

RECALIBRATION DUE DATE:

December 27, 2022

Certificate of Calibration

Calibration Certification Information

Cal. Date: December 27, 2021

Rootsmeter S/N: 438320

Ta: 295

°K

Operator: Jim Tisch

Pa: 740.4

mm Hg

Calibration Model #: TE-5025A Calibrator S/N: 0843

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3770	3.2	2.00
2	3	4	1	0.9710	6.4	4.00
3	5	6	1	0.8740	7.9	5.00
4	7	8	1	0.8340	8.8	5.50
5	9	10	1	0.6870	12.7	8.00

	Data Tabulation								
Vstd	Qstd	$\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}$		Qa	$\sqrt{\Delta H (Ta/Pa)}$				
(m3)	(x-axis)	(y-axis)	Va	(x-axis)	(y-axis)				
0.9799	0.7116	1.4029	0.9957	0.7231	0.8927				
0.9756	1.0048	1.9841	0.9914	1.0210	1.2624				
0.9736	1.1140	2.2183	0.9893	1.1320	1.4114				
0.9724	1.1660	2.3265	0.9881	1.1848	1.4803				
0.9673	1.4079	2.8059	0.9828	1.4306	1.7853				
	m=	2.02086		m=	1.26543				
QSTD[b=	-0.03672	QA	b=	-0.02336				
	r=	0.99992		r=	0.99992				

	Calculation	S		
Vstd=	ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	Va=	ΔVol((Pa-ΔP)/Pa)	
Qstd=	Qstd= Vstd/ΔTime		Qa= Va/ΔTime	
·····	For subsequent flow rate	e calculatio	ns:	
Qstd=	$1/m\left(\left(\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}\right)-b\right)$	Qa=	$1/m\left(\left(\sqrt{\Delta H(Ta/Pa)}\right)-b\right)$	

	Standard Conditions
Tstd:	298.15 °K
Pstd:	760 mm Hg
	Key
ΔH: calibrato	r manometer reading (in H2O)
ΔP: rootsmet	er manometer reading (mm Hg)
	solute temperature (°K)
Pa: actual ba	rometric pressure (mm Hg)
b: intercept	
m· slone	

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

AECOM Asia Company Limited Tisch TSP Mass Flow Controlled High Volume Air Sampler Field Calibration Report

Station	Block B, Merit In	dustrial Centre (E-A14a)	Operator:	Choi W	/ing Ho	
Cal. Date:	9/9/2022	· · · · · · · · · · · · · · · · · · ·		Next Due Date:	9/11/2022		
Model No.:	TE-5170			Serial No.	103	380	į.
Equipment No.:	A-001-15T			- -			
			Ambient (Condition			
Temperatur	e, Ta (K)	304.0	Pressure, F	Pa (mmHg)		752.5	
,	•						- 0.5
		(Orifice Transfer Sta	andard Information	1		
Serial	No:	843	Slope, mc	2.02	2086	Intercept, bc	-0.03672
Last Calibrat	tion Date:	27-Dec-21		may Oatd ha	= [H x (Pa/760) x	(209/Ta)1 ^{1/2}	
Next Calibra	tion Date:	27-Dec-22		me x Qsta + be =	= [H X (Pa//00) X	(298/14)]	
							7
			Calibration of	TSP Sampler			
		(Orfice		HV	S Flow Recorder	
Resistance Plate No.	DH (orifice), in. of water	[DH x (Pa/7	760) x (298/Ta)] ^{1/2}	Qstd (m³/min) X - axis	Flow Recorder Reading (CFM)	Continuous Flow Reading IC (CFN	
18	7.0		2.61	1.31	44.0	43.35	
13	6.1		2.43		40.0	39.41	
10	5.0		2.20		34.0	33.50	
7	4.2		2.02	1.02	30.0	29.56	
5	3.0		1.71	0.86	22.0	21.67	
By Linear Regress Slope , mw = Correlation Coeffi *If Correlation Coef	48.6284 cient* =		. 9995 rate.	Intercept, bw =	-20.	1731	
			Set Point (Calculation			
From the TSP Field	d Calibration Cur	ve, take Qstd = 1	.30m³/min	95 - 40-21		Walleton Control	
From the Regressi	on Equation, the	"Y" value accordi	ing to				
		mw	x Qstd + bw = IC x	[(Pa/760) x (298/T	a)] ^{1/2}		
Therefore, Set Poir	nt; IC = (mw x Q	std + bw) x [(76	0 / Pa) x (Ta / 298)] ^{1/2} =		43.69	-
Remarks:							
OC Reviewer	WS CH	AN	Signature:	R		Date: 9 / 9	/2022

