

RECALIBRATION DUE DATE:

January 24, 2019

Certificate of Calibration

Calibration Certification Information

Cal. Date: January 24, 2018

Rootsmeter S/N: 438320

Ta: 293 Pa: 756.9 °K

Operator: Jim Tisch

Calibration Model #: TE-5025A

Calibrator S/N: 3166

mm Hg

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4430	3.2	2.00
2	3	4	1	1.0270	6.4	4.00
3	5	6	1	0.9220	7.9	5.00
4	7	8	1	0.8780	8.7	5.50
5	9	10	1	0.7270	12.6	8.00

		Data Tabulat	ion		
Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	√∆H(Ta/Pa)
1.0087	0.6990	1.4233	0.9958	0.6901	0.8799
1.0044	0.9780	2.0129	0.9915	0.9655	1.2443
1.0024	1.0872	2.2505	0.9896	1.0733	1.3912
1.0013	1.1404	2.3603	0.9885	1.1259	1.4591
0.9961	1.3701	2.8467	0.9834	1.3526	1.7598
CARCON - VI-	m=	2.12231		m=	1.32895
QSTD	b=	-0.06016	QA	b=	-0.03719
	r=	0.99999	~ .	r=	0.99999

	Calculation	ns	
Vstd=	ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	Va=	ΔVol((Pa-ΔP)/Pa)
Qstd=	Vstd/∆Time		Va/ΔTime
	For subsequent flow ra	te calculatio	ns:
Qstd=	$1/m\left(\left(\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}\right)-b\right)$	Qa=	1/m((√ΔH(Ta/Pa))-t

	Standard Conditions
Tstd:	298.15 °K
Pstd:	760 mm Hg
	Key
ΔH: calibrator	manometer reading (in H2O)
ΔP: rootsmete	er manometer reading (mm Hg)
Ta: actual abs	olute temperature (°K)
Pa: actual bar	ometric pressure (mm Hg)
b: intercept	
m: slope	

RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

Pauline Wong

08-Mar-18



Calibration Data for High Volume Sampler (TSP Sampler)

TESTING	Janoi	ation E	ata ioi i	ngn von	unic Gan	ipici (i	or Gampier,	,	
Location :		CMA1b							08-Mar-18
Equipment no.		HVS001							: 08-May-18
CALIBRATION OF CONTIL	NUOUS FL	OW RECO	RDER_						
				Ambient C	ondition				
Temperature, T _a		288		Kelvin	Pressure, Pa		10	019	mmHg
			Orifice	Transfer Sta	ndard Inform	ation			
Equipment No.		Ori001		Slope, m _c	2.025	33	Intercept, bc		-0.03593
Last Calibration Date		20-Mar-1	7		(H	x P _a / 1	013.3 x 298 / ⁻	Γ _a) ^{1/}	/2
Next Calibration Date		20-Mar-1	8			m _c	$x Q_{std} + b_c$		
				Calibration	n of TSP				
Calibration	Ма	nometer Re	eading	Q	std	Cont	inuous Flow		IC
Point	Н ((inches of v	vater)	(m ³ /	min.)	Re	corder, W	(W(P	² _a /1013.3x298/T _a) ^{1/2} /35.31)
	(up)	(down)	(difference)	X-a	axis		(CFM)		Y-axis
1	1.6	1.6	3.2	0.9	187		28		28.5620
2	2.5	2.5	5.0	1.1	439		36		36.7225
3	3.8	3.8	7.6	1.4	062		44		44.8831
4	5.0	5.0	10.0	1.6	104		52		53.0436
5	6.2	6.2	12.4	1.7	913		60		61.2042
By Linear Regression of Y	on X								
	Slope, m	=	36.	7366	Int	ercept, b =	= -5.8	5976	
Correlation C	Coefficient*	=	0.9	9978					
Calibration	Accepted	=	Yes	/ No **					
* if Correlation Coefficient <	: 0.990, che	eck and rec	alibration aga	ain.					
** Delete as appropriate.									
Remarks : As per client's	s provided	information,	the equipme	ent reference i	no. of the calil	brated High	Volume Sampler h	as bee	n

Checked by

Date

re-assigned from EL452 to HVS001 with respect to the update in quality management system.

