



**FEHILY
TIMONEY**

**CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING**

APPENDIX 9.2

Equipment Calibration
Certificates





NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to **Fehily Timoney & Company**
J5 Plaza
North Business Park
North Road
Dublin 11

Attention of **Maureen Marsden**

Certificate Number	220034
Item Calibrated	Svantek SVAN 977 Sound Level Meter with ACO 7052E Microphone
Serial Number	34173 (SLM) and 54691 (Microphone)
ID Number	None
Order Number	7018
Date Received	06 Jan 2022
NML Procedure Number	AP-NM-09

Method The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).

Calibration Standards Norsonic 1504A Calibration System incorporating:
SR DS360 Signal Generator, No. 0735 [Cal Due Date: 10 Jun 2022]
Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 10 Jun 2022]
B&K 4134 Measuring Microphone, No. 0744 [Cal Due Date: 03 Jun 2023]
B&K 4228 Pistonphone, No. 0740 [Cal Due Date: 04 Jun 2023]
B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 07 Oct 2022]

Calibrated by



David Fleming

Approved by



Paul Hetherington

Date of Calibration

17 Jan 2022

Date of Issue

17 Jan 2022



This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)



NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to **Fehily Timoney & Company**
J5 Plaza
North Park Business Park
North Road
Dublin 11

Certificate Number	222422
Item Calibrated	Svantek SVAN 977 Sound Level Meter with ACO 7052E Microphone
Serial Number	69552 (SLM) and 69543 (Microphone)
ID Number	None
Order Number	7127
Date Received	07 Jun 2022
NML Procedure Number	AP-NM-09

Method The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).

Calibration Standards Norsonic 1504A Calibration System incorporating:
SR DS360 Signal Generator, No. 0735 [Cal Due Date: 08 Jul 2022]
Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 08 Jul 2022]
B&K 4134 Measuring Microphone, No. 0744 [Cal Due Date: 03 Jun 2023]
B&K 4228 Pistonphone, No. 0740 [Cal Due Date: 04 Jun 2023]
B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 07 Oct 2022]

Calibrated by

David Fleming

Approved by

Paul Hetherington

Date of Calibration

22 Jun 2022

Date of Issue

22 Jun 2022



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ISO9001 certified

FACTORY CALIBRATION DATA OF THE SV 307 No. 104990

with microphone SVANTEK type ST30A No. 108889

IMEI: 35500109776701

1. CALIBRATION (acoustical)

LEVEL METER function; Reference frequency: 1000Hz; Sound Pressure Level: 114.03 dB.

Characteristic	Correct value [dB]	Indication [dB]	Error [dB]
Z	114.03	114.07	0.04
A	114.03	114.07	0.04
C	114.03	114.07	0.04

Calibration measured with the microphone SVANTEK type ST30A No. 108889. Calibration factor: 0.00 dB.

2. LINEARITY TEST (electrical)

LEVEL METER function; Characteristic: A; f_{ref} = 31.5 Hz

Nominal result LEQ [dB]	29.0	30.0	31.0	35.0	40.0	60.0	80.0	85.0
Error [dB]	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-0.0

LEVEL METER function; Characteristic: A; f_{ref} = 1000 Hz

Nominal result LEQ [dB]	29.0	30.0	31.0	35.0	40.0	60.0	80.0	100.0	120.0	125.0
Error [dB]	0.1	0.1	0.1	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0

LEVEL METER function; Characteristic: A; f_{ref} = 8000 Hz

Nominal result LEQ [dB]	29.0	30.0	31.0	35.0	40.0	60.0	80.0	100.0	120.0	124.0
Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	-0.0	-0.0

3. TONE BURST RESPONSE

LEVEL METER function; Characteristic: A; f_{ref} = 4000 Hz; Burst duration: 2s

Steady level nominal result = 122 dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	Indication [dB]	122.9	121.9	121.0	119.4	117.2	113.7	110.8	107.9	104.0	101.0	97.9	84.9
		Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
	Slow	Indication [dB]	119.9	117.9	114.9	111.7	108.8	104.9	98.9	94.9	-	-	-	-
		Error [dB]	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	Indication [dB]	122.0	119.0	116.0	112.0	109.0	105.0	102.0	99.0	95.0	91.9	88.9	85.9	
	Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	

Steady level nominal result = 62 dB

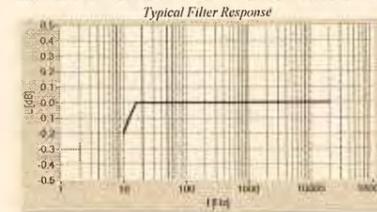
Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2
MAX	Fast	Indication [dB]	62.0	61.8	61.0	59.8	57.2	53.7	50.9	47.9	44.0
		Error [dB]	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
	Slow	Indication [dB]	59.9	57.9	54.8	51.7	48.8	44.9	41.9	38.9	34.9
		Error [dB]	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
SEL	Indication [dB]	62.0	59.0	55.0	52.0	49.0	45.0	42.0	39.0	35.0	
	Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	0.0	0.0	

