 	REPORT of calibration of the sound level meter (in accordance with the IEC 61672-3)		RHL-002	
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Application No:	15859	Date:	2025-12-02
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Applicant data:

Name:	Corporación Autónoma Regional de las Cuencas de los Ríos Negro y Nare - Cornare
Address:	Autopista Medellín – Bogotá, Carrera 59 44-48, Kilómetro 54, El Santuario, Antioquia, Colombia.

Equipment for testing

Reception of calibration: 2025-12-01
Sound level meter: type SC420, serial number T252324 ID ME-MR-304, manufacturer Cesva, class 1
Microphone preamplifier: type PA020, serial number 691, manufacturer Cesva
Microphone: type C-140, serial number 16251, manufacturer Cesva

Standards list

Laboratory standard calibrator

Type SV30A, serial number 32510, manufacturer SVANTEK, class 1,
Sound pressure level $L_p = 94,03\text{dB}$ (from calibration certificate),
Free field correction $\delta L_{p,f} = 0\text{ dB}$, pressure correction $\delta L_{p,ps} = 0,001\text{ dB}$

Customer calibrator

Type -, serial number -, manufacturer -, class - ,
Sound pressure level $L_{p0} = -\text{ dB}$ (from calibration certificate),
Free field correction $\delta L_{p0,f} = -\text{ dB}$, pressure correction $\delta L_{p0,ps} = -\text{ dB}$

Results:

Minimum environmental conditions measured in the testing:
Ambient pressure 849,80 hPa, Temperature 21,6 °C, Relative Humidity 29,6 %RH




1. Indication at the calibration check frequency

The indication of the meter before adjustment: 93,8dB, Calibration factor: -0,20dB
The adjustment of the indication used the procedure given in the instruction manual
Calibration factor determined during adjustment: -0,20dB¹
Frequency weighting: A; range: -; $f_{\text{sin}} = 1\text{ kHz}$,

		Measurement 1	Measurement 2	Measurement 3	Expanded uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class1 [dB]
Calibrator supplied with the meter	Indication [dB]	-	-	-			
	Deviation [dB]	-	-	-	-	-	-
Laboratory standard calibrator	Indication [dB]	94,0	94,0	94,0			
	Deviation [dB]	0,0	0,0	0,0	0,15	0,15	0,25
				Inconsistency of indication [dB]	0,00		

In tolerance

¹ Further measurements are performed with the calibration factor determined after adjustment

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2. Self-generated noise with microphone installed

Frequency weighting		A
The lower limit of the linear operating range [dB]		15,0
Indication [dB]	for reference microphone	16,6
	for testing microphone	19,2
The highest level of self-generated noise stated in the instruction manual [dB]		18,2

This test is only veridatory, does not provide uncertainty and is not part of the scope accreditation of the laboratory ISO/IEC 17025:2017,
In tolerance

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

Frequency weighting		A	C	Z
The lower limit of the linear operating range [dB]		15,0	17,0	22,0
Indication [dB]		7,6	10,8	17,4

This test is only veridatory, does not provide uncertainty and is not part of the scope accreditation of the laboratory ISO/IEC 17025:2017, The level of the self-generated noise of the meter with the impedance shall not exceed the highest value of the noise level stated in the instruction manual,
In tolerance

4. Frequency weightings

a) Using electrostatic actuator

Range: - ; the level of the input signal: 94,
Frequency weighting: C

Freq. [Hz]	Indication L(f) [dB]				Free filed corretion ΔL_x [dB]	The influence of a windscreen d_{wind} [dB]	The influence of a housing d_{case} [dB]	The value of frequency characteristics of the meter with the microphone in the free field sound	The relative characteristics (re 1 kHz) L(f)-L(1kHz)	Nominal frequency weightings [dB]	The deviation of an indication [dB]	Expanded uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class1 [dB]
	1	2	3	Averaged										
125,0	93,9	93,9	93,9	93,90	-0,04	0,00	0,00	93,86	-0,20	-0,2	0,0	0,16	0,60	$\pm 1,0$
1000,0	94,0	94,0	94,0	94,00	0,14	0,01	-0,09	94,06	0,00	0,0	0,0	0,16	0,60	$\pm 0,7$
4000,0	92,0	92,0	92,0	92,00	1,23	-0,04	0,03	93,22	-0,84	-0,8	0,0	0,16	0,60	$\pm 1,0$
8000,0	87,1	87,1	87,2	87,13	3,56	0,08	-0,31	90,46	-3,60	-3,0	-0,6	0,17	0,70	-2,5; +1,5

