Campbell Associates Ltd
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CALIBRATION

0789

Certificate of Calibration and Conformance

Certificate Number:- U18664

Test object:	**Sound Level Meter, BS EN IEC 61672-1:2003 Class 1 (Precision) and associated Frequency Analyser BS EN IEC 61260, Class 1**
Manufacturer:	**Norsonic**
Type:	**131**
Serial no:	**1312731**
Customer:	**Campbell Associates Ltd**
Department:	**Hire**
Address:	**Sonitus House, 5B Chelmsford Road Industrial Estate, Great Dunmow, Essex. CM6 1HD.**
Contact Person:	**Mr. David Egan - Laboratory Manager**

Method :
Calibration has been performed as set out in CA Technical Procedures TP01 & 02 as appropriate. These are based on the procedures for periodic verification of sound level meters as set out in BS EN IEC 61672-3:2006 and for electrical testing of frequency filters as set out in BS EN IEC 61260. Results and conformance statement are overleaf and detailed results are in the attached Test Report.

	Producer:	Type:	Serial No:	Certificate number
Microphone	GRAS	40AE	86534	18663
Calibrator*	Norsonic	1251	30873	U16836
Preamplifier	Norsonic	1207	12259	Included

Additional items that also have been submitted for verification

Wind shield	Norsonic	Nor1451
Attenuator	None	
Extension cable	None	

These items have been taken into account wherever appropriate.

Environmental conditions:	Pressure:	Temperature:	Relative humidity:
Reference conditions:	101.325 kPa	23.0 °C	50 %RH
Measurement conditions:	100.40 kPa	20.5 °C	40.0 %RH

Date received :	29/04/2015
Date of calibration:	29/04/2015
Date of issue:	30/04/2015

Engineer

Palanivel Marappan B.Eng (Hons), M.Sc

Supervisor

Darren Batten Tech IOA

Certificate of Calibration and Conformance

UKAS Laboratory Number 0789

Certificate Number:- U18664

Conformance

From markings on the sound level meter or by reference to the manufacturer's published literature it has been determined that the instrument submitted for verification was originally manufactured to BS EN IEC 61672-1:2002 and similarly that the associated sound calibrator conforms to BS EN IEC 60942.

Statement of conformance

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of BS EN IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available[1], from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with BS EN IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in BS EN IEC 61672-1:2002, and that the sound level meter submitted for testing conforms to the class 1 requirements of BS EN IEC 61672-1:2003.
The filter functions have been found to conform, by electrical testing, to the relative attenuation requirement of BS EN IEC 61260 (as required by UKAS Lab23) for a class 1 filter over the range of frequencies shown in the attached test report.

[1] This evidence is held on file at the calibration laboratory

Measurement Results:

Indication at the calibration check frequency - IEC61672-3 Ed.1 #9	Passed
Self-generated noise - IEC 61672-3 #10	Passed
Acoustical test of a frequency weighting - IEC 61672-3 Ed.1 #11	Passed
Frequency weightings: A Network - IEC 61672-3 Ed.1 #12	Passed
Frequency weightings: C Network - IEC 61672-3 Ed.1 #12	Passed
Frequency weightings: Z Network - IEC 61672-3 Ed.1 #12	Passed
Frequency and time weightings at 1 kHz IEC61672-3 Ed.1 #13	Passed
Level linearity on the reference level range - IEC 61672-3 #14	Passed
Toneburst response - IEC 61672-3 Ed.1 #16	Passed
Peak C sound level - IEC 61672-3 Ed.1 #17	Passed
Overload indication - IEC 61672-3 Ed. 1 #18	Passed
Filter Test 1/1octave: Relative attenuation - IEC 61260, #4.4 & #5.3	Passed
Filter Test 1/3octave: Relative attenuation - IEC 61260, #4.4 & #5.3	Passed
Combined electrical and acoustical test - IEC 61672-3 Ed.1 #12	Passed

Comment

Correct level with associated calibrator is 113.9dB(A).

