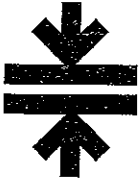


SANAS



ACCREDITED
LABORATORY

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De Beer Calibration Services

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CERTIFICATE OF CALIBRATION

CERTIFICATE NUMBER	2003-506
ORGANISATION	UNIVERSITY OF PRETORIA, MECHANICAL ENGINEERING
CALIBRATION OF	INTEGRATING SOUND LEVEL METER, 1/2" MICROPHONE, SOUND LEVEL CALIBRATOR and OCTAVE FILTER
CALIBRATED BY	M.W. DE BEER
MANUFACTURERS	RION
MODEL NUMBERS	NL-14, UC-53, NC-73 and NX-04
SERIAL NUMBERS	10162026, 53718, 10844969 and 10360699
DATE OF CALIBRATION	13 NOVEMBER 2003
RECOMMENDED DUE DATE	NOVEMBER 2004

This certificate is issued in accordance with the conditions of approval granted by the South African National Accreditation System (SANAS). This Certificate may not be reproduced without the consent of SANAS and De Beer Calibration Services.

Calibrations performed by this laboratory are in terms of standards, the accuracies of which are traceable to national measuring standards as maintained by the CSIR.

The values in this certificate are correct at the time of calibration. It is recommended that re-calibration should be performed on or before the recalibration due date, to ensure that the instrument's accuracy remains within the desired specification.

SANAS is also a signatory to the mutual recognition agreement of the International Laboratory Accreditation Cooperation (ILAC). This means that SANAS-endorsed reports and certificates are accepted by many of South Africa's trading partners in Europe, North America, Australia and throughout the Asia Pacific region. This certificate is therefore recognised by all the above countries.

M.W. DE BEER (SANAS AUTHORIZED SIGNATORY)

18 November 2003

DATE OF ISSUE

Director: M.W. de Beer

1. PROCEDURE

The UUT was calibrated according to procedures 1002/P/003 to 1002/P/007 and to the IEC 60651, 60804, 60942 and 1260 specifications for Sound Level Meters, Integrating Sound Level Meters, Sound Calibrators, Octave and $\frac{1}{3}$ -Octave Filters respectively as well as the manufacturer's specifications.

2. RESULTS

2.1 The following parameters of the Integrating Sound Level Meter were calibrated:

Input sensitivity	Manufacturer's specification
Amplitude linearity (at 31,5 Hz, 1 kHz and 8 kHz from 40,0 dB to 120,0 dB)	IEC 60651: sections 7.9 & 7.10
Weighting networks A & C (31,5 Hz to 20 kHz)	IEC 60651: section 6.1
Linear (flat)	Manufacturer's specification
Detector network (Fast, Slow & Impulse)	IEC 60651: sections 7.2 & 7.3
Integrating (Time Averaging)	IEC 60804: section 9.3.2
Integrating (Pulse Range)	IEC 60804: section 9.3.4
Impulse integrating (AI-weighted)	IEC 60804: annex B
Max. level	Manufacturer's specification
Peak level	Manufacturer's specification
AC output	Manufacturer's specification
DC output	Manufacturer's specification

Conclusion: The Integrating Sound Level Meter complies with the above-specified clauses of the IEC 60651 and 60804 specifications, Type 1.

2.2 The following parameters of the $\frac{1}{2}$ " Microphone were calibrated:

Output sensitivity at 250 Hz
Frequency response (125 Hz to 2 kHz)

Conclusion: The parameters measured for the $\frac{1}{2}$ " Microphone, complies with the manufacturer's specification.



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2.3 The following parameters of the Sound Level Calibrator were calibrated:

Output level	IEC 60942: section 5.2.3
Output frequency	IEC 60942: section 5.3.3

The Sound Level Calibrator output level was adjusted from 94,9 dB to 94,0 dB.

Conclusion: The Sound Level Calibrator complies with the above-specified clauses of the IEC 60942 specification, Class 1.

2.4 The following parameters of the Octave Filter were calibrated:

Octave Frequency response (31,5 Hz to 16 kHz)	IEC 1260: sections 4.7 & 5.6
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Conclusion: The Octave Filter complies with the above-specified clauses of the IEC 1260 specification, Class 2.

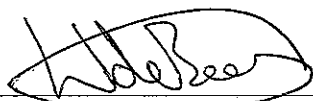
3. REMARKS

3.1 The reported uncertainties of measurements were calculated and expressed in accordance with the SANAS EAL-R2 document entitled "Expression of the Uncertainty of Measurement in Calibration" dated April 1997.

3.2 The reported uncertainties of measurements are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

3.3 The uncertainties of the measurements were taken into account when the above statements of compliance to the relevant specifications are made.

3.4 The environmental conditions were: Temperature: $(23 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 15) \%$.



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3.5 Calibration labels bearing cal date, due date (if requested), certificate number and serial number have been affixed to the instrument.

3.6 The uncertainties of measurements were estimated as follows:

Integrating Sound Level Meter:	± 1,7 dB
½" Microphone:	± 1,7 dB
Sound Level Calibrator:	± 1,7 dB
Octave Filter:	± 1,7 dB



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