The measurement at 4 kHz is only a verification at this point, although uncertainty is reported, it is not part of item 13, Electrical signal tests of frequency weightings of IEC 61672-3: 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests, It is not part of the laboratory's scope of accreditation with ISO/IEC 17025: 2017,

In tolerance

b) Using electrical signal tests

Frequency [Hz]	Nominal frequency weightings [dB]			Indication [dB]			Relative value (re 1kHz) of the frequency weighting [dB]		
	A	C	Z	L _A	L _C	L _Z	L _{Aw} = L _A - L _{A,1k}	L _{Cw} = L _C - L _{C,1k}	L _{Zw} = L _Z - L _{Z,1k}
63,0	-26,2	-0,8	0,0	92,00	92,00	92,00	0,00	0,00	0,00
125,0	-16,1	-0,2	0,0	92,10	92,00	92,00	0,10	0,00	0,00
250,0	-8,6	0,0	0,0	92,00	92,00	92,00	0,00	0,00	0,00
500,0	-3,2	0,0	0,0	92,00	92,00	92,00	0,00	0,00	0,00
1000,0	0,0	0,0	0,0	92,00	92,00	92,00	0,00	0,00	0,00
2000,0	1,2	-0,2	0,0	92,00	92,10	92,00	0,00	0,10	0,00
4000,0	1,0	-0,8	0,0	92,10	92,10	92,10	0,10	0,10	0,10
8000,0	-1,1	-3,0	0,0	92,00	92,10	92,10	0,00	0,10	0,10
16000,0	-26,2	-0,8	0,0	87,10	87,20	92,10	-4,90	-4,80	0,10

frequency [Hz]	The deviation of the typical microphone frequency response from a uniform frequency response δ_{mic} [dB]	Typical effects of reflections from the case of the sound level meter and diffraction of sound around the microphone δ_{case} [dB]	The influence of a windscreen δ_{wind} [dB]	Relative free field frequency response after taking into account the corrections δ_{mic} ; δ_{case} i δ_{wind} [dB]			Expanded uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class 1 [dB]
				$L_{A,C} = L_{A,w} + \delta_{mic} + \delta_{case} + \delta_{wind}$	$L_{C,C} = L_{C,w} + \delta_{mic} + \delta_{case} + \delta_{wind}$	$L_{Z,C} = L_{Z,w} + \delta_{mic} + \delta_{case} + \delta_{wind}$			
63,0	0,03	0,00	0,00	0,00	0,00	0,00	0,16	0,60	$\pm 1,0$
125,0	0,02	0,00	0,00	0,10	0,00	0,00	0,16	0,60	$\pm 1,0$
250,0	0,00	-0,02	-0,09	-0,10	-0,10	-0,10	0,16	0,60	$\pm 1,0$
500,0	0,09	0,00	-0,05	0,00	0,00	0,00	0,16	0,60	$\pm 1,0$
1000,0	0,16	-0,09	0,01	0,10	0,10	0,10	0,16	0,60	$\pm 0,7$
2000,0	0,38	0,05	0,06	0,50	0,60	0,50	0,16	0,60	$\pm 1,0$
4000,0	0,72	0,03	-0,04	0,80	0,80	0,80	0,16	0,60	$\pm 1,0$
8000,0	1,14	-0,31	0,08	0,90	1,00	1,00	0,17	0,70	-2,5; +1,5
16000,0	0,72	-0,36	-0,48	-5,00	-4,90	0,00	0,17	1,00	-16,0; +2,5

