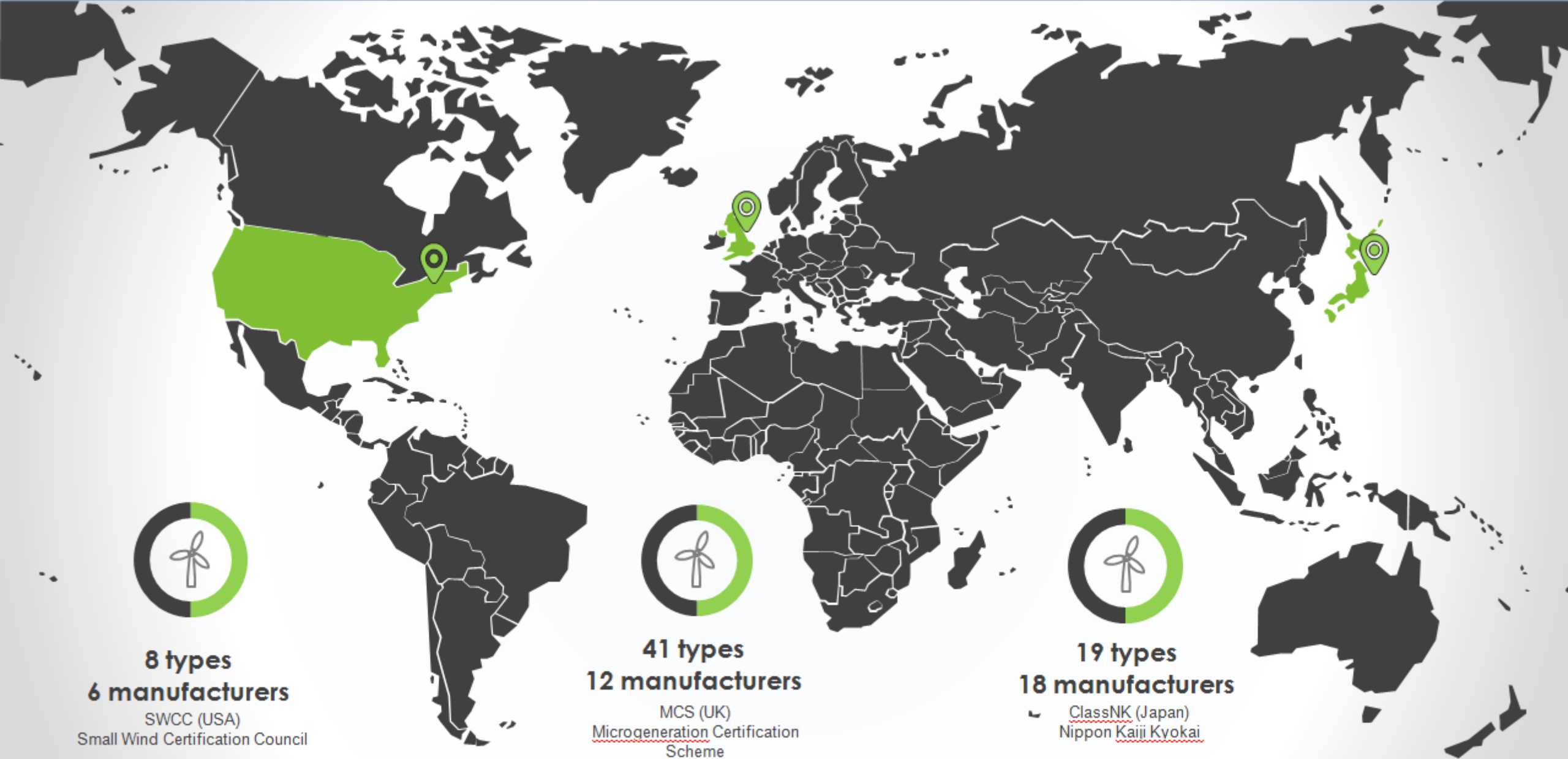
Valutazione del rumore



Test elettrici e EMC

Certificazione di tipo per turbine eoliche di grandi e piccole dimensioni

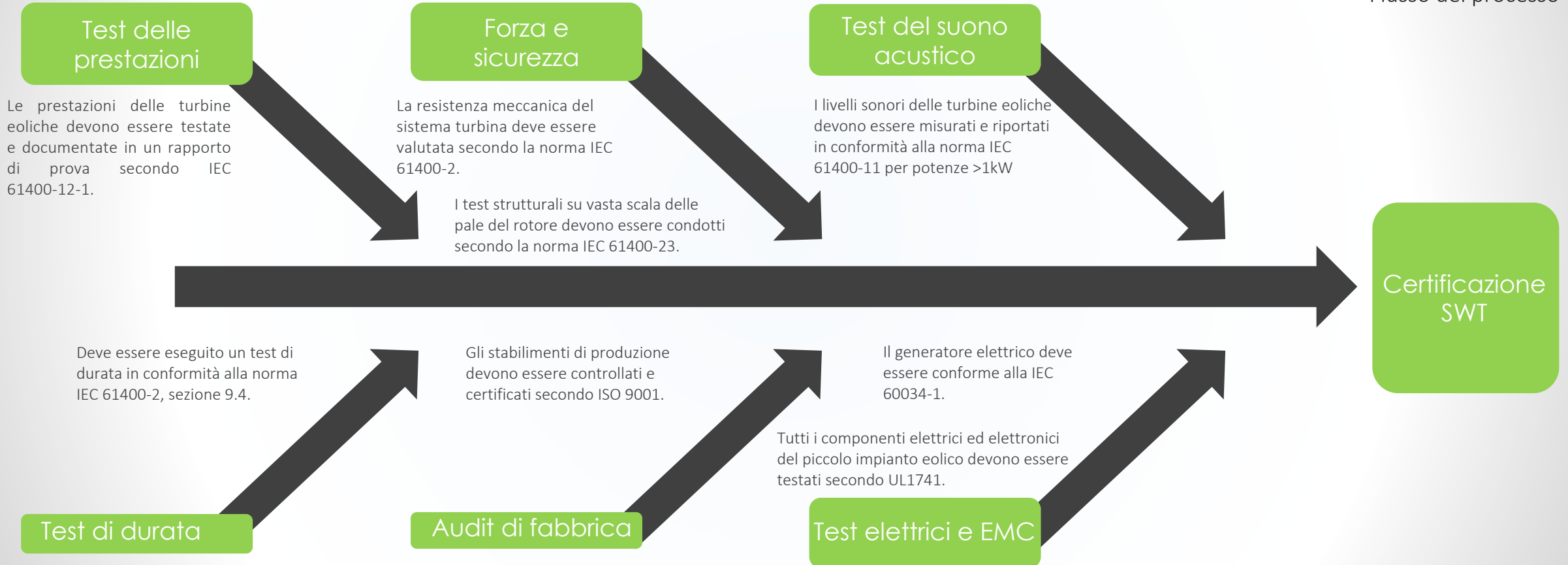
		Grandi turbine eoliche	Piccole turbine eoliche
Standard applicabile per tipo di certificazione		IEC 61400-22	AWEA SWT Standard o RenewableUK SWT Standard o JSWTA 0001 SWT Standard
Tipologia di test	Test delle prestazioni energetiche	IEC 61400-12-1	IEC 61400-12-1
	Test di durata	NON NECESSARIO	IEC 61400-22 Annex E, e IEC 61400-2 (9.4)
Forza e sicurezza	Valutazione del tipo di design della turbina	IEC 61400-1 Valutazione completa tipo turbina, casi di carico della turbina (7.4), Sistemi di controllo e protezione (8), Sistemi meccanici (9) e Sistemi elettrici (10)	IEC 61400-2 Valutazione del progetto limitato utilizzando: metodo di carico semplificato (7.4), o modellazione aeroelastica (7.5) o misurazione del carico (7.6)
	Test statico delle lame	<i>IEC 61400-23 (Opzionale)</i>	IEC 61400-23
Conformità di produzione	Audit di fabbrica	ISO 9001	ISO 9001
