



CALIBRATION CERTIFICATE
SOUND LEVEL METER

RHL-014

ISO/IEC 17025:2017
16-LAC-045

Date of issue: 2025-12-02

Certificate No: 15859

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OBJECT OF CALIBRATION	Sound level meter type SC420, number T252324 ID ME-MR-304, manufacturer Cesva with preamplifier type PA020, number 691, manufacturer Cesva and microphone type C-140, number 16251, manufacturer Cesva.
CUSTOMER	Corporación Autónoma Regional de las Cuencas de los Ríos Negro y Nare - Cornare Autopista Medellín – Bogotá, Carrera 59 44-48, Kilómetro 54, El Santuario, Antioquia, Colombia.
CALIBRATION METHOD	Method described in process PPL-001 "Procedure for calibration of sound level meters", written on the basis of international standard IEC 61672-3:2013. Electroacoustics. Part 3: Periodic tests.
ENVIRONMENTAL CONDITIONS	Temperature °C: Minimum 21,6, Maximum 21,8 Ambient pressure hPa: Minimum 849,80, Maximum 850,00 Relative humidity %RH: Minimum 29,6, Maximum 30,1
DATE OF RECEPTION	2025-12-01
DATE OF CALIBRATION	2025-12-02
METROLOGICAL TRACEABILITY TO A MEASUREMENT UNIT	The calibration performed is traceable to the International System of Units (SI). for Frequency (Hz) as a unit derived from (s^{-1}), the Voltage (V) as a unit derived from ($kg * m^2 * A^{-1} * s^{-3}$), the Pascal (Pa) as a unit derived from ($kg * m^{-1} * s^{-2}$). The decibel unit (dB) has been accepted by the CIPM for use with the International System of Units (SI), but they are not part of them and is interpreted as $L_x = 10 * \log_{10}(x * x_0^{-1})$ dB. Where: L_x is named as the power level with respect to x_0 . This information is taken from the document "The International System of Units (SI)" ninth edition 2019. BIPM.
METROLOGICAL TRACEABILITY	Calibration results were referred to primary standard of sound pressure maintained in the Central Office of Measures with the application of the working standard – sound calibrator type SV 30A, No 32510, manufactured by Svantek, Certificate issued by Svantek 00049860/01/2022. Frequency generator type SV401 No 109, manufactured by Svantek, Certificate issued by Svantek 00056440/02/2023 and Sound level meter type SV912AE No 15923, manufactured by Svantek, Certificate issued by Svantek 00056430/02/2023. The thermo-hygrometer 1161, No. 160302807, manufactured by TES, certified issued by Celsius 469878 traceable to NIST and the barometer belonging to this equipment with certificate MET-LP-CC 10293 certified issued by Metrolabor traceable to laboratories accredited in the ISO/IEC 17025:2017 standard or National Metrology Institutes INM.
CALIBRATION LOCATION	The calibration was performed in the acoustic pressure and frequency area of the Intecccon Colombia S.A.S. located at Carrera 43a # 19-17, local 9513, Medellín, Colombia.
UNCERTAINTY OF MEASUREMENTS	JCGM 100:2008 GUM 1995 with minor corrections, Evaluation of measurement data - Guide to the expression of uncertainty in measurement. The expanded uncertainty of the reported measurement is established as the standard measurement uncertainty multiplied by the coverage factor "k" and the probability of coverage, which should be approximately 95% and not less than this value.

The certificate may be presented or copied as a whole document only.

CONFORMITY WITH REQUIREMENTS

On the basis of the calibration results, it has been found that sound level meter meets metrological requirements specified in the standard IEC 61672-1:2013. Electroacoustics – Sound level meters. Part 1: Specifications, for class 1.
 The tests two (2) and three (3) are only verificatory in accordance what is expressed in the standard IEC 61672-3:2013, this does not provide uncertainty. In test four (4), the measurement at 4 kHz in the frequency weighting test using electrostatic actuator is only a verification of this point, although uncertainty is reported, it is not part of item 13, Electrical signal tests of frequency weightings of IEC 61672-3:2013. The Tests eleven (11), High-level stability, and twelve (12), Long-term stability, are carried out in accordance with the provisions of the standard IEC 61672-3:2013 but are not part of the scope of the laboratory. The foregoing is not part of the laboratory's scope of accreditation with ISO/IEC 17025: 2017.

