

RECALIBRATION DUE DATE:

June 28, 2023

Certificate of Calibration

Calibration Certification Information

Cal. Date: June

June 28, 2022

TE-5025A

Rootsmeter S/N: 438320

Ta: 296

°K

Operator: Jim Tisch

Calibration Model #:

... ...

Calibrator S/N: 0988

Pa: 755.4

mm Hg

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3700	3.2	2.00
2	3	4	1	0.9730	6.4	4.00
3	5	6	1	0.8710	7.9	5.00
4	7	8	1	0.8310	8.8	5.50
5	9	10	1	0.6830	12.7	8.00

1.11	Data Tabulation									
Vstd	Qstd	$\sqrt{\Delta H \left(\frac{Pa}{Pstd}\right) \left(\frac{Tstd}{Ta}\right)}$		Qa	$\sqrt{\Delta H ig({ t Ta/Pa} ig)}$					
(m3)	(x-axis)	(y-axis)	Va	(x-axis)	(y-axis)					
0.9964	0.7273	1.4147	0.9958	0.7268	0.8853					
0.9922	1.0197	2.0007	0.9915	1.0190	1.2520					
0.9902	1.1368	2.2368	0.9895	1.1361	1.3997					
0.9890	1.1901	2.3460	0.9884	1.1894	1.4680					
0.9838	1.4405	2.8294	0.9832	1.4395	1.7705					
	m=	1.98736		m=	1.24445					
QSTD[b=	-0.02635	QA	b=	-0.01649					
	F	0.99994	- T	r=	0.99994					

	Calculation	S	
Vstd=	ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	Va=	ΔVol((Pa-ΔP)/Pa)
Qstd= Vstd/ΔTime Qa= Va/A		Va/∆Time	
	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: calibrate	r manometer reading (in H2O)
ΔP: rootsmet	er manometer reading (mm Hg)
Ta: actual ab	solute temperature (°K)
Pa: actual ba	rometric 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

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 V	Choi Wing Ho		
Cal. Date:	5/5/2023			Next Due Date:	5/7/	7/2023		
Model No.:	TE-5170			Serial No.	10	380	<u></u>	
Equipment No.:	A-001-15T	_						
			Ambient (Condition	11 12			
Temperatur	e, Ta (K)	303.0	Pressure, F	Pa (mmHg)		753.1		
		(Orifice Transfer Sta	<mark>ındard Informatio</mark>	n			
Serial	No:	988	Slope, mc	1.98	.98736 Intercept, bc -0.02			
Last Calibrat	ion Date:	28-Jun-22		me v Ostd + be :	= [H x (Pa/760) x	(208/Ta)1 ^{1/2}		
Next Calibra	tion Date:	28-Jun-23		me x Qstu + be -	- [H X (I a/ /00) 2			
		120				×		
			Calibration of	TSP Sampler				
3		1	Orfice		HV	S Flow Recorder		
Resistance Plate No. DH (orifice), in. of water [DH x (Pa/760) x (298/Ta)] ^{1/2}		Qstd (m³/min) X - axis	Flow Recorder Reading (CFM)	Continuous Flow Reading IC (CF				
18	7.0		2.61	1.33	44.0	43.44	,	
13	5.9		2.40	1.22	39.0	38.50		
10	5.0		2.21	_ 1.12	35.0	34.55		
7	4.0		1.97	1.01	30.0	29.62		
5	3.0		1.71	0.87	24.0	23.69		
By Linear Regress Blope , mw = Correlation Coeffice If Correlation Coef	43.1696 cient* =			Intercept, bw =	-13.	9735		
			Set Point C	alculation				
rom the TSP Field								
rom the Regression	on Equation, the '	'Y" value accordi	ing to					
		*****	x Qstd + bw = IC x	[/Del760\ /000/T	a)11/2			
		mw	x wsiu + DW - IC X	[(raiiou) X (29811	a)]			
herefore, Set Poir	nt; IC = (mw x Qs	std + bw) x [(760	0 / Pa) x (Ta / 298))] ^{1/2} =		42.69		
	,	, -,	, ,				-	
Domontos								
Remarks:								
QC Reviewer:	WS CHI	m	Signature:	21		Date: 5/5	123	