A: In tolerance C: In tolerance Z: In tolerance

5. Frequency and time weightings at 1 kHz

Frequency weighting	A			C	Z
	Fast	Slow	-	Fast	Fast
Time weighted	SPL	SPL	LEQ	SPL	SPL
Function	$L_{A,F}$	$L_{A,S}$	$L_{A,LEQ}$	L_C	L_Z
indication [dB]	94,0	94,0	94,0	94,0	94,0
The deviation of an indication [dB]	0,00	$L_{A,S} - L_{A,F}$	$L_{A,LEQ} - L_{A,F}$	$L_C - L_{A,F}$	$L_Z - L_{A,F}$
Expanded uncertainty [dB]	0,16	0,16	0,16	0,16	0,16
Maximum allowable measurement uncertainty [dB]	0,20	0,20	0,20	0,20	0,20
Acceptable limits Class 1 [dB]	$\pm 0,2$	$\pm 0,2$	$\pm 0,2$	$\pm 0,2$	$\pm 0,2$

Range: - In tolerance

6. Toneburst response

Toneburst duration [ms]	200			2			0,25	
	Fast	Slow	-	Fast	Slow	-	Fast	Slow
Time weighting	MAX	MAX	LEQ	MAX	MAX	LEQ	MAX	LEQ
Type of results	MAX	MAX	LEQ	MAX	MAX	LEQ	MAX	LEQ
Indication for the steady sinusoidal signal L [dB]	134,0	134,0	134,0	134,0	134,0	134,0	134,0	134,0
Indication for the toneburst L_i [dB]	133,0	126,6	-	116,0	107,0	-	106,8	-
Sound exposure level (SEL) [dB]	127,0	127,0	127,0	107,0	107,0	107,0	97,9	97,9
Difference $L_i - L$ [dB]	-1,0	-7,4	-7,0	-18,0	-27,0	-27,0	-27,2	-36,1
Correct value of difference Δ [dB]	-1,0	-7,4	-7,0	-18,0	-27,0	-27,0	-27,0	-36,0
The deviation of an indication ($\Delta - (L_i - L)$) [dB]	0,00	0,00	0,00	0,00	0,00	0,00	-0,20	-0,10
Expanded uncertainty [dB]	0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16
Maximum allowable measurement uncertainty [dB]	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30
Acceptable limits Class 1 [dB]	$\pm 0,5$	$\pm 0,5$	$\pm 0,5$	-1,5; +1,0	-1,5; +1,0	-1,5; +1,0	-3,0; +1,0	-3,0; +1,0

In tolerance

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

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

In tolerance

8. Peak C sound level

Numbers of cycles in test signal	Frequency [Hz]	Indication for the steady sinusoidal signal L_c [dB]	Peak indication L_{Cpeak} [dB]	Difference $L_{Cpeak} - L_c$ [dB]	Correct value of difference Δ [dB]	The deviation of an indication ($\Delta - (L_{Cpeak} - L_c)$) [dB]	Expanded uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class 1 [dB]
One	8000	132,0	134,9	2,9	3,4	-0,50	0,17	0,35	$\pm 2,0$
Positive half-cycle	500	132,0	134,3	2,3	2,4	-0,10	0,16	0,35	$\pm 1,0$
Negative half-cycle	500	132,0	134,2	2,2		-0,20	0,16		

In tolerance

9. Overload indication

Frequency weighting: A

Indication for the steady sinusoidal signal L [dB]	Overload indication		Difference $ L_d - L_u $ [dB]	Expanded uncertainty [dB]	Maximum allowable measurement uncertainty [dB]	Acceptable limits Class 1 [dB]
	for positive half-cycle L_d [dB]	for negative half-cycle L_u [dB]				
136,0	90,8	90,8	0,00	0,17	0,25	$\pm 1,5$

In tolerance

10. 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	$\pm 0,1$

This test is carried out in accordance with the provision of the standard IEC 61672-3: 2013 but is not part of the scope of the laboratory with ISO / IEC 17025: 2017,

In Tolerance

11. 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	$\pm 0,1$

This test is carried out in accordance with the provision of the standard IEC 61672-3: 2013 but is not part of the scope of the laboratory with ISO / IEC 17025: 2017,

In Tolerance

Maximum environmental conditions measured in the testing:

Ambient pressure 850,00 hPa,

Temperature 21,8 °C,

Relative humidity 30,1 %RH

David Benitez Rojas

Calibration specialist

Henry Thaisaku Takahashi G,

Checked by

End of report.