EXPLANATORY NOTES

This certificate faithfully expresses the result of the measurements made.
 The partial reproduction of this certificate is not recommended as it can lead to misinterpretations. It is only valid in its entirety and with the corresponding signatures. Without laboratory approval the report should not be reproduced, except when reproduced in its entirety, this provides assurance that parts of the report are not taken out of context. The results contained in this certificate refer to the time and conditions in which the measurements were made. The results are related only to the items subjected to calibration. Inteccon Colombia S.A.S. is not responsible for damages that may arise from the improper use of calibrated instruments.
 It is the responsibility of the user to set the date of a new instrument calibration. The validity time of the results contained in this certificate depends on both the characteristics of the calibrated instrument and the practices for its handling and use.
 The end user of this certificate must assume the value of the uncertainty, if necessary, to comply with the tolerance limits.

CALIBRATION RESULTS

The results are presented on pages 2 to 5 of this certificate including measurement uncertainty. The expanded measurement uncertainty reported is established as the standard measurement uncertainty multiplied by a coverage factor $k = 2$ and the coverage probability $p = 95.45\%$.

1. Indication at the calibration check frequency

The sound level meter was calibrated in compliance with the instruction manual. During this process, the indication of this SLM was adjusted to the sound pressure level of the sound level calibrator type SV 30A, No 32510, from SVANTEK. The sound pressure level was corrected by the free-field factor.
 Deviation of the acoustic pressure measurement of the A-weighted sound level using the sound calibrator type SV 30A, No 32510, from SVANTEK, was made according to the standard reference conditions: for static pressure 1013.25 hPa, for temperature 23 °C and for relative humidity 50 %RH, results:
 The calibration factor introduced after the adjustment. **-0,20dB**

$(0,00 \pm 0,15) \text{ dB}$

The deviation was determined as a difference between the measured sound level and the sound level corrected by the free-field factor appropriate to mentioned sound calibrator.

2. Self-generated noise with microphone installed

Frequency weighting	A
The highest level of self-generated noise stated in the instruction manual [dB]	15,0
Indication [dB]	19,2

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3. Self-generated noise with microphone replaced by the electrical input signal device

Frequency weighting	A	C	Z
The highest expected level of self-generated noise stated in the instruction manual [dB]	15,0	17,0	22,0
Level of self-generated noise [dB]	7,6	10,8	17,4

Self-generated noise with microphone replaced by the input signal device should not exceed the highest expected level of self-generated noise stated in the instruction manual.

4. Acoustical signal tests of a frequency weighting C

Frequency [Hz]	The deviation of frequency weighting [dB]	Extended uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class1 [dB]
125.0	0,00	0,16	0.60	±1,0
1000.0	0,00	0,16	0.60	±0,7
4000.0	0,00	0,16	0.60	±1,0
8000.0	-0,60	0,17	0.70	-2,5; +1,5

5. Electrical signal tests of frequency weightings

Frequency [Hz]	The deviation of frequency weighting [dB]			Extended uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class 1 [dB]
	A	C	Z			
63.0	0,00	0,00	0,00	0,16	0,60	±1,0
125.0	0,10	0,00	0,00	0,16	0,60	±1,0
250.0	-0,10	-0,10	-0,10	0,16	0,60	±1,0
500.0	0,00	0,00	0,00	0,16	0,60	±1,0
1000.0	0,10	0,10	0,10	0,16	0,60	±0,7
2000.0	0,50	0,60	0,50	0,16	0,60	±1,0
4000.0	0,80	0,80	0,80	0,16	0,60	±1,0
8000.0	0,90	1,00	1,00	0,17	0,70	-2,5; +1,5
16000.0	-5,00	-4,90	0,00	0,17	1,00	-16,0; +2,5