Jackey MA

08-Mar-18

Calibrated by

Date



TESTING	Campiation Data for High Volume Sampler (13P Sampler)								
Location :		CMA2a				Calibration	on Date	:	08-Mar-18
Equipment no.		HVS002			Calibration Due Date				08-May-18
CALIBRATION OF CONTIL	NUOUS FL	OW RECO	<u>RDER</u>						
	ı			Ambient Co			T		
Temperature, T _a		288		Kelvin	Pressure, P _a	ı	10)19	mmHg
			Orifice ¹	Transfer Stan	dard Informa	ation			
Equipment No.		Ori001		Slope, m _c	2.0253	33	Intercept, bc		-0.03593
Last Calibration Date		20-Mar-1	7		(H	x P _a / 10	13.3 x 298 / T	a) 1/2	
Next Calibration Date		20-Mar-1	8			m _c >	$(Q_{std} + b_c)$		
				Calibration	of TSP				
Calibration	Mai	nometer R	eading	Q,	std	Contin	uous Flow		IC
Point	н	inches of	water)	(m ³ /	min.)	Rec	order, W	(W(P _a /1013	3.3x298/T _a) ^{1/2} /35.31)
	(up)	(down)	(difference)	X-a	xis	(CFM)			Y-axis
1	1.6	1.6	3.2	0.91	187		30		30.6021
2	2.5	2.5	5.0	1.14	139		38	3	38.7627
3	3.9	3.9	7.8	1.42	244		50	5	51.0035
4	5.2	5.2	10.4	1.64	120		55	5	56.1038
5	6.5	6.5	13.0	1.83	337		62	6	63.2443
By Linear Regression of Y of Correlation Correlation Collibration	Slope, m	= =	0.9	966 /Ne**	Int	tercept, b =	-1.6	6563	
Remarks :	s provided i	nformation,	the equipme	nt reference n			′olume Sampler h	as been	
<u>re-assigned f</u>			with respect	to the update	in quality mar				unline Marin
Calibrated by		ackey MA				Checked	by		ualine Wong
Date	Date : 08-Mar-18			Date			08-Mar-18		



Location	:	CMA3a	Calibration Date	:	09-Mar-18
Equipment no.	: _	HVS012	Calibration Due Date	:	09-May-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition							
Temperature, T _a	288	Kelvin Pressure , P _a	1023	mmHg			

Orifice Transfer Standard Information									
Equipment No.	Equipment No. Ori001 Slope, m _c 2.02533 Intercept, bc -0.03593								
Last Calibration Date	20-Mar-17		(H x P _a / 1	013.3 x 298 / T _a	a) ^{1/2}				
Next Calibration Date	Next Calibration Date 20-Mar-18 m _c x Q _{std} + b _c								

	Calibration of TSP									
Calibration	Ma	nometer Re	eading	Q _{std}	Continuous Flow	IC				
Point	Н (inches of v	vater)	(m ³ / min.)	Recorder, W	(W(P _a /1013.3x298/T _a) ^{1/2} /35.31)				
	(up)	(down)	(difference)	X-axis	(CFM)	Y-axis				
1	1.5	1.5	3.0	0.8918	34	34.7504				
2	2.4	2.4	4.8	1.1234	40	40.8828				
3	3.7	3.7	7.4	1.3905	48	49.0594				
4	4.8	4.8	9.6	1.5813	54	55.1918				
5	6.0	6.0	12.0	1.7659	59	60.3021				
By Linear Regression of Y	on X									
	Slope, m	=	29.6	409 In	tercept, b = 8	3.0050				
Correlation C	oefficient*	=	0.99	995						
Calibration	Accepted	=	Yes/	Ne**						

^{*} if Correlation Coefficient < 0.990, check and recalibration again.

As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been Remarks :

re-assigned from EL333 to HVS012 with respect to the update in quality management system.

Calibrated by : Jackey MA Checked by : Pauline Wong

Date Date Checked by : O9-Mar-18

^{**} Delete as appropriate.



Location	:	CMA4a	Calibration Date	:	09-Mar-18
Equipment no.	:	HVS004	Calibration Due Date	:	09-May-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition												
Temperature, T _a	emperature, T _a 288 Kelvin Pressure, P _a 1023 mmHg											
Orifice Transfer Standard Information												
Equipment No.	Ori001	Slope, m _c 2.02533 Intercept, bc -0.03593										
Last Calibration Date	20-Mar-17		(H x P _a	/ 10	13.3 x 298 / T _a) 1/2						
Next Calibration Date	20-Mar-18		n	n _c x	Q _{std} +b _c							
Calibration of TSP												
Calibration	Collination Management Residence Of Continuous Flori											