AECOM Asia Company Limited Tisch TSP Mass Flow Controlled High Volume Air Sampler Field Calibration Report

Station	Block B, Merit In	idustrial Centre (E-A14a)	_ Operator:	Choi V	Ving Ho
Cal. Date:	8/11/2022			Next Due Date:	8/1/	2023
Model No.:	TE-5170			Serial No.	10	380
Equipment No.:	A-001-15T					
			Ambient (
Temperatur	e, Ta (K)	295.0	Pressure, F	Pa (mmHg)		761.1
			Dalffee Transfee Ota			
Serial	No:	843	Orifice Transfer Sta Slope, mc		n 2086	Intercept, bc -0.03672
Last Calibra		27-Dec-21	Stope, inc	2.02	2080	Intercept, 0c -0.03072
Next Calibra		27-Dec-21 27-Dec-22	1	mc x Qstd + bc	$= [H \times (Pa/760) \times$	$(298/Ta)]^{1/2}$
TVCAT Gallbra	ation bate.		L			
			Calibration of	TSP Sampler		
			Orfice		HV	S Flow Recorder
Resistance Plate No.	DH (orifice), in. of water	[DH x (Pa/i	760) x (298/Ta)] ^{1/2}	Qstd (m³/min) X - axis	Flow Recorder Reading (CFM)	Continuous Flow Recorder Reading IC (CFM) Y-axis
18	7.1		2.68	1.34	45.0	45.26
13	6.0		2.46	1.24	39.0	39.23
10	5.1		2.27		35.0	35.20
7	4.1		2.04	1.03	30.0	30.17
5	3.0		1.74	0.88	23.0	23.13
By Linear Regress Slope , mw = Correlation Coeffi	46.7601	0	.9978	Intercept, bw =	-18.	0524
*If Correlation Coef	fficient < 0.990, c	heck and recalib	rate.			
			Set Point 0	Calculation		
From the TSP Field	d Calibration Cur	ve, take Qstd = 1				
From the Regression						
		mw	x Qstd + bw = IC x	[(Pa/760) x (298/T	a)] ^{1/2}	
Therefore, Set Poir	nt; IC = (mw x Qs	std + bw) x [(76	0 / Pa) x (Ta / 298))] ^{1/2} =	ő	42.49
Remarks:						
						0
QC Reviewer:	WS CH	AN	Signature:	41		Date: 08/11/2022

EQUIPMENT CALIBRATION RECORD

Type:			Laser Dus	t Monitor				
Manufacti	urer/Brand:		SIBATA					
Model No	.:		LD-3					
Equipmen	t No.:		A.005.09a					
Sensitivity	Adjustment Scal	le Setting:	797 CPM					
Operator:			WS CHAN	WS CHAN				
Standard I	Equimment	<u> </u>					***	
Equipmen	t:		High Volu					
Venue:			Fanling G	overnmen	t Secondary School	ol	i e	
Model No	.:		TE-5170		33		,	
Serial No.:	:		3154					
Last Calibi	ration Date:		28-Apr-22	2			i	
Calibratio	n Result							
Consitiuit	. Adiustment Coo	la Catting (Dafar	o Calibrati	001:		797	СРМ	
	Adjustment Sca					797	CPM	
Sensitivity	Adjustment Sca	ie Setting (After	Calibratio	n):			CPIVI	
Hour	Date	Time	Ambient	Condition	Concentration ①	Total Count 2	Count/	
	(dd/mm/yy)		Temp (°C)	R.H.(%)	(mg/m3)		Minute ③	
					Y-axis		X-axis	
1	03/05/22	9:30-10:30	26.0	60	0.0490	1950	32.50	
2	03/05/22	10:30-11:30	26.0	60	0.0500	2050	34.17	
3	03/05/22	11:30-12:30	26.0	60	0.0520	2150	35.83	
4	03/05/22	12:30-13:30	26.0	60	0.0540	2300	38.33	
Note:	~	data was measu			Sampler			
	\sim	was logged by L						
	(3) Count/minu	ite was calculate	ed by (Tota	l Count/60	0)			
By Linear	Regression of Y	on X						
_ /	Slope (K-factor)		0.0015					
	Correlation coe		0.9994		•			
					-			
Validity o	f Calibration Rec	ord:	3-May-23					
Remarks:								
				Same a sur "				