Type:			Laser Dus	st Monito	r		
	urer/Brand:		SIBATA				- 2
Model No	.:		LD-3				- 5:
Equipmen	t No.:		A.005.07	a			- .6
Sensitivity	Adjustment Sca	le Setting:	557CPM				= 1
Operator:			WS CHAN	1			-
							-
Standard	Equimment						
Equipmen	t:		High Volu	ıme Samp	ler		
Venue:			Pedestria	n Plaza			•
Model No	.:		TE-5170				•
Serial No.:			10273				* e-
Last Calibr	ation Date:		4-Apr-23				-
Calibration	n Result						
	Adjustment Sca			•		557	СРМ
Sensitivity	Adjustment Sca	le Setting (After	Calibratio	n):		557	CPM
Hour	Date	Time	Amahiant	C== dia: = =	Concentration	T-+-16(3)	
Houi	(dd/mm/yy)	Time	Ambient Temp (°C)		Concentration 1	Total Count 2	Count/
	(dd/mm/yy)		Temp (c)	R.H.(%)	(mg/m3)		Minute ③
1	26/04/23	9:00-10:00	23.5	65	Y-axis 0.0490	1910	X-axis
2	26/04/23	10:00-11:00	23.5	65	0.0500		31.83
3	26/04/23	11:00-12:00	23.5	65	0.0520	1980	33.00
4	26/04/23	12:00-12:00	23.5	65	0.0520	2020 2070	33.67
Note:		data was measu				2070	34.50
		was logged by L			Sampler		
	③ Count/minu	te was calculate	d by (Total	Count/60))		
By Linear F	Regression of Y o	ın X					
•	Slope (K-factor):		0.0015				
	Correlation coef		0.9999				
Validity of	Calibration Reco	ord:	26-Ap	or-24			
Remarks:							
oc i	Reviewer:	Y.W. Fung	c	ignature:	9	Data	28-∆nr-23

Type:			Laser Du	st Monito	r		
	turer/Brand:		SIBATA				_
Model No	0.:		LD-3				=
Equipme	nt No.:		A.005.09	a			=
Sensitivit	y Adjustment Sca	ale Setting:	797 CPM				-
							-
Operator			WS CHAN	J			=
Standard	Equimment						
Equipmer	nt:		High Volu	ıme Samp	lor		
Venue:			Pedestria		ici		₹
Model No	o.:		TE-5170				£.
Serial No.	•••		10273				-
Last Calib	ration Date:		4-Apr-23				•
Calibratio	on Pocult						
Calibratio	iii Kesult						
Sensitivity	y Adjustment Sca	le Setting (Befor	re Calibrati	on):		797	СРМ
	, y Adjustment Sca				797	CPM	
	, , , ,		Cambratio	,.		131	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	26/04/23	9:00-10:00	23.5	65	0.0490	1940	32.33
2	26/04/23	10:00-11:00	23.5	65	0.0500	1980	33.00
3	26/04/23	11:00-12:00	23.5	65	0.0520	2050	34.17
4	26/04/23	12:00-13:00	23.5	65	0.0540	2060	34.33
Note:		data was measu			Sampler		
	(2) Total Count	was logged by L	aser Dust I	Monitor			
	(3) Count/minu	ite was calculate	d by (Total	Count/60))		
By Linear	Regression of Y	on X					
	Slope (K-factor)		0.0015				
	Correlation coe		0.9997				
Validity of	f Calibration Reco	ord:	26-Ap	or-24			
Remarks:							
					11/		
QC	Reviewer:	Y.W. Fung	ς	ignature:	//	Dato	28_Apr_22

Type: Laser Dust Monitor Manufacturer/Brand: SIBATA Model No.: LD-3 Equipment No.: A.005.10a Sensitivity Adjustment Scale Setting: 753 CPM					r		- - -	
Operator	:		WS CHAN	V			-	
Standard	Equimment							
Equipmer Venue: Model No Serial No. Last Calib	v.:		High Volume Sampler Pedestrian Plaza TE-5170 10273 4-Apr-23					
Calibratio	n Result							
Sensitivity Adjustment Scale Setting (After Calibration): 753 CP						CPM CPM		
Hour	Date (dd/mm/yy)	Time	Ambient (°C)			Total Count 2	Count/ Minute③	
1	26/04/23	9:00-10:00	23.5	65	Y-axis 0.0490	1940	X-axis 32.33	
2	26/04/23	10:00-11:00	23.5	65	0.0500	2000	33.33	
3	26/04/23	11:00-12:00	23.5	65	0.0520	2040	34.00	
4	26/04/23	12:00-13:00	23.5	65	0.0540	2080	34.67	
Note: By Linear	② Total Count ③ Count/minu Regression of Yo		aser Dust I d by (Total	Monitor	·			
	Slope (K-factor) Correlation coef		0.0015	`				
Validity of	Calibration Reco		26-Ap	or-24				
Remarks:								
QC	Reviewer:	Y.W. Fung	_. s	ignature:	V	Date:	28-Apr-23	