				Calibration of TSP		
Calibration	Manometer Reading		Q _{std}	Continuous Flow	IC	
Point	Н (inches of v	water)	(m ³ / min.)	Recorder, W	(W(P _a /1013.3x298/T _a) ^{1/2} /35.31)
	(up)	(down)	(difference)	X-axis	(CFM)	Y-axis
1	1.5	1.5	3.0	0.8918	28	28.6180
2	2.5	2.5	5.0	1.1462	38	38.8387
3	3.8	3.8	7.6	1.4089	48	49.0594
4	4.9	4.9	9.8	1.5975	54	55.1918
5	6.2	6.2	12.4	1.7948	62	63.3683
y Linear Regression of Y	on X					
	Slope, m	=	38.0	0787 In	ntercept, b = -5	0704
Correlation C	coefficient*	=	0.9	995		
Calibration	Accepted	=	Yes	/ No **		

^{*} if Correlation Coefficient < 0.990, check and recalibration again.

Remarks : As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been

re-assigned from EL390 to HVS004 with respect to the update in quality management system.

Calibrated by : Jackey MA Checked by : Pauline Wong

Date Date Checked by : Pauline Wong

Pauline Wong

O9-Mar-18

^{**} Delete as appropriate.



Location	: <u></u>	CMA5b	Calibration Date	: .	09-Mar-18
Equipment no.	:	HVS010	Calibration Due Date	:]	09-May-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition							
Temperature, T _a	288	Kelvin F	Pressure, P _a	1023	mmHg		

Orifice Transfer Standard Information									
Equipment No.	Ori001	Slope, m _c	2.02533	Intercept, bc	-0.03593				
Last Calibration Date	20-Mar-17	(HxP _a /1013.3 x 298/T _a) ^{1/2}							
Next Calibration Date	20-Mar-18		= m	$n_c \times Q_{std} + b_c$					

Calibration of TSP									
Calibration	Mai	nometer Re	eading	Q _{std}	Continuous Flow	IC			
Point	Н (inches of v	vater)	(m ³ / min.)	Recorder, W	(W(P _a /1013.3x298/T _a) ^{1/2} /35.31)			
	(up)	(down)	(difference)	X-axis	(CFM)	Y-axis			
1	1.5	1.5	3.0	0.8918	32	32.7062			
2	2.5	2.5	5.0	1.1462	40	40.8828			
3	3.9	3.9	7.8	1.4271	48	49.0594			
4	5.1	5.1	10.2	1.6294	54	55.1918			
5	5.9	5.9	11.8	1.7512	59	60.3021			
By Linear Regression of Y	on X								
	Slope, m	=	31.3	3759 In	tercept, b = 4	.6699			

Correlation Coefficient* 0.9989

Calibration Accepted Yes/No**

**	Delete	as	ар	pro	priate.
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As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been Remarks:

re-assigned from EL222 to HVS010 with respect to the update in quality management system

Calibrated by Jackey MA 09-Mar-18 Pauline Wong Checked by Date 09-Mar-18 Date

^{*} if Correlation Coefficient < 0.990, check and recalibration again.



Location	:	MA1e	Calibration Date	:	09-Mar-18
Equipment no.	:	HVS007	Calibration Due Date	:	09-May-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

		Ambient Con	ndition		
Temperature, T _a	288	Kelvin P ı	ressure, P _a	1023	mmHg

Orifice Transfer Standard Information									
Equipment No.	Ori001	Slope, m _c	2.02533	Intercept, bc	-0.03593				
Last Calibration Date	20-Mar-17	20-Mar-17 (H x P _a / 1013.3 x 298 / T _a) 1/2							
Next Calibration Date	20-Mar-18		m ,	$_{c}$ x Q $_{std}$ + $_{c}$					

Calibration of TSP									
Calibration	Ма	nometer R	eading	Q _{std}	Continuous Flow	IC			
Point	н	(inches of	water)	(m ³ / min.)	Recorder, W	(W(P _a /1013.3x298/T _a) ^{1/2} /35.31)			
	(up)	(down)	(difference)	X-axis	(CFM)	Y-axis			
1	1.6	1.6	3.2	0.9205	30	30.6621			
2	2.5	2.5	5.0	1.1462	38	38.8387			
3	4.0	4.0	8.0	1.4451	48	49.0594			
4	5.2	5.2	10.4	1.6452	54	55.1918			
5	6.5	6.5	13.0	1.8373	62	63.3683			
By Linear Regression of Y	on X								
	Slope, m	=	34.99	949 In	tercept, b = -	1.5278			
Correlation C	coefficient*	=	0.99	91					
Calibration	Accepted	=	Yes/	10 **					
1									

* if	Correlation	Coefficient	< 0.990,	check and	recalibration	again.
------	-------------	-------------	----------	-----------	---------------	--------

Remarks: As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been re-assigned from EL455 to HVS007 with respect to the update in quality management system.

 Calibrated by Date
 : Jackey MA
 Checked by Date
 : Pauline Wong

 Date
 09-Mar-18
 09-Mar-18
 09-Mar-18



Location	: _	MA1w	Calibration Date		09-Mar-18
Equipment no.	: [HVS008	Calibration Due Date	:	09-May-18

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition					
Temperature, T _a	288	Kelvin	Pressure, P _a	1023	mmHg

Orifice Transfer Standard Information					
Equipment No.	Ori001	Slope, m _c	2.02533	Intercept, bc	-0.03593
Last Calibration Date	20-Mar-17		(H x P _a / 1	013.3 x 298 / T	a) 1/2
Next Calibration Date	20-Mar-18		= m _c	$x Q_{std} + b_c$	

Calibration of TSP							
Calibration	Ma	nometer Re	eading	Q _{std}	Continuous Flow	IC	
Point	H (inches of water)		(m ³ / min.)	Recorder, W	(W(P _a /1013.3x298/T _a) ^{1/2} /35.31)		
	(up)	(down)	(difference)	X-axis	(CFM)	Y-axis	
1	1.6	1.6	3.2	0.9205	22	22.4855	
2	2.5	2.5	5.0	1.1462	30	30.6621	
3	3.8	3.8	7.6	1.4089	39	39.8607	
4	5.0	5.0	10.0	1.6136	45	45.9932	
5	6.4	6.4	12.8	1.8232	52	53.1476	
By Linear Regression of Y	on X						
	Slope, m	=	33.75	575 In	tercept, b =	8.2390	
Correlation C	oefficient*	=	0.99	95			
Calibration	Accepted	=	Yes/4	\o **			

* if Correlation Coefficient < 0.990, check a	ınd recalibration again.
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As per client's provided information, the equipment reference no. of the calibrated High Volume Sampler has been re-assigned from EL080 to HVS008 with respect to the update in quality management system. Remarks:

Pauline Wong Calibrated by Jackey MA Checked by 09-Mar-18 09-Mar-18 Date Date



港 黄 竹 坑 道 3 7 號 利 達 中 心 1 2 樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website: www.cigismec.com

Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

Certificate No.:

17CA0426 01-02

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Item tested

Description: Manufacturer:

Sound Level Meter (Type 1)

Larson Davis

Microphone PCB

Type/Model No .: Serial/Equipment No.: LxT1 0003737 377B02 171529

Adaptors used:

Item submitted by

Customer Name: Address of Customer:

Lam Environmental Service Ltd.

Request No .: Date of receipt:

26-Apr-2017

Date of test:

28-Apr-2017

Reference equipment used in the calibration

Description:

Signal generator

Multi function sound calibrator

Model: B&K 4226

DS 360

Serial No. 2288444

61227

Expiry Date: 18-Jun-2017 01-Apr-2018

Traceable to: CIGISMEC CEPREI

Ambient conditions

Temperature:

Relative humidity: Air pressure:

21 ± 1 °C 50 ± 10 % 1010 ± 5 hPa

Test specifications

1. The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580; Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and

replaced by an equivalent capacitance within a tolerance of ±20%

The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Min/Feng Jun Qi

Actual Measurement data are documented on worksheets.

Approved Signatory:

Date:

04-May-2017

Company Chop:

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

C Sois & Materials Engineering Co . Ltd.



香港黃竹坑鐵37號利達中心12樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website: www.cigismec.com Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

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1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	Α	Pass	0.3	
	C	Pass	0.8	2.1
	Lin	Pass	1.6	2.2
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	Α	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
service allow movements	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	N/A	N/A	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
A MARION OF STREET A CONTRACTOR	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
2 2	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

Calibrated by:

Date:

Lai Sheng Jie 28-Apr-2017 Checked by:

Date: 0

Fung Chi Yip \ 04-May-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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CERTIFICATE OF CALIBRATION

Certificate No.:

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Item tested

Description

Sound Level Meter (Type 1)

Microphone

Manufacturer: Type/Model No.: Larson Davis

PCB

Serial/Equipment No.:

LxT1 0003737 377B02 171529

Adaptors used:

Item submitted by

Customer Name:

Lam Geotechnics Ltd.

Address of Customer:

Request No.

Date of receipt:

22-Mar-2018

Date of test:

28-Mar-2018

Reference equipment used in the calibration

Description:

Model:

Serial No.

Expiry Date:

Traceable to:

Multi function sound calibrator Signal generator

B&K 4226 DS 360

2288444 61227

08-Sep-2018 01-Apr-2018

CIGISMEC CEPREL

Ambient conditions

Temperature:

21 ± 1 °C

Relative humidity: Air pressure:

50 ± 10 % 1005 ± 5 hPa

Test specifications

The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152

2. The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of +20%

3. The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Feng Jun Qi

Actual Measurement data are documented on worksheets

Approved Signatory:

Date:

06-Apr-2018

Company Chop:

The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

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1. **Electrical Tests**

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	Α	Pass	0.3	
	A C	Pass	0.8	2.1
	Lin	Pass	1.6	2.2
Linearity range for Leq	At reference range . Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	A C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	N/A	N/A	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz Weighting A at 8000 Hz	Pass Pass	0.3 0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated

Calibrated by:

End

Fung Chi Yip

Checked by:

Lam Tze Wai

Date: 28-Mar-2018

Date:

06-Apr-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

C Soils & Materials Engineering Co. Ltd.



香港黃竹坑道37號利達中心12樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail; smec@cigismec.com Website; www.cigismec.com Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

Certificate No.:

18CA0213 02

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Item tested

Description:

Sound Level Meter (Type 1)

Microphone B & K Preamp B & K

Manufacturer: Type/Model No.: B & K 2250

4950 2755097 ZC0032 19223

Serial/Equipment No.: Adaptors used: 2701778

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Item submitted by

Customer Name:

Lam Geotechnics Limited.

Address of Customer:

Request No.:

.

Date of receipt:

13-Feb-2018

Date of test:

21-Feb-2018

Reference equipment used in the calibration

Description:

Model:

Serial No.

Expiry Date:

Traceable to:

Multi function sound calibrator Signal generator Signal generator B&K 4226 DS 360

DS 360

2288444 33873

61227

08-Sep-2018 25-Apr-2018 01-Apr-2018 CIGISMEC CEPREI CEPREI

Ambient conditions

Temperature:

20 ± 1 °C

Relative humidity:

50 ± 10 % 1000 ± 5 hPa

Test specifications

 The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

 The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

 The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

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Actual Measurement data are documented on worksheets

Fen

Approved Signatory:

Date:

21-Feb-2018

Company Chop:

SENGINEGO SENGINEGO

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

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Certificate No.:

18CA0213 02

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1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	c	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leg	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 125 Hz		Subtest Status Uncertanity (dB) Weighting A at 125 Hz Pass 0.3

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

Calibrated by:

Date:

Fung Chi Yip

21-Feb-2018

End

Checked by:

Date:

Lam Yze Wai 21-Feb-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Soils & Material's Engineering Co., Ltd.



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CERTIFICATE OF CALIBRATION

Certificate No.:

18CA0309 01

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Item tested

Description:

Sound Level Meter (Type 1)

Microphone

Preamp B & K

Manufacturer: Type/Model No.: B & K 2250-L B & K 4950

B & K ZC0032

Serial/Equipment No.: Adaptors used: 2722310

2698702

13318

Item submitted by

Customer Name:

Lam Geotechnics Ltd.

Address of Customer.

Request No.:

i i

Date of receipt:

09-Mar-2018

Date of test:

10-Mar-2018

Reference equipment used in the calibration

Description:

on: Model:

5

Serial No.

Expiry Date:

Traceable to:

Multi function sound calibrator Signal generator Signal generator

B&K 4226 DS 360 DS 360 2288444 33873 61227 08-Sep-2018 25-Apr-2018 01-Apr-2018 CIGISMEC CEPREI CEPREI

Ambient conditions

Temperature:

21 ± 1 °C

Relative humidity:

50 ± 10 %

Air pressure:

1000 ± 5 hPa

Test specifications

 The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

 The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

 The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Feng

Approved Signatory:

Date:

12-Mar-2018

Company Chop:

SENGIMERA 解合試驗 COMMON 有限公司 多705米〇)

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

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Certificate No.:

18CA0309 01

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1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	С	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	С	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2. Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz Weighting A at 8000 Hz	Pass Pass	0.3 0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

Calibrated by:

- End

.....