QC Reviewer: Signature: Date: 4 May 22

EQUIPMENT CALIBRATION RECORD

Type:	Laser Dust Monitor						
Manufacti	acturer/Brand: SIBATA						
Model No						3	
Equipmen	t No.:		A.005.10a	3			1
Sensitivity	Adjustment Sca	le Setting:	753 CPM				
Operator:			WS CHAN				c.
Standard F	Equimment						
otanaara i	<u> </u>	<u> </u>					
Equipmen	t:			me Samp			i.
Venue:				overnmer	t Secondary Schoo	ol	e .
Model No	.:		TE-5170				
Serial No.:	:		3154				
Last Calibr	ration Date:		28-Apr-22	2			
Calibration	n Result						
Concitivity	Adjustment Coo	la Catting / Dafa	ro Colibrati	ionli		752	CDM
	Adjustment Sca			51		753	CPM
Sensitivity	Adjustment Sca	ie Setting (After	Calibratio	n):		753	CPM
Hour	Date	Time	Ambient	Condition	Concentration 1	Total Count 2	Count/
	(dd/mm/yy)		Temp (°C)	R.H.(%)	(mg/m3)		Minute ③
					Y-axis		X-axis
1	03/05/22	9:30-10:30	26.0	60	0.0490	1950	32.50
2	03/05/22	10:30-11:30	26.0	60	0.0500	2040	34.00
3	03/05/22	11:30-12:30	26.0	60	0.0520	2160	36.00
4	03/05/22	12:30-13:30	26.0	60	0.0540	2300	38.33
Note:	~	data was measu			Sampler		
	2 Total Count	was logged by L	aser Dust	Monitor			
	③ Count/minu	ite was calculate	ed by (Tota	I Count/60	0)		
By Linear	Regression of Y	on X					
Dy Ellicai	Slope (K-factor)		0.0015				
	Correlation coe		0.9994				
	correlation coc	meient.	0.5554		-		
Validity of	f Calibration Rec	ord:	3-Ma	ay-23			
Remarks:							
				0.77			
				* 2006			

QC Reviewer: Signature: Date: 4 May 12



綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港新界葵涌永基路22-24號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com





CERTIFICATE OF CALIBRATION

Certificate No.:

22CA0329 02

Page

Item tested

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

B & K 2250-L 2681366 Microphone B & K 4950 2665582

Preamp B & K ZC0032 17190

of

Item submitted by

Customer Name: Address of Customer: AECOM ASIA CO LTD

Sound Level Meter (Class 1)

Request No : Date of receipt:

Adaptors used:

29-Mar-2022

Date of test:

30-Mar-2022

Reference equipment used in the calibration

Description: Multi function sound calibrator Model: B&K 4226 DS 360

Serial No. 2288444 33873

Expiry Date: 23-Aug-2022 27-May-2022

Traceable to: CIGISMEC CEPREI

Ambient conditions

Temperature:

Signal generator

22 ± 1 °C 55 ± 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 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

Approved Signatory:

Date: 31-Mar-2022

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. The results apply to the item as received.

@ Soils & Materials Engineering Co., Ltd

Form No.CARP152-1/Issue 1/Rev.C/01/02/2007

HKAS has accredited this laboratory (Reg. No. HOKLAS 028) under HOKLAS for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. The results relate only to the item(s) calibrated. This certificate shall not be reproduced except in full without approval of the laboratory.



合試驗有限公司

香港新界葵涌永基路22-24號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail; smec@cigismec.com Website: www.cigismec.com



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

22CA0329 02

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	
oon gonerates notes	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	Α	Pass	0.3	
. , , ,	С	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
0 0	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	
5 5	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	
Acquetic tento				

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 8000 Hz	Pass	0.5	
	Weighting A at 125 Hz	Weighting A at 125 Hz Pass	Subtest Status Uncertanity (dB) Weighting A at 125 Hz Pass 0.3

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 ung Chi Yip 30-Mar-2022

Date:

Date:

31-Mar-2022

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.

Fnd

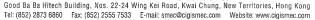
Soils & Materials Engineering Co., Ltd.

Form No.CARP152-2/Issue 1/Rev.C/01/02/2007



綜 合 試 驗 有 限 公 司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港新界葵涌永基路22-24號好爸爸創科大廈





CERTIFICATE OF CALIBRATION

Certificate No.:

22CA0504 01

of

Traceable to:

SCL

CEPREI

CEPREI

CEPREI

CEPREI

CEPREI

CEPREI

Item tested

Description: Manufacturer: Acoustical Calibrator (Class 1)

B & K Type/Model No. 4231 Serial/Equipment No.: 3006428 Adaptors used:

Item submitted by

Curstomer

AECOM

Address of Customer: Request No.:

Date of receipt: 04-May-2022

Date of test:

04-May-2022

Reference equipment used in the calibration

Description: Lab standard microphone Preamplifier Measuring amplifier Signal generator

B&K 4180 B&K 2673 B&K 2610 DS 360 34401A

Model:

53132A

8903B

2239857 2346941 33873

US36087050 GB41300350

Serial No.

2341427

01-Jun-2022

27-May-2022 27-May-2022 28-May-2022 02-Jun-2022

Expiry Date:

04-May-2022

31-May-2022

MY40003662

Ambient conditions

Temperature: Relative humidity Air pressure:

Digital multi-meter

Universal counter

Audio analyzer

22 ± 1 °C 55 + 10 % 1005 ± 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

Approved Signatory:

05-May-2022

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.

© Soils & Materials Engineering Co., Ltd.

Form No CARP156-1/Issue 1/Rev D/01/03/2007

綜合試驗 有限公司

HKAS has accredited this laboratory (Reg. No. HOKLAS 028) under HOKLAS for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. The results relate only to the item(s) calibrated. This certificate shall not be reproduced except in full without approval of the laboratory.



綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港新界葵涌永基路22-24號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

22CA0504 01

Page:

2

of 2

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.

			(Output level in do to 20 fil a
Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	94.16	0.10

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 = 0.014 dB

Estimated expanded uncertainty

0.005 dB

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 = 999.96 Hz

Estimated expanded uncertainty

0.1 Hz

Coverage factor k = 2.2

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 = 0.4 %

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.

Calibrated by:

Date:

Funa Chi Yir 04-May-2022

Checked by

Date: 05-May-2022

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

End

© Soils & Materials Engineering Co., Ltd.

Form No.CARP156-2/Issue 1/Rev.C/01/05/2005



綜 合 試 驗 有 限 公 司

涌永基路22-24號好爸爸創科大慶 Good Ba Ba Hitech Building, Nos, 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com





CERTIFICATE OF CALIBRATION

Certificate No.:

22CA1005 01-01

Microphone

B & K

2846461

4189

of

Item tested

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

Type/Model No.: 2270 Serial/Equipment No.: 3007965 Adaptors used:

Pream B & K ZC0032 17965

Item submitted by

Customer Name: Address of Customer: AECOM ASIA CO. LTD.

Request No.: Date of receipt:

05-Oct-2022

Date of test: 06-Oct-2022 Reference equipment used in the calibration

Description: Multi function sound calibrator Signal generator

Model: B&K 4226 DS 360

Serial No. 2288444 33873

Expiry Date: 23-Aug-2023 21-Jan-2023

Traceable to: CIGISMEC CEPRE

Ambient conditions

Temperature:

22 ± 1 °C 55 ± 10 %

1005 ± 5 hPa

Relative humidity: Air pressure:

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%.
- 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

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

Actual Measurement data are documented on worksheets

Approved Signatory:

07-Oct-2022

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. The results apply to the item as received.