6. Frequency and time weightings at 1 kHz

Frequency weighting	Sound level				Time-averaged sound level
	A	A	C	Z	A
Time weighting	Fast	Slow	Fast	Fast	-
Indication [dB]	94,0	94,0	94,0	94,0	94,0
The deviation of indication from the indication of A-weighted sound level with Fast time weighting [dB]	X	0,00	0,00	0,00	0,00
Extended uncertainty [dB]	X	0,16	0,16	0,16	0,16
Maximum allowable measurement uncertainty [dB]	X	0,20	0,20	0,20	0,20
Tolerance limits Class 1 [dB]	X	±0,2	±0,2	±0,2	±0,2

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7. Level linearity on the reference level range

Frequency weighting: A, range -

Level linearity range at frequency 8 kHz stated in the instruction manual: from 30,0 dB, to 136,0 dB.

Expected sound level [dB]	Level linearity error [dB]	Extended uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class 1 [dB]
136,0	0,00	0,16	0,30	±0,8
135,0	0,00			
134,0	0,00			
133,0	0,00			
132,0	0,00			
131,0	0,00			
130,0	0,00			
129,0	0,00			
124,0	0,00			
119,0	0,00			
114,0	0,00			
109,0	0,00			
104,0	0,00			
99,0	0,00			
94,0	0,00			
89,0	0,00			
84,0	0,00			
79,0	0,00			
74,0	0,00			
69,0	0,00			
64,0	0,00			
59,0	0,00			
54,0	0,00			
49,0	0,00			
44,0	0,00			
39,0	0,00			
38,0	0,00			
37,0	0,00			
36,0	0,00			
35,0	0,00			
34,0	0,00			
33,0	0,00			
32,0	0,00			
31,0	0,00			
30,0	0,00			

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8. Toneburst response

Measurement quantity	Time weighting	Toneburst duration [ms]	The indications in response to toneburst relative to the steady sound level [dB]	Reference toneburst response relative to the steady sound level [dB]	The deviations of the measured toneburst in responses from the corresponding reference toneburst [dB]	Extended uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class 1 [dB]
Time-weighted sound level	Fast	200	-1,0	-1.0	0,00	0,16	0,30	±0,5
		2	-18,0	-18.0	0,00	0,16	0,30	-1,5; +1,0
		0.25	-27,2	-27.0	-0,20	0,16	0,30	-3,0; +1,0
Time-weighted sound level	Slow	200	-7,4	-7.4	0,00	0,16	0,30	±0,5
		2	-27,0	-27.0	0,00	0,16	0,30	-1,5; +1,0
Sound exposure level	L _{AE} -L _{eq}	200	-7,0	-7.0	0,00	0,16	0,30	±0,5
		2	-27,0	-27.0	0,00	0,16	0,30	-1,5; +1,0
		0.25	-36,1	-36.0	-0,10	0,16	0,30	-3,0; +1,0

9. Peak C sound level

Numbers of cycles in test signal	Frequency of test signal [Hz]	The deviation of indication [dB]	Extended uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class 1 [dB]
One	8000	-0,50	0,17	0,35	±2,0
Positive half-cycle	500	-0,10	0,16	0,35	±1,0
Negative half-cycle	500	-0,20	0,16		

10. Overload indication

Frequency weighting A

The difference between the levels of the positive and negative one-half-cycles input signals that first cause the displays of overload indication [dB]	Extended uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class 1 [dB]
0,00	0,17	0,25	±1,5

11. High-level stability

A-weighted sound level indicated in response to a steady 1 kHz electrical signal		The difference between the initial and final indications [dB]	Extended uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class 1 [dB]
at beginning of a 5 min period of continuous exposure to the signal [dB]	at the end of a 5 min period of continuous exposure to the signal [dB]				
136,00	136,00	0,00	0,10	0,10	±0,10

12. Long-term stability

A-weighted sound level indicated in response to steady 1 kHz electrical signal		The difference between the initial and final indications [dB]	Extended uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class 1 [dB]
at the beginning of a period of operation [dB]	at the end of a period of operation [dB]				
94,00	94,00	0,00	0,10	0,10	±0,10

End of certificate.



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