Tipo Misurazioni caratteristiche	Misurazioni qualità dell'energia	<i>IEC 61400-21 (Opzionale)</i>	NON NECESSARIO
	Misurazioni rumore acustico	<i>IEC 61400-11 (Opzionale)</i>	IEC 61400-11
Conformità alla progettazione della fondazione		<i>Local code (Opzionale)</i>	NON NECESSARIO
Progettazione dell'impianto elettrico	Test elettrici	IEC 61400-1 (10), e IEC 60034-1/UL 1400-1	IEC 61400-2 (10), e IEC 60034-1/UL 1004-1
	Test EMC	IEC 61400-1 (10), e UL 1741	<i>Non affrontato (opzionale)</i>



Certificazione per piccole turbine eoliche nel mondo

Certificazione per piccole turbine eoliche

Flusso del processo



Contenuti



Certificazione per piccole turbine eoliche



Test di piccole turbine eoliche, resistenza e sicurezza e audit di fabbrica




Valutazione del rumore



Test elettrici e EMC

Test delle prestazioni energetiche

IMPARTIALITY SERVICE INNOVATION EFFICIENCY



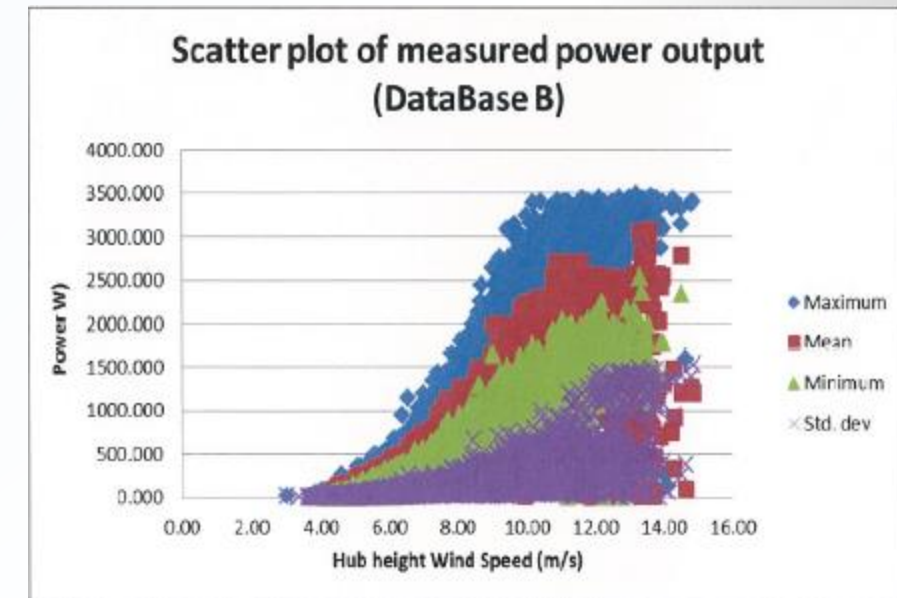
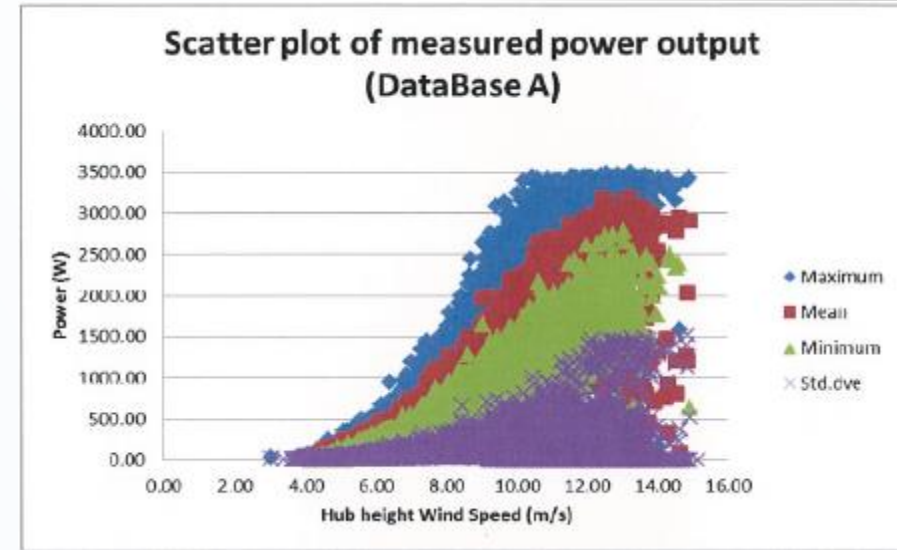
Wind Turbine Power Performance Testing Report

Report No.: WTR20130001
Released on: 6 November 2013

Laboratory: Penghu Wind Turbine Testing Laboratory
Address: 300 Liuhe Road, Magong City, Penghu County, Taiwan 880



Taiwan Electric Research and Testing Center



IEC 61400-12-1
Edition 1.0 2005-12

INTERNATIONAL STANDARD

Wind turbines –
Part 12-1: Power performance measurements of electricity producing wind turbines

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE XC

ICS 27.180 ISBN 2-8318-8333-4



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Taiwan Elect

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1001 Kaonan Highway, Kaohsiung, Taiwan 811 (R.O.C.)

TEL : 886-7-3513121
FAX : 886-7-3516528
Report No : 120614002-D-2



風力機
耐久測試報告

委託單位：新高能

測試機種：DS-30

單位地址：新北市林

測試地點：台南市七

測試日期：2012 / 07 / 0

測試標準：IEC

測試實

財團法人 金屬工業研究發展中

姓名	容丕達
測試人員	黃聰文
報告簽署人	

注意：(1) 本報告僅對測試結果負責
(2) 本報告未經書面



EUROPEAN STANDARD **EN 61400-2**
NORME EUROPÉENNE
EUROPÄISCHE NORM July 2006

ICS 27.190 Supersedes EN 61400-2:1998
English version

Wind turbines
Part 2: Design requirements for small wind turbines
(IEC 61400-2:2006)

Aérogénérateurs Windenergieanlagen
Partie 2: Exigences en matière de Tail 2: Sicherheit kleiner
conception des petits aérogénérateurs Windenergieanlagen
(IEC 61400-2:2006) (IEC 61400-2:2006)

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CENELEC

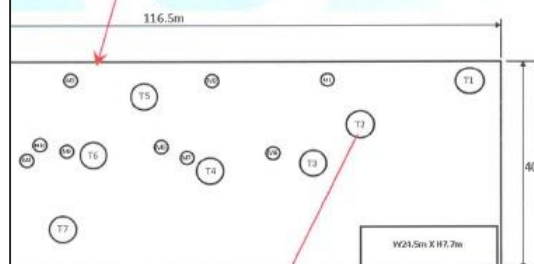
European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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測試場位置圖



風力機於測試場擺放位置

Test di durata

Centro di ricerca e sviluppo Metal Industries

6.2 Operational time fraction

Year	Month	T _T [hr]	T _N [hr]	T _E [hr]	T _U [hr]	O [%]
2012	June	744	0	24.0486	11.3142	100
2012	July	744	0	6.2203	7.9972	100
2012	August	720	0	0	7.8833	100
2012	September	744	1.77	49.0831	7.0219	99.7427
2012	October	720	0	47.0969	8.8286	100
2012	November	744	1	0	60.6167	99.8537
2012	December	562	0	0	4.1833	100
2013	January	744	0	24.0486	11.3142	100
Total		4978	2.77	126.4489	107.8452	99.9416

6.3 Hours of power production

Year	Month	Hours of power production	Hours of > 1.2 Times Vave	Hours of > 1.8 Times Vave
2012	July	345.5	1.8333	0
2012	August	415.5	31.6667	19.5
2012	September	408.5	40.8333	10.5
2012	October	491.3333	80.6667	0
2012	November	411.6667	18.6667	0
2012	December	539.5	75.1667	13.6667
2013	January	454.5	102.8333	4.1667
Total		3066.5	351.6667	47.8334

Forza e sicurezza

Valutazione della turbina utilizzando il metodo di gestione del carico semplificato

ICS 27.180		— 1 —	
中華民國國家標準	風力機—第2-1部:小型垂直軸風力機設計、性能及安全要求	總號	15176-2-1
CNS		類號	C4501-2-1
Wind turbines – Part 2-1 : Design, performance and safety requirements for small vertical axis wind turbines			
目錄			
節次		頁次	
前言		2	
1. 適用範圍		3	
2. 引用標準		3	
3. 用語及定義		3	
4. 技術要求			
4.1 技術範圍			
4.2 一般要求			
4.3 功率性能要求			
4.4 耐久性及運轉可靠度要求			
4.5 噪音要求			
4.6 支撐塔架及基礎要求			
4.7 控制器及變流器性能要求			
4.8 電力品質要求			
4.9 電磁相容要求			
5. 試驗法			
5.1 試驗場地			
5.2 系統之試驗及評估			
5.3 發電機試驗			
5.4 控制器及併網型變流器試驗			
6. 外觀防護			
7. 運輸及貯放			
8. 組裝及安裝			
9. 操作及檢修			
10. 標示			
11. 文件規定			
附錄 A(規定)關於 CNS 15176-12-1 小型風力機功率性能試驗之			
附錄 B(參考)小型垂直軸風力機簡易負載計算模式			
參考資料			

Limited Design Evaluation Report of DS3000 Wind Turbine Systems Structural Strength and Safety Analysis According to IEC 61400-2:2006