Soils & Materials Engineering Co., Ltd.

Form No.CARP152-1/Issue 1/Rev.C/01/02/2007

HKAS has accredited this laboratory (Reg. No. HOKLAS 028) under HOKLAS for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. The results relate only to the item(s) calibrated. This certificate shall not be reproduced except in full without approval of the laboratory.



綜 合 試 驗 有 限 公 司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港新界葵涌永基路22-24號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com





CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

22CA1005 01-01

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:	Uncertanity (dB) / Coverage Facto		
Self-generated noise	Α	Pass	0.3		
	С	Pass	1.0 2.1		
	Lin	Pass	2.0 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		
	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		
Acquetic tests				-	

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	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 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 Yir b6-Oct-2022

calibrated on a schedule to maintain the required accuracy level.

Chan Yuk Yiu

07-Oct-2022

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are

C Soils & Materials Engineering Co., Ltd.

Form No.CARP152-2/Issue 1/Rev.C/01/02/2007



綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港新界葵涌永基路22-24號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com





CERTIFICATE OF CALIBRATION

Certificate No.:

22CA1005 01-02

of

Item tested

Description: Manufacturer: Type/Model No.:

B & K 2270 2644597

Microphone B & K 4950 2879980

Pream B & K ZC0032 29398

Serial/Equipment No.: Item submitted by

Customer Name: Address of Customer: AECOM ASIA CO LTD

Sound Level Meter (Type 1)

Request No .: Date of receipt:

Adaptors used:

05-Oct-2022

Date of test:

06-Oct-2022

Reference equipment used in the calibration

Description: Multi function sound calibrator Signal generator

Model: B&K 4226 DS 360

Serial No. 2288444 33873

Expiry Date: 23-Aug-2023 21-Jan-2023

Traceable to: CIGISMEC CEPREI

Ambient conditions

Temperature: Relative humidity: 22 ± 1 °C 55 ± 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.
- 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

Approved Signatory:

07-Oct-2022

Company Chop:

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

Soils & Materials Engineering Co., Ltd

Form No.CARP152-1/Issue 1/Rev.C/01/02/2007

HKAS has accredited this laboratory (Reg. No. HOKLAS 028) under HOKLAS for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. The results relate only to the item(s) calibrated. This certificate shall not be reproduced except in full without approval of the laboratory.



綜 合 試 驗 有 限 公 司

香港新界藝涌永基路99-94號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com





CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

22CA1005 01-02

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:	Uncertanity (dB) / Coverage Factor
Self-generated noise	Α	Pass	0.3
	С	Pass	1.0 2.1
	Lin	Pass	2.0 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
	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 1/10 ⁴ 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
Acquetic tosts	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	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 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:

Funa Chi Yio Date: 06-Oct-2022

Date:

Chan Yuk Yiu 07-Oct-2022

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

C Soils & Materials Engineering Co., Ltd.

Form No.CARP152-2/Issue 1/Rev.C/01/02/2007



綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港新界葵涌永基路22-24號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com



CERTIFICATE OF CALIBRATION

Certificate No.:

21CA1105 03

Page:

of 2

Traceable to:

SCI

CEPREI

CEPREI

CEPREL

CEPREI

CEPREI

CEPREL

Item tested

Description:

Acoustical Calibrator (Class 1)

Manufacturer Type/Model No.:

4231

Serial/Equipment No .: 3014024 / N004.04 Adaptors used:

Item submitted by

Curstomer:

AECOM ASIA CO LIMITED

Address of Customer:

Request No .:

05-Nov-2021

Date of receipt Date of test:

08-Nov-2021

Reference equipment used in the calibration

Description: Lab standard microphone Preamplifier Measuring amplifier Signal generator Digital multi-meter

Model: Serial No 2341427 B&K 4180 B&K 2673 2743150 B&K 2610 2346941 DS 360 33873 34401A

US36087050 GB41300350 MY40003662

01-Jun-2022 27-May-2022 27-May-2022 28-May-2022 02-Jun-2022

Expiry Date:

04-May-2022

31-May-2022

Ambient conditions

Temperature: Relative humidity Air pressure:

Audio analyzer

Universal counter

22 ± 1 °C 55 ± 10 % 1005 ± 5 hPa

8903B

53132A

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.