Type:			Laser Dust Monitor				
Manufact	turer/Brand:		SIBATA				_
Model No	o.:		LD-3		- <u>-</u> <u>-</u>		
Equipmer	nt No.:		A.005.11		- ?		
Sensitivit	y Adjustment Sca	ale Setting:	799 CPM				-: -:
Operator	:		WS CHAN	J			_
Standard	Equimment					-	
Equipmer	nt:		High Volu	ıme Samp	ler		
Venue:			Pedestria				- :
Model No).:		TE-5170				-
Serial No.	•		10273				
Last Calib	ration Date:		4-Apr-23				
Calibratio	n Result						
Sancitivity	Adjustment Car	la Cattina /Dafa	eo Colibert				
	/ Adjustment Sca			*		799	CPM
sensitivit)	/ Adjustment Sca	ie Setting (After	Campratio	n):		799	СРМ
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	26/04/23	9:00-10:00	23.5	65	0.0490	1980	33.00
2	26/04/23	10:00-11:00	23.5	65	0.0500	2050	34.17
3	26/04/23	11:00-12:00	23.5	65	0.0520	2100	35.00
4	26/04/23	12:00-13:00	23.5	65	0.0540	2160	36.00
Note:	2 Total Count	data was measu was logged by L ite was calculate	aser Dust I	Monitor	·		
By Linear	Regression of Y c	on X					
	Slope (K-factor)	:	0.0015				
	Correlation coe	fficient:	0.9999				
Validity of	Calibration Reco	ord:	26-A	or-24			
Remarks:							
00	Reviewer:	Y.W. Fung	c	ignature:	4	Data	28. Apr. 23

Type:			Laser Du					
Manufact	turer/Brand:		SIBATA				- 52	
Model No	o.:		LD-3B				-	
Equipme	nt No.:		A.005.13	 а			_	
Sensitivit	y Adjustment Sca	ale Setting:	643 CPM				-	
Operator	:		WS CHAN	N			_	
Standard	Equimment							
Equipmer	nt:		High Volu	ıme Samp	ler			
Venue:			Pedestria		iei		- -	
Model No).:		TE-5170	11111020			ē.	
Serial No.			10273				2	
Last Calib	ration Date:		4-Apr-23				*	
							•	
Calibratio	n Result							
Sensitivity Adjustment Scale Setting (Befo				,		643	_CPM	
Sensitivity	/ Adjustment Sca	ile Setting (After	Calibratio	n):		643	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	26/04/23	9:00-10:00	23.5	65	0.0490	1920	32.00	
2	26/04/23	10:00-11:00	23.5	65	0.0500	2000	33.33	
3	26/04/23	11:00-12:00	23.5	65	0.0520	2060	34.33	
4	26/04/23	12:00-13:00	23.5	65	0.0540	2110	35.17	
Note:	1 Monitoring	data was measu	red by Hig	h Volume	Sampler			
		was logged by L Ite was calculate))			
By Linear	Regression of Y o	on X						
,	Slope (K-factor)		0.0015					
	Correlation coe		0.9999					
Validity of	Calibration Reco	ord:	26-A	or-24				
Remarks:								
					9/			
QC	Reviewer:	Y.W. Fung	S	ignature:	V	Date:	28-Apr-23	