EUROPEAN STANDARD **EN 61400-2**
 NORME EUROPÉENNE
 EUROPÄISCHE NORM July 2006

ICS 27.180 Supersedes EN 61400-2:1998
 English version

**Wind turbines
 Part 2: Design requirements for small wind turbines
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Aérogénérateurs Windenergieanlagen
 Partie 2: Exigences en matière de Teil 2: Sicherheit kleiner
 conception des petits aérogénérateurs Windenergieanlagen
 (CEI 61400-2:2006) (IEC 61400-2:2006)

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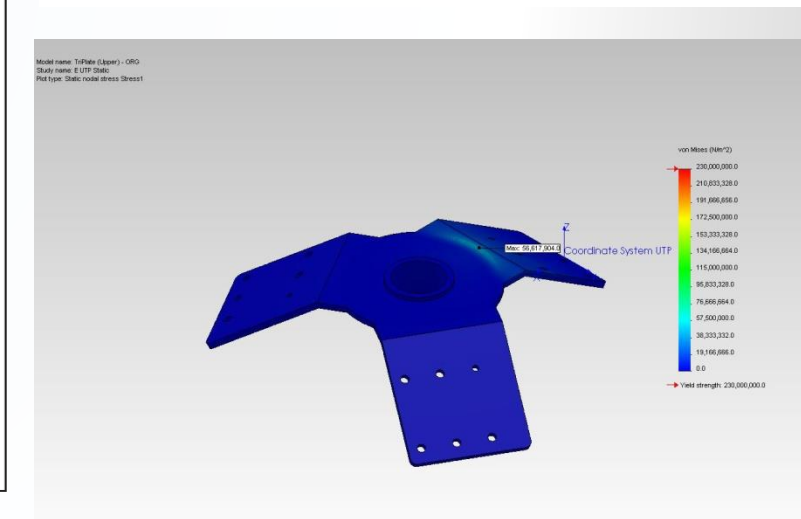
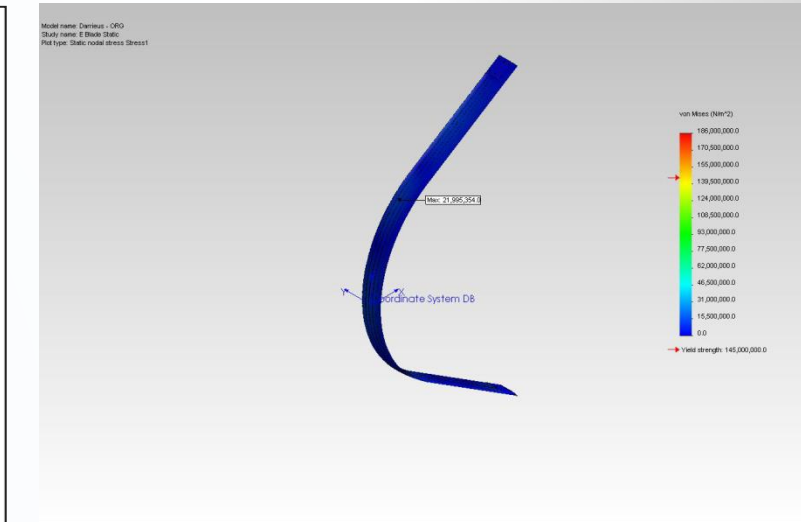
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Hi-VAWT Technology Corp. Ltd.
 No.168, Jhln 1st Road
 Linkou District, New Taipei City, 24443
 Taiwan, R.O.C.

Edition 2, 2013

CENELEC
 European Committee for Electrotechnical Standardization
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Forza e sicurezza

TECHNICAL SPECIFICATION IEC TS 61400-23

First edition
2001-04

Wind turbine generator systems –

Part 23:
Full-scale structural testing of rotor blades

Aérogénérateurs –

*Partie 23:
Essais en vraie grandeur des structures des pales*



Reference number
IEC/TS 61400-23:2001(E)

Test statico della lama del rotore

1. Fix the fixture



2. Arrange arm of boom



3. Scales to zero



4. Adjust the length of the chain



5. Pull up loading



6. Measure deformation



Audit di fabbrica

ISO 9001



ISO 9001

ISO 9001 è uno standard internazionale che fornisce i requisiti per il sistema di gestione della qualità (QMS) di un'organizzazione.

Contenuti



Certificazione per piccole turbine eoliche



Test di piccole turbine eoliche, resistenza e sicurezza e audit di fabbrica



Valutazione del rumore



Test elettrici e EMC



Metal Industries Research and Development Center
金屬工業研究發展中心
1001 Kaonan Highway, Kaohsiung, Taiwan 811 (R.O.C.)

TEL : +886-7-3513121
FAX : +886-7-3516528
Report No:
120614002-A-2-A01



Testing Laboratory
L2288

風力機

噪音量測報告

委託單位: 新高能源科技股份有限公司

測試機種: DS-3000 垂直軸風力機

單位地址: 新北市林口區竹林一路168號

測試地點: 台南市七股區下山子寮段62號

測試日期: 2012/09/11 日至 2012/09/15 日

測試標準: IEC 61400-11: 2006, Section 3 of AWEA Small
Wind Turbine Performance and Safety Standard:
2009

測試實驗室:

財團法人 金屬工業研究發展中心 中小型風力機系統測試實驗室

	姓名	簽章
測試人員	邱信豪	
報告簽署人	何鎮平	

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Valutazione del rumore

Centro di ricerca e sviluppo Metal Industries



IEC 61400-11

Edition 2.1 2006-11

INTERNATIONAL
STANDARD

Wind turbine generator systems –
Part 11: Acoustic noise measurement techniques

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE CJ

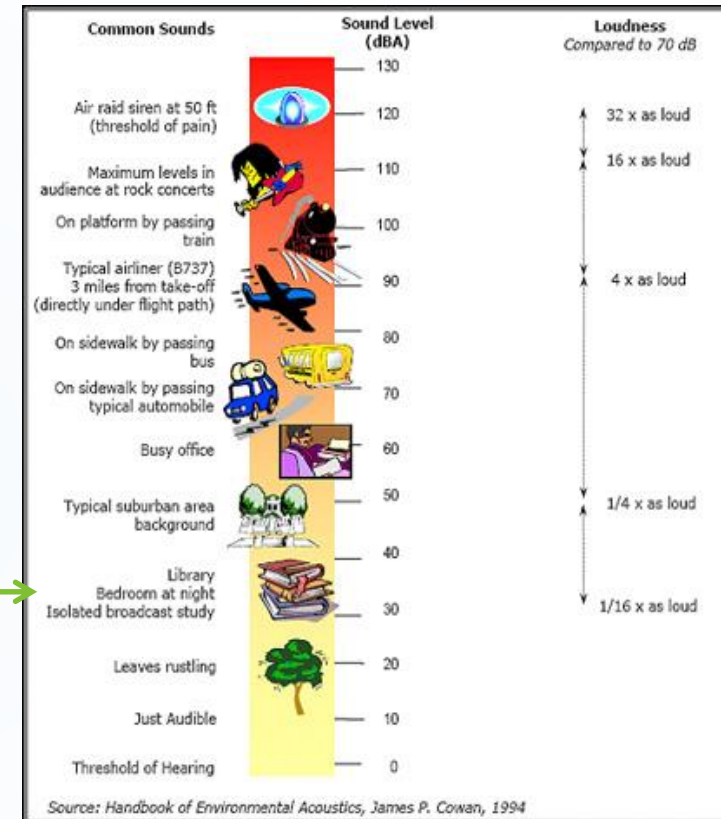
ICS 27.180

ISBN 2-8318-8802-4

Valutazione del rumore

與轉子中心 距離[m]	L _{AWEA} : 37.4 dB(A)				
	背景噪音位準(dB(A))				
	30	35	40	45	50
10	52.9	53.0	53.1	53.6	54.7
20	47.0	47.2	47.7	49.1	51.7
30	43.6	44.0	45.0	47.3	50.9
40	41.2	41.9	43.5	46.4	50.5
50	39.5	40.4	42.5	46.0	50.3
60	38.1	39.3	41.9	45.7	50.2
70	37.0	38.5	41.5	45.5	50.2
80	36.1	37.9	41.2	45.4	50.1
100	34.7	37.1	40.8	45.3	50.1
150	32.7	36.1	40.4	45.1	50.0
200	31.7	35.6	40.2	45.1	50.0

Spiegazione del risultato



Livello sonoro stimato AWEA

"Livello sonoro nominale AWEA" è il livello di pressione sonora (dB(A)) non superato dall'aerogeneratore per il 95% del tempo a una distanza di 60 metri dal rotore con una velocità media del vento di 5 m / s.

Livello sonoro nominale DS-700/3000

Con un livello sonoro nominale di 37,4 dB, il livello di rumore delle turbine eoliche DS-7007/3000 è paragonabile a quello della biblioteca o della camera da letto di notte.

Vorläufiges Ergebnis zur Geräuschemission

MY ENERGY WE 3.0

Die Messungen wurden bei 3°C Umgebungstemperatur durchgeführt nach 2007 (Windenergieanlagen – Teil 11: Schallmessverfahren)¹.

Auftraggeber: R&S Windenergy GmbH & Co. KG, Gu 35767 Gusternhain

Durchführung der Messungen: Dipl.-Ing. Nico Peterschmidt
INENSUS GmbH, Am Stollen 19, 38640
www.inensus.com, Telefon 05321/6855-

Eingesetztes Messgerät: RION NL-32 (Genauigkeit nach Klasse 1)

Ort und Datum der Messungen: Steyr, Österreich, 14.10.2009



Abbildung 1: Blick entgegen der Richtung des Windes auf den Rotor. Vorne Turmfuß entfernt das Messmikrofon auf einer schallharten Platte. In Blickrichtung Rotor wird in 10 m Höhe über dem Erdboden die Windgeschwindigkeit gemessen. Die Änderung der Windrichtung wird mit Hilfe eines Windsacks elektrische Leistung wird nach der Anlagenkennlinie ins Netz eingespeist.

¹ Abweichung von der Norm: Die Messungen konnten nicht abgeschlossen werden, weil vorläufige Messergebnisse dargestellt.

1 Ergebnis der Messungen

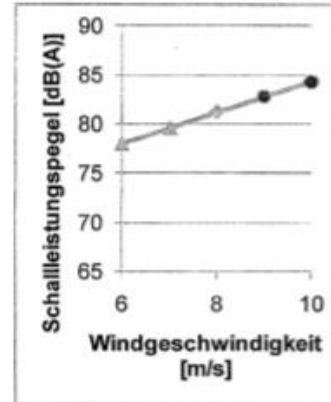


Abbildung 2: Aus den Messwerten berechneter Schallleistungspegel des Rotors im Normalbetrieb. Die dreieckigen Punkte weichen weniger als 3 dB vom Fremdgeräusch ab und dürfen nach EN 61400-11 im Abschlussbericht nicht dargestellt werden. Hier werden sie für die Extrapolation weiter aufgeführt. Die kreisförmigen Punkte wurden aus den Messpunkten bei den niedrigen Windgeschwindigkeiten linear extrapoliert. Die Werte wurden bzgl. des Fremdgeräusches korrigiert. Durch den Betrieb des Rotors erhöht sich der Schallpegel der Umgebung nur um 2,2 bis 5,3 dB; diese Messwerte sind zu niedrig, um sich deutlich vom Umgebungsgeräusch abzuheben und können daher nach EN 61400-11 nicht zur Berechnung des immisionsrelevanten Schallleistungspegels verwendet werden. Es handelt sich um vorläufige Ergebnisse, da die Messungen bei höheren Windgeschwindigkeiten noch nicht abgeschlossen werden konnten.

