

RECALIBRATION **DUE DATE:**

June 5, 2021

Pertificate o Calibration

Calibration Certification Information

Cal. Date: June 5, 2020

Rootsmeter S/N: 438320

Ta: 295

°K

Operator: Jim Tisch

Pa: 748.0

mm Hg

Calibration Model #: TE-5025A

Calibrator S/N: 0988

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3610	3.2	2.00
2	3	4	1	0.9700	6.4	4.00
3	5	6	1	0.8630	7.9	5.00
4	7	8	1	0.8240	8.8	5.50
5	9	10	1	0.6800	12.9	8.00

		Data Tabula	tion		
Vstd	Qstd	$\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}$		Qa	√∆H(Ta/Pa)
(m3)	(x-axis)	(y-axis)	Va	(x-axis)	(y-axis)
0.9900	0.7274	1.4101	0.9957	0.7316	0.8881
0.9858	1.0162	1.9943	0.9914	1.0221	1.2560
0.9838	1.1399	2.2296	0.9894	1.1465	1.4042
0.9826	1.1924	2.3385	0.9882	1.1993	1.4728
0.9771	1.4369	2.8203	0.9828	1.4452	1.7762
	m=	1.98556		m=	1.24332
QSTD	b=	-0.03069	QA	b=	-0.01933
-	r=	0.99996		r=	0.99996

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

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

RECALIBRATION

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

Tisch Environmental, Inc. 145 South Miami Avenue Village of Cleves, OH 45002

www.tisch-env.com

TOLL FREE: (877)263-7610

FAX: (513)467-9009

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

Cal. Date: Model No.: Equipment No.:	18/5/2021 TE-5170 A-001-15T	_		Next Due Date:	18/7/	2021	•
•		-,					_
auipment No :	A-001-15T			Serial No.	103	380	
, quipmont tron		-		-			•
			Ambient (Condition			
Temperature	е, Та (К)	303	Pressure, F	Pa (mmHg)		758.5	
			rifico Transfor Str	andard Information			
Serial I	No.	988	Slope, mc		3556	Intercept, bc	-0.0306
Last Calibrat		5-Jun-20	зюре, не				-0.0300
Next Calibrat		5-Jun-21		mc x Qstd + bc =	= [H x (Pa/760) x]	$(298/Ta)]^{1/2}$	
4			Calibration of	TSP Sampler	10.4	S Flow B	
		1	Orfice	, 	HV	S Flow Recorder	
Resistance Plate No.	DH (orifice), in. of water	[DH x (Pa/7	(60) x (298/Ta)] ^{1/2}	Qstd (m³/min) X - axis	Flow Recorder Reading (CFM)	Continuous Flow Reading IC (CFI	
18	7.1		2.64	1.35	45.0	44.58	
13	6.0		2.43	1.24	40.0	39.63	
10	5.0		2.22	1.13	35.0	34.68	
7	4.2		2.03	1.04	30.0	29.72	
5	2.9		1.69	0.87	22.0	21.80	
By Linear Regress Blope , mw = Correlation Coeffice If Correlation Coeffice	47.8013 cient* =		.9995 ate.	Intercept, bw =	-19.6	6195	
- Controlation Coon			uto.				
			Set Point 0	Calculation			
rom the TSP Field							
rom the Regression	on Equation, the "	r" value accordir	ng to				
		mw	x Qstd + bw = IC x	[(Pa/760) x (298/Ta	a)] ^{1/2}		
herefore, Set Poin	t; IC = (mw x Qst) / Pa) x (Ta / 298			42.92	-1
Remarks:							
QC Reviewer:	LIS CMA	ml	Signature:	20		Date: / \ / o	(/21



RECALIBRATION **DUE DATE:**

January 7, 2022

tificate e libration

Calibration Certification Information

Cal. Date: January 7, 2021

Rootsmeter S/N: 438320

Ta: 294

°K

Operator: Jim Tisch

Pa: 756.4

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	1.3970	4.2	2.00
2	3	4	1	0.9930	6.4	4.00
3	5	6	1	0.8790	8.0	5.00
4	7	8	1	0.8420	8.7	5.50
5	9	10	1	0.6950	12.7	8.00

		Data Tabula	tion		
Vstd	Qstd	$\sqrt{\Delta H \left(\frac{Pa}{Pstd}\right) \left(\frac{Tstd}{Ta}\right)}$		Qa	√∆H(Ta/Pa)
(m3)	(x-axis)	(y-axis)	Va	(x-axis)	(y-axis)
1.0032	0.7181	1.4204	0.9944	0.7118	0.8817
1.0003	1.0073	2.0088	0.9915	0.9985	1.2469
0.9982	1.1356	2.2459	0.9894	1.1256	1.3941
0.9972	1.1843	2.3555	0.9885	1.1740	1.4621
0.9919	1.4272	2.8409	0.9832	1.4147	1.7634
	m=	1.99914		m=	1.25183
QSTD[b=	-0.01375	QA	b=	-0.00854
1001-200	r=	0.99991		r=	0.99991

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

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

RECALIBRATION

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Tisch Environmental, Inc. 145 South Miami Avenue Village of Cleves, OH 45002

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TOLL FREE: (877)263-7610 FAX: (513)467-9009

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

Cal. Date: Model No.: Equipment No.: Temperature	16/7/2021 TE-5170 A-001-15T	304	Ambient (Next Due Date: Serial No.	16/9/ 103	2021 380	
Equipment No.:	A-001-15T	304		•	100	380	•
		304		- Candidan		t <u>s</u>	
Temperature	, Та (К)	304		Condition			
Temperature	, Та (К)	304		Condition			
Temperature	, Та (К)	304		Jonation	All MARKET BEING THE STATE OF T		
			Pressure, F	Pa (mmHg)		755.1	
0			Orifice Transfer Sta	T		Intercept, bc	0.1275
Serial N		843	Slope, mc	1.99	9914	-0.1375	
Last Calibrati		7-Jan-21		mc x Qstd + bc =	= [H x (Pa/760) x	$(298/Ta)]^{1/2}$	
Next Calibrati	on Date:	7-Jan-22					
		•	Calibration of	TSP Sampler			
	#		Orfice	Tor Campion	HV	S Flow Recorder	
Danistanas Dieta					,,,,		
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 (CFI	
18	7.0		2.61	1.37	44.0	43.42	
13	6.0		2.42	1.28	40.0	39.48	
10	5.0		2.21	1.17	35.0	34.54	
7	4.2		2.02	1.08	30.0	29.61	
5	3.0		1.71	0.92	23.0	22.70	
By Linear Regress Slope , mw = Correlation Coeffic	46.6345 cient* =		.9986	Intercept, bw =	-20.	4247	-
*If Correlation Coeff	icient < 0.990, ch	eck and recalibi	rate.				
			Set Point (Calculation			
From the TSP Field	Calibration Curve	e, take Qstd = 1	.30m³/min	The Control of the Co			1 4000
From the Regressio	n Equation, the "	Y" value accordi	ing to				
		mw	x Qstd + bw = IC x	[(Pa/760) x (298/T	a)] ^{1/2}		
Therefore, Set Poin	t; IC = (mw x Qs	td + bw) x [(76	0 / Pa) x (Ta / 298)] ^{1/2} =		40.73	-:
Remarks:							
QC Reviewer:	15 CHA	1	Signature:	21		Date: /6 /6	7/21

EQUIPMENT CALIBRATION RECORD

Type:			Laser Dus	st Monito			
	urer/Brand:		SIBATA				_
Model No	·. :		LD-3				_
Equipmer			A.005.09	_			
Sensitivity	Adjustment Sca	le Setting:	797 CPM	- -			
Operator:			Mike She	_			
Standard	Equimment						
Equipmen	it:		High Volu	ıme Samp	ler		
Venue:					nt Secondary Scho	ol.	-
Model No	.:		TE-5170	overmine.	it decondary deno	01	<u>-</u> -
Serial No.			3154		- W		-
	ration Date:		23-Apr-23	1			-
					W		-
Calibratio	n Result						
Sensitivity	Adjustment Sca	le Setting /Bofo	ra Calibrati	ion):		707	CDM
	Adjustment Sca					797	CPM
Sensitivity	Aujustinent sca	ie setting (Arter	Calibratio	n):		797	_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	30/04/21	9:30-10:30	28.0	78	0.04950	1980	33.00
2	30/04/21	10:30-11:30	28.0	78	0.05045	2030	33.83
3	30/04/21	11:30-12:30	28.0	78	0.05250	2120	35.33
4	30/04/21	12:30-13:30	28.0	78	0.05520	2310	38.50
Note:		data was measu	100		Sampler		
	=	was logged by L					
	(3) Count/minu	te was calculate	d by (Tota	l Count/60	0)		
Bv Linear I	Regression of Y c	on X					
	Slope (K-factor)		0.0015				
	Correlation coe		0.9997				
Validity of	Calibration Reco	ord:	30-A _l	pr-22			
- 62							
Remarks:							
QC	Reviewer:	YW Fing	S	Signature:	W	Date:	3-May 7
000 3 00000	**************************************	1	•		1		

EQUIPMENT CALIBRATION RECORD

Manufact			Laser Du	st Monito			
ivialiulaci	turer/Brand:		SIBATA				
Model No	o.:		LD-3				_
Equipme	nt No.:		A.005.10	-			
Sensitivit	y Adjustment Sca	ale Setting:	753 CPM		_		
Operator	:		Mike She	k (MSKM)		-	÷
Standard	Equimment						
Equipmer	nt:		High Volu	ıme Samp	lor		3.0
Venue:			-		nt Secondary Scho	ol.	-
Model No	o.:		TE-5170	overrimer.	it secondary serio	01	-
Serial No.			3154				9
	ration Date:		23-Apr-2	1			-
			•			<u> </u>	
Calibratio	n Result			p			
Consistints	Adiustra ant C	la Cattina /D /	6 111				
	y Adjustment Sca			6350		753	CPM
Sensitivity	y Adjustment Sca	le 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
			1		Y-axis		X-axis
			ļ				717 777
1	30/04/21	9:30-10:30	28.0	78	0.04950	1945	32.42
2	30/04/21	10:30-11:30	28.0	78 78	0.04950 0.05045	1945 2010	
2	30/04/21 30/04/21	10:30-11:30 11:30-12:30	28.0 28.0	78 78	0.05045 0.05250		32.42
2 3 4	30/04/21 30/04/21 30/04/21	10:30-11:30 11:30-12:30 12:30-13:30	28.0 28.0 28.0	78 78 78	0.05045 0.05250 0.05520	2010	32.42 33.50
2 3 4	30/04/21 30/04/21 30/04/21 ① Monitoring	10:30-11:30 11:30-12:30 12:30-13:30 data was measu	28.0 28.0 28.0 ared by Hig	78 78 78 h Volume	0.05045 0.05250 0.05520	2010 2110	32.42 33.50 35.17
2 3 4	30/04/21 30/04/21 30/04/21 ① Monitoring ② Total Count	10:30-11:30 11:30-12:30 12:30-13:30 data was measu was logged by L	28.0 28.0 28.0 red by Hig aser Dust	78 78 78 h Volume Monitor	0.05045 0.05250 0.05520 Sampler	2010 2110	32.42 33.50 35.17
2 3 4	30/04/21 30/04/21 30/04/21 ① Monitoring ② Total Count	10:30-11:30 11:30-12:30 12:30-13:30 data was measu	28.0 28.0 28.0 red by Hig aser Dust	78 78 78 h Volume Monitor	0.05045 0.05250 0.05520 Sampler	2010 2110	32.42 33.50 35.17
2 3 4 Note:	30/04/21 30/04/21 30/04/21 ① Monitoring ② Total Count ③ Count/minu	10:30-11:30 11:30-12:30 12:30-13:30 data was measu was logged by L	28.0 28.0 28.0 red by Hig aser Dust	78 78 78 h Volume Monitor	0.05045 0.05250 0.05520 Sampler	2010 2110	32.42 33.50 35.17
2 3 4 Note:	30/04/21 30/04/21 30/04/21 1 Monitoring 2 Total Count 3 Count/minu	10:30-11:30 11:30-12:30 12:30-13:30 data was measu was logged by L ate was calculate	28.0 28.0 28.0 red by Hig aser Dust	78 78 78 h Volume Monitor	0.05045 0.05250 0.05520 Sampler	2010 2110	32.42 33.50 35.17
2 3 4 Note:	30/04/21 30/04/21 30/04/21 ① Monitoring ② Total Count ③ Count/minu	10:30-11:30 11:30-12:30 12:30-13:30 data was measu was logged by L ate was calculate	28.0 28.0 28.0 red by Hig aser Dust	78 78 78 h Volume Monitor	0.05045 0.05250 0.05520 Sampler	2010 2110	32.42 33.50 35.17
2 3 4 Note:	30/04/21 30/04/21 30/04/21 1 Monitoring 2 Total Count 3 Count/minu Regression of Y of Slope (K-factor)	10:30-11:30 11:30-12:30 12:30-13:30 data was measu was logged by L te was calculate on X : fficient:	28.0 28.0 28.0 28.0 Ired by Hig aser Dust ed by (Tota 0.0015	78 78 78 h Volume Monitor I Count/60	0.05045 0.05250 0.05520 Sampler	2010 2110	32.42 33.50 35.17
2 3 4 Note: By Linear	30/04/21 30/04/21 30/04/21 ① Monitoring ② Total Count ③ Count/minu Regression of Y of Slope (K-factor) Correlation coe	10:30-11:30 11:30-12:30 12:30-13:30 data was measu was logged by L te was calculate on X : fficient:	28.0 28.0 28.0 red by Hig aser Dust d by (Tota 0.0015 0.9994	78 78 78 h Volume Monitor I Count/60	0.05045 0.05250 0.05520 Sampler	2010 2110	32.42 33.50 35.17
2 3 4 Note:	30/04/21 30/04/21 30/04/21 ① Monitoring ② Total Count ③ Count/minu Regression of Y of Slope (K-factor) Correlation coe	10:30-11:30 11:30-12:30 12:30-13:30 data was measu was logged by L te was calculate on X : fficient:	28.0 28.0 28.0 red by Hig aser Dust d by (Tota 0.0015 0.9994	78 78 78 h Volume Monitor I Count/60	0.05045 0.05250 0.05520 Sampler	2010 2110	32.42 33.50 35.17
2 3 4 Note: By Linear	30/04/21 30/04/21 30/04/21 ① Monitoring ② Total Count ③ Count/minu Regression of Y of Slope (K-factor) Correlation coe	10:30-11:30 11:30-12:30 12:30-13:30 data was measu was logged by L te was calculate on X : fficient:	28.0 28.0 28.0 red by Hig aser Dust d by (Tota 0.0015 0.9994	78 78 78 h Volume Monitor I Count/60	0.05045 0.05250 0.05520 Sampler	2010 2110	32.42 33.50 35.17