Approved Signatory:

Date:

09-Nov-2021

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. The results apply to the item as received.

© Soils & Materials Engineering Co., Ltd

Form No.CARP156-1/Issue 1/Rev D/01/03/2007

₩ 綜合試驗 有限公司

HKAS has accredited this laboratory (Reg. No. HOKLAS 028) under HOKLAS for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. The results relate only to the item(s) calibrated. This certificate shall not be reproduced except in full without approval of the laboratory.



綜 合 試 驗 有 限 公 司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港新界葵涌永基路22-24號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No :

21CA1105 03

Page: 2

of

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	94.05	0.10

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 = 0.014 dB

Estimated expanded uncertainty

0.005 dB

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

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

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: 08-Nov-2021,

Checked by

Chan Yuk Yiu 09-Nov-2021

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 & Materials Engineering Co., Ltd.

Form No.CARP156-2/Issue 1/Rev.C/01/05/2005



綜 合 試 驗 有 限 公 司

Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com



CERTIFICATE OF CALIBRATION

Certificate No.:

22CA1110 01-01

of

Item tested

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

B & K

2250 3001291 Microphone B & K 4950 3005374

Preamp B & K ZC0032 31351

Item submitted by

Customer Name: Address of Customer: AECOM ASIA CO LIMITED

Sound Level Meter (Class 1)

Request No.:

Adaptors used:

Date of receipt:

10-Nov-2022

Date of test:

11-Nov-2022

Reference equipment used in the calibration

Description: Multi function sound calibrator

B&K 4226 DS 360

2288444 33873

Expiry Date: 23-Aug-2023 21-Jan-2023

Traceable to: CIGISMEC CEPREI

Ambient conditions

Temperature:

Signal generator

22 ± 1 °C 55 ± 10 % 1005 ± 5 hPa

Relative humidity: Air pressure:

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.

Approved Signatory:

12-Nov-2022

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. The results apply to the item as received.

Soils & Materials Engineering Co., Ltd.

Form No.CARP152-1/Issue 1/Rev.C/01/02/2007

HKAS has accredited this laboratory (Reg. No. HOKLAS 028) under HOKLAS for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. The results relate only to the item(s) calibrated. This certificate shall not be reproduced except in full without approval of the laboratory.

綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.



香港新界葵涌永基路22-24號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

22CA1110 01-01

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)	Coverag 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	
	Leq	Pass	0.4	

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	

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.

Fnd

Calibrated by: Fung Chi Yip Date: 1-Nov-2022

Date: 12-Nov-2022

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.

Form No.CARP152-2/Issue 1/Rev.C/01/02/2007



綜合試驗有限公司

香港新界葵涌永基路99-94號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com





CERTIFICATE OF CALIBRATION

Certificate No.:

22CA1110 01-03

1

of

Item tested

Description: Manufacturer:

Acoustical Calibrator (Class 1) Rion Co., Ltd.

Type/Model No.:

NC-74

Serial/Equipment No.:

34246490 / N.004.10

Adaptors used:

Item submitted by

AECOM ASIA CO LIMITED

Address of Customer:

Request No.: Date of receipt:

Curstomer

10-Nov-2022

Date of test:

11-Nov-2022

Reference equipment used in the calibration

Model:	Serial No.	Expiry Date:	Traceable (SCL CEPREI CEPREI CEPREI CEPREI CEPREI CEPREI
B&K 4180	2412857	23-May-2023	
B&K 2673	2743150	28-Jun-2023	
B&K 2610	2346941	30-Jun-2023	
DS 360	33873	21-Jan-2023	
34401A	US36087050	30-May-2023	
8903B	GB41300350	06-Jul-2023	
53132A	GB41300350	06-Jul-2023	CEPREI
	MY40003662	13-Jun-2023	CEPREI
	B&K 4180 B&K 2673 B&K 2610 DS 360 34401A 8903B	B&K 4180 2412857 B&K 2673 2743150 B&K 2610 2346941 DS 360 33873 34401A US36087050 8903B GB41300350	B&K 4180 2412857 23-May-2023 B&K 2673 2743150 28-Jun-2023 B&K 2610 2346941 30-Jun-2023 DS 360 33873 21-Jan-2023 34401A US36087050 30-May-2023 8903B GB41300350 06-Jul-2023