Für eine Windgeschwindigkeit von 10 m/s ergibt sich bei freier kugelförmiger Ausbreitung des Schallfeldes der Schallpegel vor dem Rotor in Abhängigkeit der Entfernung zu:

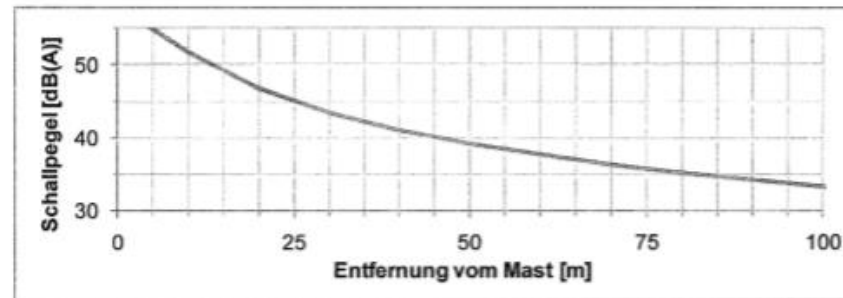


Abbildung 3: Angabe des Schallpegels 1 m über dem Boden in Abhängigkeit der Entfernung vom Mast.

Analysen des Terzbandes und der hörbaren Töne können erst nach Abschluss der Messungen durchgeführt werden.

Die in der TA Lärm vom 26. August 1998 nachts (22.00 bis 6.00 Uhr) festgelegten Pegel betragen:

- in Kerngebieten, Dorfgebieten und Mischgebieten 45 dB(A)
- in allgemeinen Wohngebieten und Kleinsiedlungsgebieten 40 dB(A)
- in reinen Wohngebieten, Kurgebieten, für Krankenhäuser und Pflegeanstalten 35 dB(A)

Goslar, den 19.10.2009


(Dipl.-Ing. Nico Peterschmidt)

Il valore di rumore è di 40dB a 10 m/s a 50 m di distanza



CONFIDENTIAL

Power, Durability, Acoustic
Performance and Safety and Function
Tests on a Model DS3000 Wind Turbine

A Report from TUV SUD Ltd for

Hi-VAWT Technology Corp.

Project No: HIE001

Report No: 2010/351
Issue 3

Date: October 2012



Rumore DS-700/3000

1. NESSUN problema di rumore armonico
2. Secondo il certificato SWCC, il rumore è di 42,3 dB
3. La differenza tra SPL pesato A e SPL pesato C non ha superato i 20 dB. (Solo circa 10 dB)

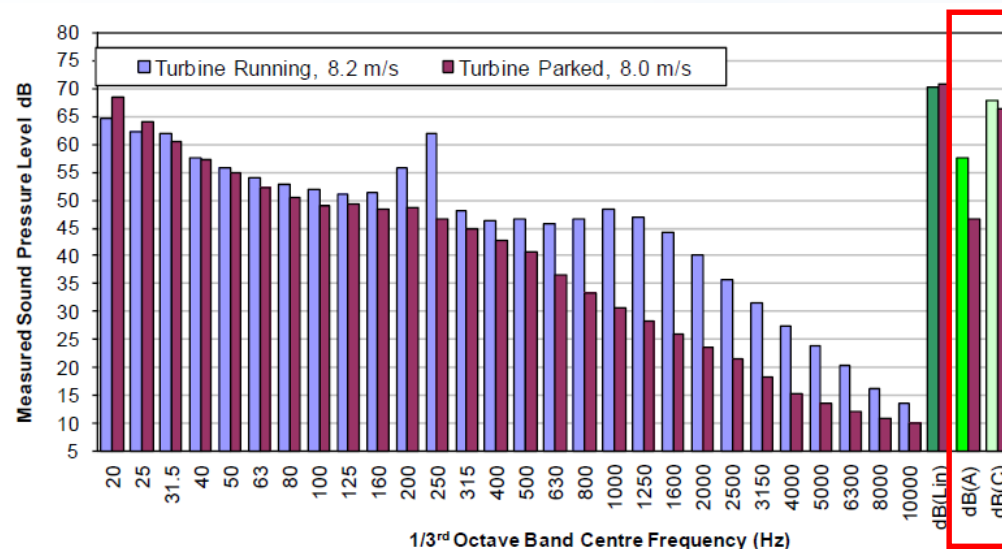


FIGURE 48 MEASURED SPECTRA AT 8 m/s

Valutazione del rumore

Rumore a bassa frequenza

Small Wind Certification Council (ICC-SWCC™)

Small Wind Turbine Certification

Manufacturer: Hi-VAWT Technology Corp.

Wind Turbine Model: DS3000
(240 VAC, 1-phase, 60 Hz)

Certification Number: SWCC-18-02

CERTIFIED
SMALL WIND TURBINE**Rated Annual Energy**

Estimated annual energy production assuming an annual average wind speed of 5 m/s (11.2 mph), a Rayleigh wind speed distribution, sea-level air density and 100% availability. Actual production will vary depending on site conditions.

2,460
kWh/year**Rated Sound Level**

The sound level that will not be exceeded 95% of the time, assuming an annual average wind speed of 5 m/s (11.2 mph), a Rayleigh wind speed distribution, sea-level air density, 100% availability and an observer location 60 m (~ 200 ft) from the rotor center.

42.3
dB(A)**Rated Power**

The wind turbine power output at 11 m/s (24.6 mph) at standard sea-level conditions.

1.4
kWCertified to be in Conformance with:
AWEA Standard 9.1 – 2009For ICC-SWCC Summary Report, Certificate and current certification status visit: www.smallwindcertification.org

A.3 Low frequency noise

A disturbance can be caused by low-frequency noise with frequencies in the range from 20 to 100 Hz. The annoyance caused by noise dominated by low frequencies is often not adequately described by the A-weighted sound pressure level, with the result that nuisance of such a noise may be underestimated if assessed using only an L_{Aeq} value.

It may be possible to decide whether the noise emission can be characterised as having a low-frequency component. This is likely to be the case if the difference between the A and C-weighted sound pressure levels exceeds approximately 20 dB.