Date:

Fung Chi Yip \ 10-Mar-2018 Checked by:

Date:

Lam Tze War

12-Mar-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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CERTIFICATE OF CALIBRATION

Certificate No.:

17CA0505 01

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Item tested

Description: Manufacturer: Type/Model No.: Sound Level Meter (Type 1) B&K

Microphone B & K 4950

Preamp B&K ZC0032

Serial/Equipment No.: Adaptors used:

2250-L 2722311

2698703

13321

Item submitted by

Customer Name:

Lam Geotechnics Ltd.

Address of Customer:

Request No.:

Date of receipt:

05-May-2017

Date of test:

06-May-2017

Reference equipment used in the calibration

Description:

Serial No.

Expiry Date:

Traceable to:

Multi function sound calibrator Signal generator

Model: B&K 4226 DS 360

2288444 61227

18-Jun-2017 01-Apr-2018 CIGISMEC CEPREI

Ambient conditions

Temperature:

22 ± 1 °C 50 ± 10 %

Relative humidity: Air pressure:

1010 ± 5 hPa

Test specifications

The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

The electrical tests were performed using an electrical signal substituted for the microphone which was removed and 2. replaced by an equivalent capacitance within a tolerance of +20%.

The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference 3. between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

n / Fleng Jungi

Actual Measurement data are documented on worksheets

Approved Signatory:

Date:

09-May-2017

Company Chop:

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

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Certificate No.:

17CA0505 01

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Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Self-generated noise	A	Pass	0.3	
	С	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	Α	Pass	0.3	
	С	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
900015484766170000000000000000000000000000000000	Leq	Pass	0.4	

2. Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

Calibrated by:

Checked by:

Date:

Lai Sheng Jie 06-May-2017

Date:

ung Chi Yip 09-May-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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CERTIFICATE OF CALIBRATION

Certificate No.:

18CA0413 02

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Item tested

Description:

Sound Level Meter (Type 1)

Microphone

Preamp

Manufacturer:

B & K

B&K

B&K

Type/Model No.: Serial/Equipment No.:

2250-L 2722311

4950 2698703 ZC0032 13321

Adaptors used

Item submitted by

Customer Name:

Lam Geotechnics Ltd.

Address of Customer:

Request No.

Date of receipt:

13-Apr-2018

Date of test:

18-Apr-2018

Reference equipment used in the calibration

Multi function sound calibrator

Model: B&K 4226 Serial No.

Expiry Date: 08-Sep-2018

Traceable to:

Signal generator

DS 360

2288444 33873

25-Apr-2018

CIGISMEC CEPREI

Ambient conditions

Temperature: Air pressure:

20 ± 1 °C

Relative humidity:

50 ± 10 % 1000 ± 5 hPa

Test specifications

The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 1 and the lab calibration procedure SMTP004-CA-152.

The electrical tests were performed using an electrical signal substituted for the microphone which was removed and 2 replaced by an equivalent capacitance within a tolerance of ±20%.

The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference 3. between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580; Part 1: 1997 for the conditions under which the test was performed

Details of the performed measurements are presented on page 2 of this certificate

Actual Measurement data are documented on worksheets

Approved Signatory:

Date:

18-Apr-2018

Company Chop:

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument

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CERTIFICATE OF CALIBRATION

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Certificate No.:

18CA0413 02

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1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A C	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	С	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
100 A Fig. C+0. 20 394 St 4 St 4 St 20 C	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPĽ	Pass	0.3	
	Leq	Pass	0.4	

2. Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz Weighting A at 8000 Hz	Pass Pass	0.3 0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

Calibrated by:

.

Checked by:

Lam Tze Wa

Date:

Fong Chi Yip 18-Apr-2018

Date:

18-Apr-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

End

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CERTIFICATE OF CALIBRATION

Certificate No.:

18CA0116 01

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Item tested

Description: Manufacturer: Sound Level Meter (Type 1) B & K

Microphone B&K

Preamp BAK ZC0032

Type/Model No.: Serial/Equipment No.: 2250L 3002695

4950 2940839

18582

Adaptors used:

Item submitted by

Lam Geotechnics Ltd.

Customer Name: Address of Customer: Request No.

Date of receipt:

16-Jan-2018

Date of test:

18-Jan-2018

Reference equipment used in the calibration

Description:

Multi function sound calibrator

Model: B&K 4226 Serial No. 2288444

Expiry Date: 08-Sep-2018

Traceable to:

Signal generator Signal generator

DS 360 DS 360

33873 61227 25-Apr-2018 01-Apr-2018 CIGISMEC CEPRE CEPRE

Ambient conditions

Temperature:

21 ± 1 °C

Relative humidity:

50 ± 10 %

Air pressure:

1005 ± 5 hPa

Test specifications

The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580. Part 1: 1997. and the lab calibration procedure SMTP004-CA-152.

2. The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of +20%.

3. The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580; Part 1; 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Feng Jun Qi

Actual Measurement data are documented on worksheets

Approved Signatory:

Date:

18-Jan-2018

Company Chop:

Comments: The results reported in his certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

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1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0,3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range . Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz Weighting A at 8000 Hz	Pass Pass	0.3 0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

Calibrated by:

Date:

Fung Chi Yip 18-Jan-2018 2.0

End

Checked by

Date:

Lam Tze Wai 18-Jan-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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CERTIFICATE OF CALIBRATION

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Item tested

Description:

Sound Level Meter (Type 1)

Microphone

Preamp

of

Manufacturer: Type/Model No.: B & K 2250-L B & K 4950 2827240 B & K ZC0032 21213

Serial/Equipment No.: Adaptors used: 3006790

Item submitted by

Customer Name:

Lam Geotechnics Limited

Address of Customer:

Request No.:

- 3

Date of receipt:

04-Sep-2017

Date of test:

09-Sep-2017

Reference equipment used in the calibration

Description:

Model:

Serial No.

Expiry Date:

Traceable to:

Multi function sound calibrator Signal generator Signal generator B&K 4226 DS 360 DS 360 2288444 33873

61227

08-Sep-2018 25-Apr-2018 01-Apr-2018 CIGISMEC CEPREI CEPREI

Ambient conditions

Temperature:

21 ± 1 °C

Relative humidity:

 $50\pm10~\%$

Air pressure:

1015 ± 5 hPa

Test specifications

 The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

 The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

 The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate

Min/Feng Jun Qi

Actual Measurement data are documented on worksheets.

Approved Signatory:

Date:

09-Sep-2017

Company Chop:

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Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

			Expanded	Coverage
Test:	Subtest:	Status:	Uncertanity (dB)	Factor
Self-generated noise	A	Pass	0.3	
I - Control (Production of the Control	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	A C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
150.55	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2. Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
- All and the state of the stat	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated

Calibrated by:

Lai Sheng Jie

Checked by:

Fung Chi Yip 09-Sep-2017

Date: 09-Sep-2017 Date:

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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CERTIFICATE OF CALIBRATION

Certificate No.:

17CA1110 02

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.

Item tested

Description: Manufacturer: Acoustical Calibrator (Class 1)

Type/Model No.: Serial/Equipment No.: Rion Co., Ltd. NC-73

Adaptors used:

10707358

Item submitted by

Curstomer.

Lam Geotechnics Ltd.

Address of Customer:

Request No.: Date of receipt:

10-Nov-2017

Date of test:

14-Nov-2017

Reference equipment used in the calibration

Description: Lab standard microphone Preamplifier Measuring amplifier Signal generator Digital multi-meter Audio analyzer Universal counter	Model:	Serial No.	Expiry Date:	Traceable to:
	B&K 4180	2341427	11-Apr-2018	SCL
	B&K 2673	2239857	05-May-2018	CEPREI
	B&K 2610	2346941	03-May-2018	CEPREI
	DS 360	61227	01-Apr-2018	CEPREI
	34401A	US36087050	25-Apr-2018	CEPREI
	8903B	GB41300350	21-Apr-2018	CEPREI
	53132A	MY40003662	22-Apr-2018	CEPREI

Ambient conditions

Temperature:

21 ± 1 °C

Relative humidity:

50 ± 10 %

Air pressure:

1010 ± 5 hPa

Test specifications

- The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.
- The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on page 2 of this certificate.

Min/Feng Jun Qi

Huang Jia

Approved Signatory:

Date:

15-Nov-2017

Company Chop:

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Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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1, Measured Sound Pressure Level

> The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties

Frequency	Output Sound Pressure	Measured Output	(Output level in dB re 20 j.Pa) Estimated Expanded
Shown Hz	Level Setting d8	Sound Pressure Level	Uncertainty d8
1000	94.00	93.93	0.10

2. Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be

At 1000 Hz

STF = 0.008 dB

Estimated expanded uncertainty

0.005 dB

3, **Actual Output Frequency**

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz

Actual Frequency = 991.5 Hz

Estimated expanded uncertainty

0.1 Hz

Coverage factor k = 2.2

Total Noise and Distortion 4.