Steady level nominal result = 40 dB

Result	Detector	Duration [ms]	1000	500	200
MAX	Fast	Indication [dB]	40.0	39.9	39.0
		Error [dB]	0.0	0.0	0.0
	Slow	Indication [dB]	38.0	35.9	32.5
		Error [dB]	-0.0	0.0	-0.1
SEL	Indication [dB]	40.0	37.0	33.1	
	Error [dB]	0.0	0.0	0.1	

4. FREQUENCY RESPONSE (electrical)

LEVEL METER function; Characteristic: Z; Input signal =122 dB;



Measured Filter Response
(f-frequency, L-level)

f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]
10	-0.1	63	0.0	4000	-0.0
12.5	-0.0	125	-0.0	8000	-0.0
16	0.0	250	0.0	16000	-0.0
20	0.0	500	0.0	20000	-0.0
25	0.0	1000	-0.0		
31.5	0.0	2000	-0.0		

All frequencies are nominal center values for the 1/3 octave bands

5. FREQUENCY RESPONSE (acoustical)

LEVEL METER function; Characteristic: Z; Input: 90 dB;

Frequency [Hz]	20	31.5	63	125	250	500	800	1000	2000
Pressure Response [dB]	0.9	0.7	0.4	0.2	0.2	0.2	0.1	0.0	-0.5
Free Field Response [dB]	0.9	0.7	0.4	0.2	0.2	0.2	0.1	0.0	0.0

Frequency [Hz]	3150	4000	5000	6300	8000	10000	12500	16000
Pressure Response [dB]	-1.4	-2.1	-3.0	-4.3	-5.7	-7.1	-8.8	-11.0
Free Field Response [dB]	-0.1	0.4	0.2	0.1	-0.0	-0.4	-1.4	-3.5

6. INTERNAL NOISE LEVEL (electrical - compensated)

LEVEL METER function; Calibration factor: 0dB

Characteristic	Z	A	C
Level [dB]	≤23	≤35	≤15

7. INTERNAL NOISE LEVEL (acoustical - compensated)

LEVEL METER function; Characteristic: A;

Indication [dB]	≤23
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Noise measured in special chamber, with reference microphone G.R.A.S type 40AN No. 73421

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
23 °C	40%	989 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1	SVANTEK	SVAN 401	100	Signal generator
2	SVANTEK	SVAN 912A	4369	Sound & Vibration Analyser
3	RIGOL	DM3068	DM30155100773	Digital multimeter
4	SVANTEK	SV338	93171	Acoustic calibrator
5	G.R.A.S.	51AB	200368	Sound Intensity Calibrator
6	G.R.A.S.	40BP	93796	1/2" Pressure Microphone
7	G.R.A.S.	40AN	73421	1/2" Free Field Microphone
8	SVANTEK	SL307	-	Microphone equivalent electrical impedance (15pF)

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.
2. The acoustic calibration was performed using the Sound Calibrator and is traceable to the GUM (Central Office of Measures) reference standard - sound level calibrator type 4231 No 2292773.
3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Cezary Dardziński

Test date: 2021-05-05



NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to Fehily Timoney & Company
J5 Plaza
North Business Park
North Road
Dublin 11

Attention of Maureen Marsden

Certificate Number	220035
Item Calibrated	Svantek SVAN 977 Sound Level Meter with ACO 7052E Microphone
Serial Number	34876 (SLM) and 56429 (Microphone)
ID Number	None
Order Number	7018
Date Received	06 Jan 2022
NML Procedure Number	AP-NM-09

Method The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).

Calibration Standards Norsonic 1504A Calibration System incorporating:
SR DS360 Signal Generator, No. 0735 [Cal Due Date: 10 Jun 2022]
Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 10 Jun 2022]
B&K 4134 Measuring Microphone, No. 0744 [Cal Due Date: 03 Jun 2023]
B&K 4228 Pistonphone, No. 0740 [Cal Due Date: 04 Jun 2023]
B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 07 Oct 2022]

Calibrated by 
David Fleming

Approved by 
Paul Hetherington

Date of Calibration 18 Jan 2022

Date of Issue 18 Jan 2022



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ISO9001 certified

FACTORY CALIBRATION DATA OF THE SV 307 No. 104985

with microphone SVANTEK type ST30A No. 108881

IMEI: 355001092063493

1. CALIBRATION (acoustical)

LEVEL METER function: Reference frequency: 1000Hz; Sound Pressure Level: 114.03 dB

Characteristic	Correct value [dB]	Indication [dB]	Error [dB]
Z	114.03	114.09	0.06
A	114.03	114.09	0.06
C	114.03	114.09	0.06

Calibration measured with the microphone SVANTEK type ST30A No. 108881. Calibration factor: 0.00 dB

2. LINEARITY TEST (electrical)

LEVEL METER function: Characteristic: A; $f_{ref} = 31.5$ Hz

Nominal result LEQ [dB]	29.0	30.0	31.0	35.0	40.0	60.0	80.0	85.0
Error [dB]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

LEVEL METER function: Characteristic: A; $f_{ref} = 1000$ Hz

Nominal result LEQ [dB]	29.0	30.0	31.0	35.0	40.0	60.0	80.0	100.0	120.0	125.0
Error [dB]	0.1	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0