In these circumstances, low-frequency noise may be quantified by extending the one-third octave band measurements described in the main body of the text, down to 20 Hz. For one-third octave bands, the 20, 25, 31.5 and 40 Hz bands should additionally be determined.

Narrowband spectra for frequencies below 100 Hz should be determined using a bandwidth smaller than one-half the blade passage frequency.



中華民國專利證書

新型第 M 341767 號

新型名稱：具功率因素調整之風力發電系統

專利權人：新高能源科技股份有限公司

創作人：謝德正、徐聖宗

專利權期間：自2008年10月1日至2018年4月22日止

上開新型業依專利法規定通過形式審查取得專利權
行使專利權依法應提示新型專利技術報告進行警告
經濟部智慧財產局

局長 王美花

中華民國

97



月

1

日

IL DISPOSITIVO PFC BREVETTATO Hi-VAWT RIMUOVE IL RUMORE ARMONICO

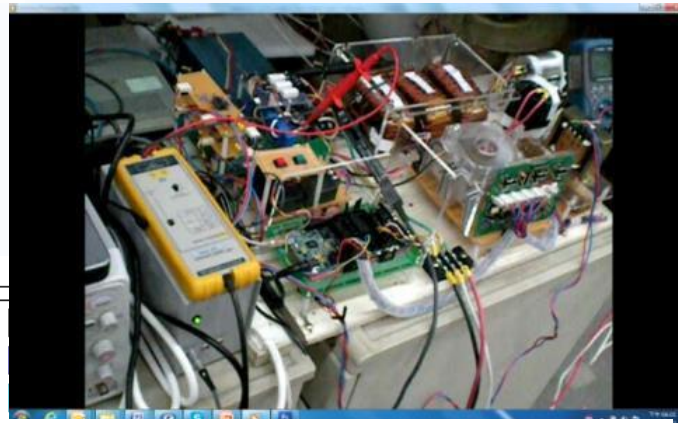
Ampezza



PFC

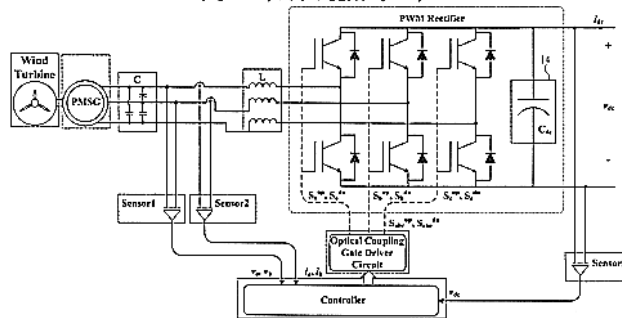
PFC disegnato per:

1. Ridurre la distorsione di corrente
2. Aumentare il fattore di potenza
3. Eliminare il rumore a bassa frequenza



裝置設計圖

裝置設計圖(可變頻式PFC)



Ampezza



Senza PFC, grande ampezza di rumore a bassa frequenza



Amplitude



Con PFC, minore ampezza del rumore a bassa frequenza

Turbina eolica a bassa rumorosità è idonea per applicazioni residenziali



Energy park in Germania



FAI DA TE IN GERMANIA

✓ Installazioni Applicazioni residenziali e commerciali



✓ Installazioni Applicazioni residenziali e commerciali



Tetto piano dell'Energy center del Politecnico di Torino



Albareto, presso sito di stoccaggio gas di Snam Rete Gas SPA

✓ Installazioni Applicazioni residenziali e commerciali



Catania Istituto Archimede progetto didattico



Porto di Ravenna, progetto Powered

✓ Installazioni Applicazioni residenziali e commerciali



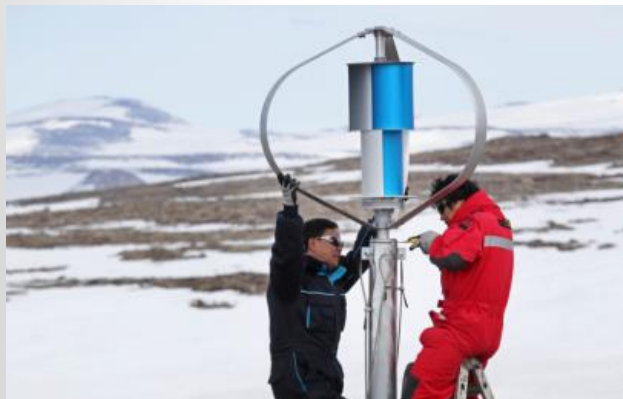
Edificio della regione a Bari, progetto eolico e panchine intelligenti

✓ Installazioni Applicazioni residenziali e commerciali



Botel 2.0 installazione di struttura galleggiante autonoma con fonte eolica e fotovoltaica presso Porto Ceresio

✓ Installazioni Applicazioni residenziali e commerciali



Polo sud, progetto di ricerca scientifica

Boa marina installata ad Augusta in Sicilia, progetto di monitoraggio acque marine

✓ Installazioni Applicazioni residenziali e commerciali



Palo ibrido eolico fotovoltaico presso sito Snam Rete Gas SPA a Gaggiano

Lampione eolico/fotovoltaico installato a Viladecans Spagna

Installazioni su tetto piano



Contenuti



Certificazione per piccole turbine eoliche



Test di piccole turbine eoliche, resistenza e sicurezza e audit di fabbrica



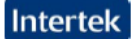
Valutazione del rumore



Test elettrici e EMC

Test elettrico del generatore

Intertek



AUTHORIZATION TO MARK

This authorizes the application of the Certification Mark(s) shown below to the models described in the Product(s) Covered section when made in accordance with the conditions set forth in the Certification Agreement and Listing Report. This authorization also applies to multiple listee model(s) identified on the correlation page of the Listing Report.

This document is the property of Intertek Testing Services and is not transferable. The certification mark(s) may be applied only at the location of the Party Authorized To Apply Mark.