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz

TND = 0.3 %

Estimated expanded uncertainty

0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

End

Calibrated by:

Checked by:

Date:

14-Nov-2017

Date:

Fung Chi Yip 5-Nov-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.



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CERTIFICATE OF CALIBRATION

Certificate No.:

17CA0320 03

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Item tested

Description:

Acoustical Calibrator (Class 1)

Manufacturer: Type/Model No.: Larson Davis CAL200

Serial/Equipment No.: Adaptors used:

13098

Item submitted by

Curstomer:

Lam Environmental Service Ltd.

Address of Customer:

-8

Request No.:

Date of receipt:

20-Mar-2017

Date of test:

23-Mar-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	14-Apr-2017	SCL
Preamplifier	B&K 2673	2239857	28-Apr-2017	CEPREI
Measuring amplifier	B&K 2610	2346941	26-Apr-2017	CEPREI
Signal generator	DS 360	61227	18-Apr-2017	CEPREI
Digital multi-meter	34401A	US36087050	18-Apr-2017	CEPREI
Audio analyzer	8903B	GB41300350	19-Apr-2017	CEPREI
Universal counter	53132A	MY40003662	19-Apr-2017	CEPREI
			10.75	

Ambient conditions

Temperature:

Relative humidity:

21 ± 1 °C 60 ± 10 %

Air pressure:

1010 ± 5 hPa

Test specifications

- The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.
- 2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference
 pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure
 changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on page 2 of this certificate.

m/Feng Jun Qi

Approved Signatory:

Date:

24-Mar-2017

Company Chop:

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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17CA0320 03

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1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

Frequency	Output Sound Pressure	Measured Output	Estimated Expanded
Shown	Level Setting	Sound Pressure Level	Uncertainty
Hz	dB	dB	dB
1000	94.00	93.98	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz

STF = 0.002 dB

Estimated expanded uncertainty

0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz

Actual Frequency = 1000.2 Hz

Estimated expanded uncertainty

0.1 Hz

Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz

TND = 0.5 %

Estimated expanded uncertainty

Lai Stileng Jie

23-Mar-2017

0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

Calibrated by:

Date:

End

Checked by:

Date

Fung Chi Yip 24-Mar-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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綜合試驗有限公司

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CERTIFICATE OF CALIBRATION

Certificate No.:

18CA0309 02

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Item tested

Description:

Acoustical Calibrator (Class 1)

Manufacturer: Type/Model No.: Larson Davis CAL 200

Serial/Equipment No.: Adaptors used:

13098

Item submitted by

Curstomer:

Lam Environmental Service Ltd.

Address of Customer:

Request No:

Date of receipt:

09-Mar-2018

Date of test:

12-Mar-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	11-Apr-2018	SCL
Preamplifier	B&K 2673	2239857	05-May-2018	CEPREI
Measuring amplifier	B&K 2610	2346941	03-May-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI
Digital multi-meter	34401A	US36087050	25-Apr-2018	CEPREI
Audio analyzer	8903B	GB41300350	21-Apr-2018	CEPREI
Universal counter	53132A	MY40003662	22-Apr-2018	CEPREI

Ambient conditions

Temperature:

21 ± 1 °C

Relative humidity:

50 ± 10 %

Air pressure:

1000 ± 5 hPa

Test specifications

- 1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156
- 2 The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- 3. The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions

Details of the performed measurements are presented on page 2 of this certificate

Feng Jun Qi

Approved Signatory:

Date:

12-Mar-2018

Company Chop:

Comments: The results reported in this ceglificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long term stability of the instrument.

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CERTIFICATE OF CALIBRATION

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Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	(Output level in dB re 20 µPa) Estimated Expanded Uncertainty dB
1000	94.0	93.81	0.10

2. Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz

STF = 0.011 dB

Estimated expanded uncertainty

0.005 dB

3. **Actual Output Frequency**

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz

Actual Frequency = 1000.0 Hz

Estimated expanded uncertainty

0.1 Hz

Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz

TND = 0.6 %

Estimated expanded uncertainty

0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

End

Calibrated by:

Date:

Fund Chi Yio

Checked by:

Lam Tze Wai

12-Mar-2018

Date:

12-Mar-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level

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