Type:			Laser Du					
Manufact	urer/Brand:		SIBATA				<u> </u>	
Model No).:		LD-3B				—x	
Equipmer	nt No.:		A.005.14					
Sensitivity	/ Adjustment Sca	ale Setting:	786 CPM					
Operator:			WS CHAN	V			_	
Standard	Equimment							
Equipmer	nt·		High Volu	ıme Samp	lor		<u></u>	
Venue:			Pedestria		161		-	
Model No	h.:		TE-5170	11111020			-	
Serial No.			10273				5	
Last Calib	ration Date:		4-Apr-23				Ē	
							4	
Calibratio	n Result							
	Adjustment Sca			,		786	CPM	
Sensitivity	Adjustment Sca	le Setting (After	Calibratio	Calibration): 786				
	1	r	Ť .					
Hour	Date	Time		Condition	Concentration 1	Total Count 2	Count/	
	(dd/mm/yy)		Temp (°C)	R.H.(%)	(mg/m3)		Minute③	
1	26/04/22	0.00.40.00			Y-axis		X-axis	
1	26/04/23	9:00-10:00	23.5	65	0.0490	2050	34.17	
2	26/04/23	10:00-11:00	23.5	65	0.0500	2110	35.17	
3	26/04/23	11:00-12:00	23.5	65	0.0520	2190	36.50	
4 Note:	26/04/23	12:00-13:00	23.5	65	0.0540	2210	36.83	
Note.	2 Total Count	data was measu was logged by L te was calculate	aser Dust I	Monitor	•			
By Linear I	Regression of Yo	on X						
	Slope (K-factor)	•	0.0014					
	Correlation coef	fficient:	0.9998					
Validity of	Calibration Reco	ord:	26-Ap	or-24				
Remarks:								
OC I	Reviewer:	Y.W. Fung	S	ignature:	9	Date:	28. Apr. 22	

Type:			Laser Dust Monitor					
Manufact	turer/Brand:		SIBATA	SIBATA				
Model No	o.:		LD-3B				- 8	
Equipmer	nt No.:		A.005.16	a			— 2	
Sensitivity	y Adjustment Sca	ale Setting:	521 CPM				- 8	
		J	1					
Operator	:		WS CHAN	WS CHAN				
Standard	Equimment							
Standard	Equiminent							
Equipmer	nt:		High Volu	ıme Samp	ler			
Venue:			Pedestria	n Plaza			-	
Model No).:		TE-5170				=	
Serial No.	:		10273				-	
Last Calib	ration Date:		4-Apr-23				-	
			-				=	
Calibratio	n Result							
Sancitivity	Adjustment Son	la Satting /Bafa	ro Calibus±	ion):		504	CD1:	
Sensitivity Adjustment Scale Setting (Befo Sensitivity Adjustment Scale Setting (After						521	CPM	
Sensitivity	Aujustment Sca	ie setting (After	Calibratio	n):		521	_CPM	
Hour	Date	Time	Ambient	Condition	Concentration (1)	Total Count 2	Count/	
	(dd/mm/yy)		Temp (°C)	R.H.(%)	(mg/m3)		Minute(3)	
			1 \ -7		Y-axis		X-axis	
1	26/04/23	9:00-10:00	23.5	65	0.0490	1860	31.00	
2	26/04/23	10:00-11:00	23.5	65	0.0500	1940	32.33	
3	26/04/23	11:00-12:00	23.5	65	0.0520	2020	33.67	
4	26/04/23	12:00-13:00	23.5	65	0.0540	2150	35.83	
Note:		data was measu				2100	33.03	
	\sim	was logged by L	-		• •			
		te was calculate))			
By Linear	Regression of Y							
	Slope (K-factor)		0.0015					
	Correlation coef	fficient:	0.9997					
Validity of	Calibration Reco	ord:	26-A	pr-24				
., 2.		8						
Remarks:								
,								
					IA .			
OC!	Reviewer:	Y.W. Fung	c	ignature:	1/	Data	20 Amr 22	
ر د	vicvici,	I VV. I UIIS	- 3	ngnature:	V	pate:	28-Apr-23	



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

Item tested

Description: Manufacturer

B & K

Type/Model No.: 2250 Serial/Equipment No.: 3001291 Adaptors used:

Microphone B & K 4950 3005374

Preamp B & K ZC0032 31351

of

Item submitted by

Customer Name: Address of Customer: AECOM ASIA CO LIMITED

Sound Level Meter (Class 1)

Request No.:

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: Relative humidity:

Signal generator

22 ± 1 °C 55 ± 10 % 1005 ± 5 hPa

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 1/10 ³ 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	0.3	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass		
Overload indication	SPL	Pass	0.4	
	Leg	Pass	0.3	
Acquetic tooto		1 433	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



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.:

23CA0307 02

Page

Microphone

B & K

4950

2665582

of

Preamp

ZC0032

B & K

17190

Item tested

Description: Manufacturer: Type/Model No.: Sound Level Meter (Class 1)

AECOM ASIA CO LTD

B & K 2250-L 2681366

Serial/Equipment No.: Adaptors used:

Item submitted by

Customer Name: Address of Customer:

Request No.: Date of receipt:

07-Mar-2023

Date of test:

08-Mar-2023

Reference equipment used in the calibration

Description: Multi function sound calibrator Signal generator

DS 360

Model: B&K 4226 Serial No. 2288444 61227

Expiry Date: 23-Aug-2023 08-Jun-2023

Traceable to: CIGISMEC CEPREI

Ambient conditions

Temperature: Relative humidity: 22 ± 1 °C 55 ± 10 % 1010 ± 5 hPa

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:

13-Mar-2023

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.