Observations

No information on the uncertainty of measurement, required by 11.7 of BS EN IEC 61672-3:2006 of the adjustment data given in the instruction manual or obtained from the manufacturer of the microphone was published in the instruction manual or made available by the manufacturer or supplier. The uncertainty of measurement of the adjustment data has therefore been assumed to be numerically zero for the purposes of this periodic test. It these uncertainties are not actually zero, there is a possibility that the frequency response of the sound level meter may not conform to the requirements of BS EN IEC 61672-1:2003.

The details of the uncertainty for each measurement is available from the Calibration Laboratory on request and is based on the 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. Details on the sources of corrections and their associated uncertainties that relate to this verification are contained the detailed test report accompanying this certificate.

Calibration Report

Certificate Number:-18663

Manufacturer:	**GRAS**
Type:	**40AE**
Serial no:	**86534**

Customer:	**Campbell Associates Ltd**
Department:	**Hire**
Address:	**Sonitus House,** **5B Chelmsford Road Industrial Estate,** **Great Dunmow, Essex. CM6 1HD.**
Contact Person:	**Mr. David Egan - Laboratory Manager**

Measurement Results:

	Sensitivity: (dB re 1V/Pa)	Capacitance: (pF)
1:	-25.57	13.8
2:	-25.56	13.8
3:	-25.56	13.8
Result (Average):	**-25.56**	**13.8**
Expanded Uncertainty:	0.10	2.00
Degree of Freedom:	>100	>100
Coverage Factor:	2.00	2.00

The following correction factors have been applied during the measurement:
Pressure:-0.010 dB/kPa Temperature:-0.070 dB/°C Relative humidity:0.001 dB/%RH

Reference Calibrator: WSC1 - Nor1253-24269 Volume correction: 0.000 dB
Records:K:\C A\Calibration\Nor-1504\Nor-1017 MicCal\2015\GRAS40AE_86534_M1.nmf
Measurement procedure: TP05
All results quoted are directly traceable to National Physical Laboratory, London

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA publication EA-4/02.

Comment:

Environmental conditions:

Pressure:	Temperature:	Relative humidity:
100.489 ± 0.045 kPa	21.7 ± 0.4 °C	43.7 ± 2.6 %RH

Date of calibration: 29/04/2015
Date of issue: 29/04/2015

Supervisor : Darren Batten TechIOA
Engineer :

M. Panivel

Palanivel Marappan B.Eng(Hons), M.Sc
Software version: 6.0h

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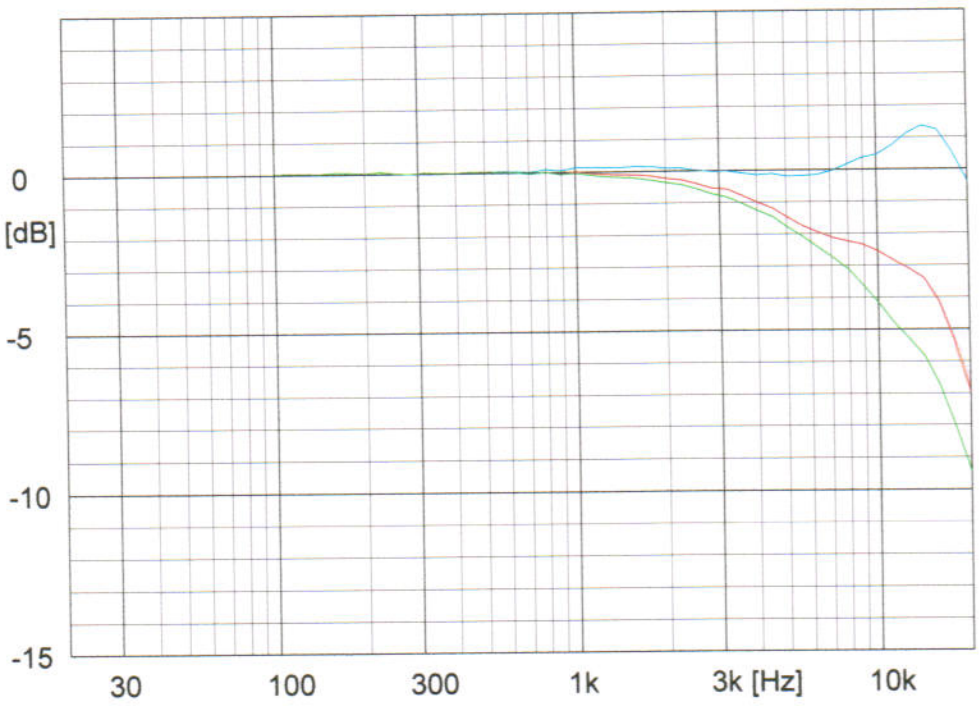
Microphone Calibration Certificate