Ambient conditions

Temperature: Relative humidity:

Air pressure:

22 ± 1 °C 55 ± 10 % 1005 ± 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. 2.
- 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

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 Junqi

Approved Signatory: <

Date: 12-Nov-2022

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. The results apply to the item as received.

C Soils & Materials Engineering Co., Ltd.

Form No.CARP156-1/Issue 1/Rev.D/01/03/2007

HKAS has accredited this laboratory (Reg. No. HOKLAS 028) under HOKLAS for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. The results relate only to the item(s) calibrated. This certificate shall not be reproduced except in full without approval of the laboratory.



綜合試驗有限公司

香港新界葵涌永基路99-94號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

22CA1110 01-03

Page:

of

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.

			(Output level in dB re 20 µPa)
Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	93.98	0.10

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

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 = 1002.1

Estimated expanded uncertainty

0.1 Hz

Coverage factor k = 2.2

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 = 1.6 %

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

Calibrated by:

Fung Chi Yip

Checked by

Date:

12-Nov-2022

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 & Materials Engineering Co., Ltd.

Form No CARP156-2/Issue 1/Rev C/01/05/2005



綜 合 試 驗 有 限 公 司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港新界藝涌永基路92-94號好爸爸創科大廈 Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com



CERTIFICATE OF CALIBRATION

Certificate No.:

22CA1110 01-02

Traceable to:

SCL

CEPREI

CEPREL

CEPREI

CEPREI

CEPREI

CEPREI

Item tested

Description:

Acoustical Calibrator (Class 1)

Manufacturer: Type/Model No.: B & K 4231

Serial/Equipment No.:

3014024 / N004.04

Adaptors used:

Item submitted by

Curstomer:

AECOM ASIA CO LIMITED

Address of Customer: Request No.:

10-Nov-2022

Date of receipt: Date of test:

11-Nov-2022

Reference equipment used in the calibration

Description: Lab standard microphone Preamplifier Measuring amplifier Signal generator Digital multi-meter Audio analyzer

Model: Serial No. B&K 4180 2412857 B&K 2673 2743150 B&K 2610 2346941 DS 360

34401A 8903B

33873 US36087050 GB41300350 MY40003662 28-Jun-2023 30-Jun-2023 21-Jan-2023 30-May-2023 06-Jul-2023

Expiry Date:

23-May-2023

13-Jun-2023

Ambient conditions

Temperature:

Universal counter

Relative humidity: Air pressure:

22 ± 1 °C $55 \pm 10 \%$ 1005 ± 5 hPa

53132A

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 3. 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

Approved Signatory:

12-Nov-2022

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. The results apply to the item as received

© Soils & Materials Engineering Co., Ltd

Form No.CARP156-1/Issue 1/Rev.D/01/03/2007

綜合試驗 有限公司

HKAS has accredited this laboratory (Reg. No. HOKLAS 028) under HOKLAS for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. The results relate only to the item(s) calibrated. This certificate shall not be reproduced except in full without approval of the laboratory.



綜 合 試 驗 有 限 公 司

Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.

22CA1110 01-02

Page: 2

of

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

(Output level in dB re 20 uPs)

(Output lover in ab to 20 p					
Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB		
1000	94.00	94.03	0.10		

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 = 0.014 dB

Estimated expanded uncertainty

0.005 dB

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

Coverage factor k = 2.2

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.

Calibrated by:

Fung Chi Yip 11-Nov-2022 Date:

Checked by:

Date:

Chan Yuk Yiu 12-Nov-2022

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 & Materials Engineering Co., Ltd.

Form No CARP156-2/Issue 1/Rev C/01/05/2005