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 23CA0307 02 Page

of

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
Calf gangrated nains	٨	Dana	0.2	
Self-generated noise	A C	Pass	0.3	
		Pass	0.8	
linearity remarkables	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 1/10 ³ 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	

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:

Fung Chi Yip Date: 08-Mar-2023 Checked by

Chan Yuk Yiu 13-Mar-2023

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



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CERTIFICATE OF CALIBRATION

Certificate No.:

22CA1005 01-01

Item tested

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

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

2270 3007965 B & K 4189 2846461

Microphone

Pream B & K ZC0032 17965

of

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: Signal generator Model: B&K 4226

DS 360

1005 ± 5 hPa

2288444

Serial No. 33873

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

Traceable to: CIGISMEC CEPRE

Ambient conditions

Multi function sound calibrator

Temperature:

22 ± 1 °C 55 ± 10 %

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.

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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 Fact
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
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

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.

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CERTIFICATE OF CALIBRATION

Certificate No.:

22CA1005 01-02

of

Item tested

Adaptors used:

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

B & K 2270 2644597 B & K 4950 2879980

Microphone

Pream B & K ZC0032 29398

Serial/Equipment No.: 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 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.

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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) / C	overage Fact
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	·		•	

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
D	december 1 Ph. 4		

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 End

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.

C Soils & Materials Engineering Co., Ltd.

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



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CERTIFICATE OF CALIBRATION

Certificate No.:

22CA1110 01-03

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of

Item tested

Description: Manufacturer: Acoustical Calibrator (Class 1) Rion Co., Ltd.

AECOM ASIA CO LIMITED

Type/Model No.:

NC-74

Serial/Equipment No.:

34246490 / N.004.10

Adaptors used:

Item submitted by

Curstomer:

Address of Customer:

Request No.: Date of receipt:

10-Nov-2022

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: B&K 4180 B&K 2673 B&K 2610 DS 360 34401A	Serial No. 2412857 2743150 2346941 33873 US36087050 GR41300350	Expiry Date: 23-May-2023 28-Jun-2023 30-Jun-2023 21-Jan-2023 30-May-2023	Traceable (SCL CEPREI CEPREI CEPREI CEPREI
Audio analyzer Universal counter	34401A	US36087050	30-May-2023	CEPREI
	8903B	GB41300350	06-Jul-2023	CEPREI
	53132A	MY40003662	13-Jun-2023	CEPREI

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.
- 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.

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.

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

22CA1110 01-03

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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

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 = 1002.1

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 = 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:

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.

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CERTIFICATE OF CALIBRATION

Certificate No.:

22CA1110 01-02

Page:

of 2

Item tested

Description:

Acoustical Calibrator (Class 1)

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

4231

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

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

Description: Lab standard microphone Preamplifier Measuring amplifier Signal generator Digital multi-meter Audio analyzer	Model:	Serial No.	Expiry Date:	Traceable to:
	B&K 4180	2412857	23-May-2023	SCL
	B&K 2673	2743150	28-Jun-2023	CEPREI
	B&K 2610	2346941	30-Jun-2023	CEPREI
	DS 360	33873	21-Jan-2023	CEPREI
	34401A	US36087050	30-May-2023	CEPREI
	8903B	GB41300350	06-Jul-2023	CEPREI
Universal counter	53132A	MY40003662	13-Jun-2023	CEPREI

Ambient conditions

Temperature:

22 ± 1 °C 55 + 10 %

Relative humidity: Air pressure: 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.
- 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

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.

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綜合試驗有限公司

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CERTIFICATE OF CALIBRATION

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Certificate No.:

22CA1110 01-02

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I, 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)

			(output level in ab ic zo hi a)
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

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 = 0.014 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 F

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.

Calibrated by:

Fung Chi Yip

Date: 11-Nov-2022

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.

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