GRAS
Type: 40AE

Serial no: 86534

Sensitivity: 52.70 mV/Pa
-25.56 ±0.10 dB re. 1 V/Pa
Capacitance: 13.8 ±2.0 pF
Date: 29/04/2015

Signature: M. Hanivel

Measurement conditions:

Polarisation voltage:	0.0 V
Pressure:	100.49 ±0.05 kPa
Temperature:	21.7 ±0.4 °C
Relative humidity:	43.7 ±2.6 %RH

Results are normalised to the reference conditions.

Free field response
Diffuse field response
Pressure (Actuator) response

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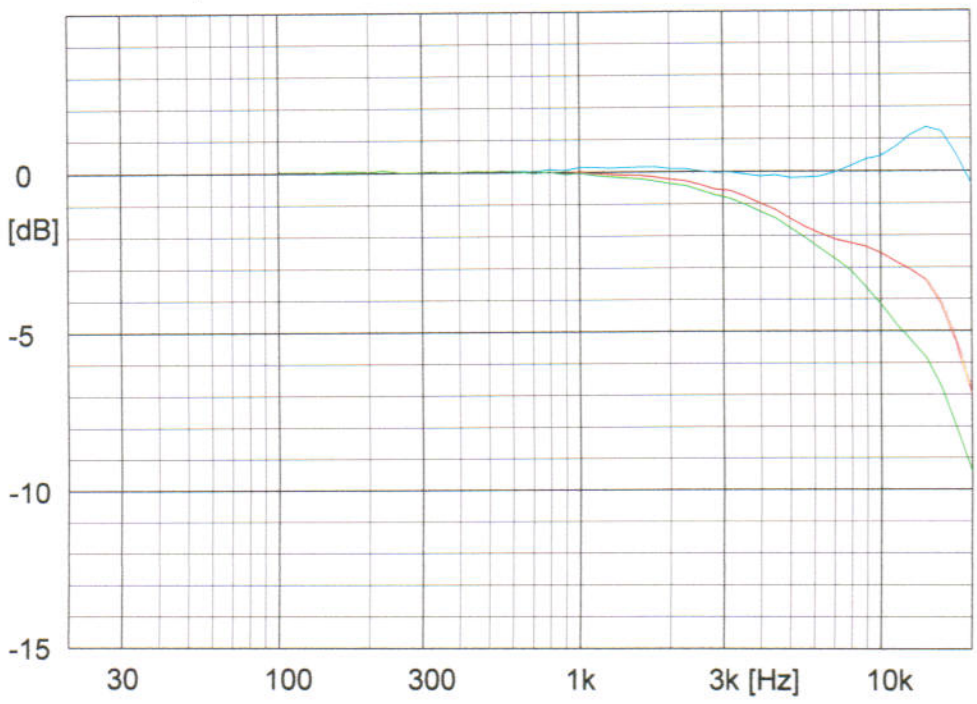
Microphone Calibration Certificate



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Comment: