



Rampion Offshore Wind Farm



ES Section 27 – Noise Appendices 27.1

ACSL

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APFP Regulation 5(2)(a)

Revision A

E.ON Climate & Renewables UK Rampion Offshore Wind Limited

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CERTIFICATE OF CALIBRATION

Model: Norsonic 140

Serial No: 1402810

Organisation: RSK Environment Limited, 18 Frogmore Road, Hemel Hempstead
Hertfordshire HP3 9RT

Job Number: 2013

Customer Order Reference: G Youn

The Sound Level Meter was assessed for conformance with International Standards *IEC 60651* and *IEC 60804* using test procedures described in *BS 7580* Part 1. The meter claims Type 1 accuracy conformance and it was against these requirements that all the results were evaluated.

The sound level meter was fitted with a Norsonic 1225 measurement microphone Serial No. 72943 and a Norsonic 1209 preamplifier Serial No. 12227. The microphone has a nominal capacitance of 20 pF and the device used to apply electrical signals to the preamplifier was of the same nominal capacitance.

A Cirrus CR:511E Acoustic Calibrator Serial No: 037732 was supplied with the meter and was utilised in establishing the initial acoustic calibration setting.

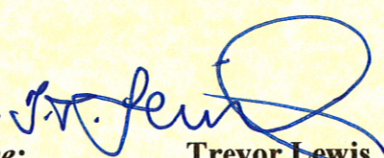
The sound level meter passed all applied tests with no deviations from Type 1 specification, in accordance with *IEC 60651* and *IEC 60804*. Accordingly, the meter meets the requirements of *BS 7580* Part 1.

The sound level meter should be set to read 93.8dB when used with the associated acoustic calibrator, microphone and preamplifier as detailed above at reference atmospheric pressure.

All ACSL's calibration instrumentation is fully traceable to National Standards. The acoustic references are calibrated by laboratories which are UKAS accredited for the purpose.

Certificate No: 13841

Date of Issue: 8th November 2011

Signature: 

Print Name:

Trevor Lewis

Registered Office: HW Associates, Portmill House, Portmill Lane, Hitchin, Hertfordshire SG5 1DJ
Registered No: 4143457 VAT No: GB 770505441
Directors: Trevor J Lewis, Owen R Clingan MIOA

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CERTIFICATE OF CALIBRATION

Model: Cirrus 511E

Serial Number: 037732

Organisation: RSK Environment Limited, 18 Frogmore Road, Hemel Hempstead
Hertfordshire HP3 9RT

Job Number: 2013

Customer Order Reference: G Youn

The acoustic calibrator was run for a period of time until a stable level was measured. The output level was compared to the certified level of the laboratory measurement references. The measurements were repeated 5 times and the average value calculated.

The ambient temperature during calibration was $24.0 \pm 1^{\circ}\text{C}$.
The barometric pressure was 100.8 to 100.9 kPa.

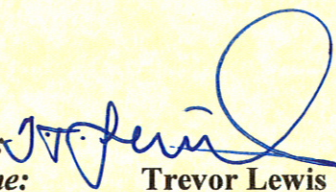
The output of the acoustic calibrator when applied to the Norsonic 1225 is 93.8dB

The output frequency of the acoustic calibrator is 1000Hz.

All ACSL's calibration instrumentation is fully traceable to National Standards. The acoustic references are calibrated by laboratories which are UKAS accredited for the purpose.

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Directors: Trevor J Lewis, Owen R Clingan MIOA

Norsonic 140 (Type 1) : Calibration Results

Customer Name:

RSK Environment Limited

Service Reference Number:

2013

Date of Calibration:

8th November 2011

Instrument Details:

	Model	Serial Number
SLM	Norsonic 140	1402810
Preamplifier	Norsonic 1209	12227
Microphone	Norsonic 1225	72943
Acoustic Calibrator	Cirrus 511E	037732

Preliminary Inspection:

BS EN 60651: Type 1I BS EN 60804: Type 1 Instrument Functional Checks: PASS

Setting Up:

Reference B&K 4231 Calibrator – Serial No: **1883557**

T/E No: **005**

B&K 4231 Calibrator SPL: **114.11 dB**

Microphone Correction: **-0.2 dB**

Initial Reading: 93.7 dB

Adjusted Readings:

1) 93.9 dB 2) 93.9 dB 3) 93.9 dB 4) 93.9 dB 5) 93.9 dB

Average Reading: 93.9 dB Total Spread: 0.0 dB Test: PASS

Self Generated Noise:

Time Constant: SLOW

Measurement Range: (-10) – 70dB

A (dB)	C (dB)	Lin(dB)
10.5	14.1	26.2

Test: PASS

Linearity:

Linearity Range: 24 – 137 dB

Linearity Leq:

Difference from REFERENCE	Instrument Reading (dB)	Error (dB)
-90.0	24.0	0.0
-89.0	25.0	0.0
-88.0	26.0	0.0
-87.0	27.0	0.0
-86.0	27.9	-0.1
-85.0	28.9	-0.1
-80.0	33.9	-0.1
-75.0	38.9	-0.1
-70.0	43.9	-0.1
-65.0	49.0	0.0
-60.0	54.0	0.0
-55.0	59.0	0.0
-50.0	64.0	0.0
-45.0	69.0	0.0
-40.0	74.0	0.0
-35.0	79.0	0.0
-30.0	84.0	0.0
-25.0	89.0	0.0
-20.0	94.0	0.0
-15.0	99.0	0.0
-10.0	104.0	0.0
-5.0	109.0	0.0
REF	114.0	0.0
5.0	119.0	0.0
10.0	124.0	0.0
15.0	129.0	0.0
18.0	132.0	0.0
19.0	133.0	0.0
20.0	134.0	0.0
21.0	135.0	0.0
22.0	136.0	0.0
23.0	137.0	0.0

Test: **PASS**

Linearity:

Reference Range: 24 – 137 dB

Linearity SPL:

Difference from REFERENCE	Instrument Reading (dB)	Error (dB)
-90.0	24.0	0.0
-89.0	25.0	0.0
-88.0	26.0	0.0
-87.0	27.0	0.0
-86.0	27.9	-0.1
-85.0	28.9	-0.1
-80.0	33.9	-0.1
-75.0	38.9	-0.1
-70.0	43.9	-0.1
-65.0	49.0	0.0
-60.0	54.0	0.0
-55.0	59.0	0.0
-50.0	64.0	0.0
-45.0	69.0	0.0
-40.0	74.0	0.0
-35.0	79.0	0.0
-30.0	84.0	0.0
-25.0	89.0	0.0
-20.0	94.0	0.0
-15.0	99.0	0.0
-10.0	104.0	0.0
-5.0	109.0	0.0
REF	114.0	0.0
5.0	119.0	0.0
10.0	124.0	0.0
15.0	129.0	0.0
18.0	132.0	0.0
19.0	133.0	0.0
20.0	134.0	0.0
21.0	135.0	0.0
22.0	136.0	0.0
23.0	137.0	0.0

Test: **PASS**

Random Incidence Check:

Initial SLM setting: 114.0 dB

Frequency (Hz)	Instrument Reading (dB)	Instrument Reading – L ₀
8,000	116.2	2.2
12,500	118.6	4.6

Test: **PASS**

Frequency Weightings:

Reference Level: 114 dB / 1 kHz

Frequency (Hz)	Instrument Range	Instrument Reading dB (A)	Instrument Reading dB (C)	Instrument Reading dB (Lin)
1,000	24 – 137	114.0	114.0	114.0
31.5	24 – 137	74.5	111.0	113.9
63	24 – 137	87.8	113.2	114.0
125	24 – 137	97.8	113.8	114.0
250	24 – 137	105.3	114.0	114.0
500	24 – 137	110.7	114.0	114.0
2,000	24 – 137	115.2	113.8	114.0
4,000	24 – 137	114.9	113.1	114.0
8,000	24 – 137	112.8	110.9	114.0
12,500	24 – 137	109.8	107.8	113.9

Test: **PASS**

Time Weightings - Fast and Slow:

Initial SLM setting: 113.0 dB

Time Weighting	Instrument Reading (dB)
FAST	111.9
SLOW	108.9

Test: **PASS**

Time Weighting – Impulse:

Initial SLM setting: 117.0 dB

Tone Burst Type	Instrument Reading (dB)
Single	107.7
Repeated	113.8

Test: **PASS**

RMS Accuracy:

Initial SLM setting: 115.0 dB

Attenuator Setting	Instrument Reading (dB)
- 6.6 dB	114.9
-17.0 dB	114.5

Test: **PASS**

Overload Indicator:

	Instrument Reading (dB)	Difference
1 dB below overload	135.1	3.0
4 dB below overload	132.1	

Test: **PASS**

Time Averaging:

Initial SLM setting: 107 dB

Repetition Period	Instrument Reading (dB)
04×10^3	106.9
04×10^4	96.9

Test: **PASS**

Pulse Range:

Test: **PASS**

Sound Exposure Level:

Test: **PASS**

Peak Response:

Frequency Weighting used: LINEAR

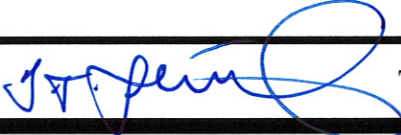
	Frequency (Hz)	Instrument Reading (dB)	Difference between Readings
Positive Pulse	50 Hz	116.0	0.0
	5 kHz	116.0	
Negative Pulse	50 Hz	116.0	0.0
	5 kHz	116.0	

Test: **PASS**

Comments:

OVERALL : PASS

Calibration Certificate Number: 13842

Issued By:  T J Lewis

Date: 8th November 2011