LEVEL METER function: Characteristic: A; $f_{ref} = 8000$ Hz

Nominal result LEQ [dB]	29.0	30.0	31.0	35.0	40.0	60.0	80.0	100.0	120.0	124.0
Error [dB]	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0

3. TONE BURST RESPONSE

LEVEL METER function: Characteristic: A; $f_{ref} = 4000$ Hz; Burst duration: 2s

Steady level nominal result = 122 dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25	
MAX	Fast	Indication [dB]	122.0	121.9	121.0	119.4	117.2	113.7	110.8	107.9	104.0	100.0	97.8	94.9	
		Error [dB]	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
	Slow	Indication [dB]	119.9	117.8	114.5	111.7	108.8	104.8	101.9	98.8	94.9	-	-	-	-
		Error [dB]	-0.3	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-	-	-	-
SEL	-	Indication [dB]	122.0	119.0	115.0	112.0	109.0	105.0	102.0	99.0	95.0	91.0	88.0	85.8	
	Error [dB]	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1	

Steady level nominal result = 62 dB

Result	Detector	Duration [ms]	1000	500	200	100	50	20	10	5	2
MAX	Fast	Indication [dB]	62.0	61.9	61.0	59.4	57.2	53.7	50.8	47.9	44.0
		Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
	Slow	Indication [dB]	59.9	57.9	54.5	51.7	48.8	44.9	41.9	38.8	34.9
		Error [dB]	-0.1	-0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
SEL	-	Indication [dB]	62.0	59.0	55.0	52.0	49.0	45.0	42.0	39.0	35.0
	Error [dB]	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	

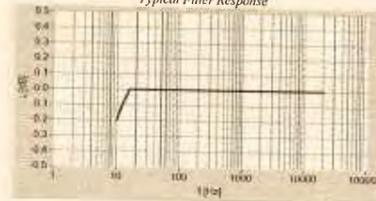
Steady level nominal result = 40 dB

Result	Detector	Duration [ms]	1000	500	200
MAX	Fast	Indication [dB]	40.0	39.9	39.0
		Error [dB]	0.0	0.0	0.0
	Slow	Indication [dB]	37.9	35.9	32.6
		Error [dB]	-0.1	0.0	0.0
SEL	-	Indication [dB]	40.0	37.0	33.1
	Error [dB]	0.0	0.0	-0.1	

4. FREQUENCY RESPONSE (electrical)

LEVEL METER function; Characteristic: Z; Input signal =122 dB;

Typical Filter Response



Measured Filter Response
(f-frequency, L-level)

f [Hz]	L [dB]	f [Hz]	L [dB]	f [Hz]	L [dB]
10	-0.1	63	-0.0	4000	-0.0
12.5	-0.0	125	-0.0	8000	-0.0
16	0.0	250	-0.0	16000	-0.0
20	0.0	500	-0.0	20000	-0.0
25	0.0	1000	-0.0		
31.5	0.0	2000	-0.0		

All frequencies are nominal center values for the 1/3 octave bands

5. FREQUENCY RESPONSE (acoustical)

LEVEL METER function; Characteristic: Z; Input: 90 dB;

Frequency [Hz]	20	31.5	63	125	250	500	1000	2000
Pressure Response [dB]	0.8	0.6	0.3	0.2	0.2	0.2	-0.1	-0.5
Free Field Response [dB]	0.8	0.6	0.3	0.2	0.2	0.2	-0.1	-0.5

Frequency [Hz]	3150	4000	5000	6300	8000	10000	12500	16000
Pressure Response [dB]	-1.4	-2.1	-3.0	-4.3	-5.8	-7.2	-9.1	-11.1
Free Field Response [dB]	-0.1	0.4	0.2	0.0	-0.1	-0.3	-1.7	-4.0

6. INTERNAL NOISE LEVEL (electrical - compensated)

LEVEL METER function; Calibration factor: 0dB

Characteristic	Z	A	C
Level [dB]	<23	<15	<15

7. INTERNAL NOISE LEVEL (acoustical - compensated)

LEVEL METER function; Characteristic: A;

Indication [dB]	<23
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Noise measured in special chamber, with reference microphone G.R.A.S type 40AN No. 73421

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
21 °C	36%	989 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1	SVANTEK	SVAN 401	100	Signal generator
2	SVANTEK	SVAN 912A	4369	Sound & Vibration Analyser
3	RIGOL	DM3068	DM30155100773	Digital multimeter
4	SVANTEK	SY33B	93171	Acoustic calibrator
5	G.R.A.S.	51AB	200368	Sound Intensity Calibrator
6	G.R.A.S.	40BP	93296	1/4" Pressure Microphone
7	G.R.A.S.	40AN	73421	1/2" Free Field Microphone
8	SVANTEK	SL307	-	Microphone equivalent electrical impedance (10pF)

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.
2. The acoustic calibration was performed using the Sound Calibrator and is traceable to the GUM (Central Office of Measures) reference standard - sound level calibrator type 4231 No 2292773.
3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Cezary Dardziński

Test date: 2021-05-05

