

The Lake Lothing (Lowestoft) Third Crossing Order 201[*]



Lake Lothing
**THIRD
CROSSING**

**Document 6.3: Environmental Statement
Volume 3 Appendices**

Appendix 13C

Noise meter calibration certificates

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)

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Certificate Number: 02954/1

Date of Issue: 6 February 2017

SET-UP INFORMATION

The instrument version was Master 01 V1.400. The reference range, reference SPL, primary indicator range, pulse range and linearity range as specified by the manufacturer have been used. The instrument was adjusted to read 114.2 dB (A) in response to the associated calibrator. This reading was obtained from the calibration certificate of the calibrator, and information in the manufacturer's instruction manual. The instrument was calibrated without a windshield. Consult manufacturer's instructions if using a windshield.

MEASUREMENTS

The levels of self-generated noise were:

A:	10.8 dB
B:	9.8 dB
C:	11.7 dB
Z:	16.9 dB

At the end of the tests the indication of the sound level meter in response to the associated sound calibrator was 114.2 dB (A) which corresponds to the following level at 101.325 kPa:

Sound Pressure Level 114.2 dB (A)
This reading should be used henceforth to set up the sound level meter for field use.

THE SOUND LEVEL METER WAS VERIFIED ACCORDING TO THE PROCEDURE GIVEN IN BS7580: Part 1 1997 WITH THE FOLLOWING EXCEPTIONS:

A stricter test than that specified in 5.5.10 and 5.5.11 of BS 7580 has been used by not applying the low level signal.

STATEMENT OF RESULT:

THE SOUND LEVEL METER CONFORMS TO THE TYPE 1 REQUIREMENTS OF BS7580: PART1 1997.

Instruments used in the verification procedure were traceable to National Standards. The method of acoustic calibration employed a standard sound pressure calibrator for the 1 kHz test whilst the tests at 125 Hz and 8 kHz were performed by the electrostatic actuator method. The uncertainty of the Laboratory's 1 kHz calibrator was ± 0.05 dB. The uncertainty of the standard calibrator is not included in the applied tolerances. It is assumed that the sound level meter was manufactured in accordance with BSEN60651: 1994 Type 1, and BSEN60804: 1994 Type 1.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements. All measurement results are retained at the acoustic calibration laboratory for at least four years.

This certificate provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)

University of
Salford
MANCHESTER

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APPROVED SIGNATORIES

Claire Lomax [x] Andy Moorhouse []

Gary Phillips [] Danny McCaul []



acoustic calibration laboratory

The University of Salford, Salford, Greater Manchester, M5 4WT, UK

<http://www.acoustics.salford.ac.uk>

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Certificate Number: 02953/2

Date of Issue: 9 December 2016

CALIBRATION OF A SOUND CALIBRATOR

FOR: Mouchel
St John's House
Queen Street
Manchester
M2 5JB

FOR THE ATTENTION OF: Robin Brown

DESCRIPTION: Calibrator with housing for one inch
microphones and adaptor type 1443 for half inch
microphones.

MANUFACTURER: Norsonic

TYPE: 1251

SERIAL NUMBER: 31460

DATE OF CALIBRATION: 06/12/2016

TEST PROCEDURE: CTP06 (Laboratory Manual)

Test Engineer (initial): GP

Name: Gary Phillips

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)

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Certificate Number: 02953/2

Date of Issue: 9 December 2016

MEASUREMENTS

The sound pressure level generated by the calibrator was measured using a calibrated, WS2P condenser microphone as specified in the certificate. The calibration was carried out with the calibrator in the half-inch configuration.

Five determinations of the sound pressure level, frequency and total distortion were made.

The results have been corrected to the reference pressure of 101.325 kPa using manufacturer's data.

RESULTS

Coupler configuration:	Half-inch
Microphone type:	GRAS 40AG
Output level (dB re 20 μ Pa):	114.26 dB \pm 0.09 dB
Frequency (Hz):	1000.55 Hz \pm 0.12 Hz
Total Harmonic Distortion (%):	<0.3 % \pm 0.15 %

Average environmental conditions at the time of measurement and maximum deviation from the stated average:

Pressure:	101.968 kPa \pm 0.018 kPa
Temperature:	22.2 °C \pm 0.4 °C
Relative humidity:	41.6 % \pm 2.0 %

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

All measurement results are retained at the acoustic calibration laboratory for at least four years.

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Certificate Number: 02953/3

Date of Issue: 9 December 2016

VERIFICATION OF A SOUND LEVEL METER to BS7580 Part 1

FOR:	Mouchel St John's House Queen Street Manchester M2 5JB
FOR THE ATTENTION OF:	Robin Brown
CALIBRATION DATE:	09/12/2016
TEST PROCEDURE:	CTP08 (Laboratory Manual)

Sound Level Meter			
Manu:	01dB	Model:	Solo Serial No: 61331
Microphone			
Manu:	01dB	Model:	MCE212 Serial No: 57685
Preamp			
Manu:	01dB	Model:	PRE 21 S Serial No: 14425
Associated Calibrator			
Manu:	Norsonic	Model:	1251 Serial No: 31462 Adaptor Type: 1443

Test Engineer (initial): GP

Name: Gary Phillips

This certificate provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)

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Certificate Number: 02953/3

Date of Issue: 9 December 2016

SET-UP INFORMATION

The instrument version was Master V1.401. The reference range, reference SPL, primary indicator range, pulse range and linearity range as specified by the manufacturer have been used. The instrument was adjusted to read 114.0 dB (A) in response to the associated calibrator. This reading was obtained from the calibration certificate of the calibrator and information in the manufacturer's instruction manual. The instrument was calibrated without a windshield. Consult manufacturer's instructions if using a windshield.

MEASUREMENTS

The levels of self-generated noise were:

A:	10.9 dB
B:	9.8 dB
C:	11.8 dB
Z:	15.8 dB

At the end of the tests the indication of the sound level meter in response to the associated sound calibrator was 114.0 dB (A) which corresponds to the following level at 101.325 kPa:

Sound Pressure Level 114.0 dB (A)
This reading should be used henceforth to set up the sound level meter for field use.

THE SOUND LEVEL METER WAS VERIFIED ACCORDING TO THE PROCEDURE GIVEN IN BS7580: Part 1 1997 WITH THE FOLLOWING EXCEPTIONS:

A stricter test than that specified in 5.5.10 and 5.5.11 of BS 7580 has been used by not applying the low level signal.

STATEMENT OF RESULT:

THE SOUND LEVEL METER CONFORMS TO THE TYPE 1 REQUIREMENTS OF BS7580: PART1 1997.

Instruments used in the verification procedure were traceable to National Standards. The method of acoustic calibration employed a standard sound pressure calibrator for the 1 kHz test whilst the tests at 125 Hz and 8 kHz were performed by the electrostatic actuator method. The uncertainty of the Laboratory's 1 kHz calibrator was ± 0.05 dB. The uncertainty of the standard calibrator is not included in the applied tolerances. It is assumed that the sound level meter was manufactured in accordance with BSEN60651: 1994 Type 1, and BSEN60804: 1994 Type 1.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements. All measurement results are retained at the acoustic calibration laboratory for at least four years.

This certificate provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

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FOR THE ATTENTION OF: Robin Brown

DESCRIPTION: Calibrator with housing for one inch
microphones and adaptor type 1443 for half inch
microphones.

MANUFACTURER: Norsonic

TYPE: 1251

SERIAL NUMBER: 31462

DATE OF CALIBRATION: 06/12/2016

TEST PROCEDURE: CTP06 (Laboratory Manual)

Test Engineer (initial): GP

Name: Gary Phillips

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)

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Certificate Number: 02953/1

Date of Issue: 9 December 2016

MEASUREMENTS

The sound pressure level generated by the calibrator was measured using a calibrated, WS2P condenser microphone as specified in the certificate. The calibration was carried out with the calibrator in the half-inch configuration.

Five determinations of the sound pressure level, frequency and total distortion were made.

The results have been corrected to the reference pressure of 101.325 kPa using manufacturer's data.

RESULTS

Coupler configuration:	Half-inch
Microphone type:	GRAS 40AG
Output level (dB re 20 μ Pa):	114.06 dB \pm 0.09 dB
Frequency (Hz):	1000.29 Hz \pm 0.12 Hz
Total Harmonic Distortion (%):	<0.3 % \pm 0.15 %

Average environmental conditions at the time of measurement and maximum deviation from the stated average:

Pressure:	101.975 kPa \pm 0.018 kPa
Temperature:	21.9 $^{\circ}$ C \pm 0.4 $^{\circ}$ C
Relative humidity:	42.4 % \pm 2.0 %

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

All measurement results are retained at the acoustic calibration laboratory for at least four years.