Applicant: Hi VAWT Technology Corp.	Manufacturer: Hi VAWT Technology Corp.
Address: No. 168, Jhulin First Road, Linkou District, New Taipei City 24443	Address: No. 168, Jhulin First Road, Linkou District, New Taipei City 24443
Country: Taiwan	Country: Taiwan
Contact: Chance Wu	Contact: Joe Wu
Phone: +886-2-8601-4373#134	Phone: +886-2-8601-4373
FAX: +886-2-8601-1263	FAX: +886-2-8601-1263
Email: chance.wu@hi-vawt.com.tw	Email: joe.wu@hi-vawt.com.tw

Party Authorized To Apply Mark: Same as Applicant
Report Issuing Office: Taiwan

Control Number: 4005841 **Authorized by:** 

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Intertek
 185 Main
 Telephone 800-345-3

Standard(s):	Rotating Electrical Machines – General Electric Generator, ANSI/UL 1004-4, Motor and Generators, CSA C22.2 No.
Product:	Wind Generator
Brand Name:	HiVAWT (Trade name means)
Models:	WG-DS3000 WG-DS1500

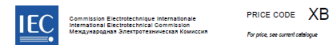
ATM for Report TP12060072-CT

INTERNATIONAL STANDARD IEC 60034-1

Eleventh edition 2004-04

Rotating electrical machines – Part 1: Rating and performance

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 International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
 Telephone: +41 22 919 21 11. Telefax: +41 22 919 20 20. E-mail: info@iec.ch. Web: www.iec.ch



UL 1004-1

Underwriters Laboratories Inc. Standard for Safety

Rotating Electrical Machines – General Requirements



UL 1004-4

Underwriters Laboratories Inc. Standard for Safety

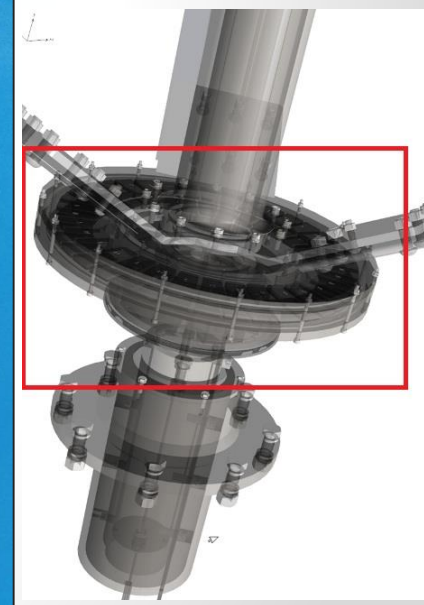
Electric Generators



Prove elettriche per generatori

Basato su IEC 60034-1 o varianti locali (ANSI / UL 1004-1 / -4, JEC 2137/2130, ecc.), Tra cui:

1. Prova di resistenza dell'avvolgimento.
2. Prova di resistenza.
3. Test di resistenza all'isolamento.



Test di compatibilità elettromagnetica

Laboratori MET

MET LABORATORIES, INC. CERTIFICATION RECORD



The applicant named below has been authorized by MET Laboratories, Inc. to represent the product(s) listed in this record as "MET Certified" and to mark these product(s) according to the terms and conditions of the MET Mark Utilization Agreement, MET Listing Reports, and the applicable marking agreements. Only the product(s) bearing the MET Mark and under a follow-up service are considered to be included in the MET Certification program. This certification has been granted under a System 3 program as defined in ISO Guide 67.

FILE NUMBER: E113489

APPROVAL DATE: June 10, 2013

REVISED: -

PRODUCT(S)	MODEL	ELECTRICAL RATINGS					
		Maximum voltage	Nominal Voltage	Phase	Frequency	Current	Maximum input short circuit current
PFC Control Cabinet	DS3000_GTCB_A	Input Rating					
		250 Vac	200 Vac	three	70 Hz, Max.	18 A ac, Max.	80 A
		Output					
		Maximum Voltage	Nominal Voltage	Maximum Current	Wattage	-	-
		420 Vac	400 Vdc	14.5 A dc	3100W, Max.	-	-
		AUX POWER					
Maximum Voltage	Nominal Voltage	Maximum Current	Frequency	--	--		
264 Vac	240 Vac	0.4 A	47 Hz ~ 63 Hz	--	--		
80 Vdc	48 Vdc	0.5 A	--	--	--		

STANDARD NUMBER	STANDARD TITLE	EDITION
UL 1741	UL Standard for Safety Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources	Second
CSA C22.2 NO 107.1-01	General Use Power Supplies	Third

MET LABORATORIES, INC. requires that any and all changes proposed in the previously identified product(s), that affects the information contained in the above referenced listing report, must be submitted to MET for evaluation prior to implementation to assure continued MET Certification status.

The above identified product(s) has/have been submitted by the applicant:

APPLICANT:

Hi-VAWT Technology Corp.
No. 168, Jhulin First Road
Linkou District, New Taipei City 24443
Taiwan

The covered products shall be subjected to follow-up inspections to ensure that the Certified product(s) are identical to the representative product sample evaluated by MET LABORATORIES, INC. and that all manufacturer's responsibilities are being fulfilled as specified in the MANUFACTURING RESPONSIBILITY section of the Certification report.

Rick Cooper
Director of Laboratory Operations,
Safety Laboratory



MET Laboratories, Inc. is accredited by OSHA and the Standards Council of Canada.
The Nation's First Nationally Recognized Testing Laboratory

NRTL

Test EMC

Le emissioni elettromagnetiche sono regolamentate per evitare interferenze alla ricezione di trasmissioni radiofoniche e televisive e a servizi sensibili come la radioastronomia e la radionavigazione.

Tutti i componenti elettrici ed elettronici del piccolo impianto eolico sono testati secondo UL1741.

Queste misurazioni / prove vengono condotte:

1. Misure di tensione massima
2. Test di temperatura
3. Prova di tenuta alla tensione dielettrica
4. Test anormale
5. Prova di impedenza di messa a terra
6. Test antistrappo
7. Carico statico
8. Prova di cortocircuito