QC Reviewer: Signature: Date: 3-May 1



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



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CERTIFICATE OF CALIBRATION

Certificate No.:

20CA1019 02-01

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of

Preamp

Item tested

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

B & K 2250

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

3001291

Microphone B & K

B & K B & K 4950 ZC0032 3005374 23853

Item submitted by

Customer Name:

AECOM ASIA CO LIMITED

Address of Customer:

Request No.:

_

Date of receipt:

19-Oct-2020

Date of test:

22-Oct-2020

Reference equipment used in the calibration

Description:

Model:

Serial No.

Expiry Date:

Traceable to:

B&K 4226

2288444

23-Aug-2021

CIGISMEC

Signal generator

DS 360

61227

24-Dec-2020

CEPREI

Ambient conditions

Multi function sound calibrator

Temperature:

22 ± 1 °C

Relative humidity: Air pressure: 55 ± 10 % 1005 ± 5 hPa

Test specifications

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

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

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

Test results

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

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

Actual Measurement data are documented on worksheets.

Feng

Approved Signatory:

Date:

23-Oct-2020

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



香港新界葵涌水基路 2 2 - 2 4 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.:

20CA1019 02-01

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of

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1, Electrical Tests

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

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
Gen-generated noise	Ĉ	Pass	0.3	
	Lin	Pass	0.8	
Linearity range for Leg			1.6	
Lineality 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	

2, Acoustic tests

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

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

3, Response to associated sound calibrator

N/A

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

Calibrated by:

Date:

Fung Chi Yip 22-Oct-2020 End

Checked by

Date:

Feng Junqi 23-Oct-2020

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.CARP152-2/Issue 1/Rev.C/01/02/2007



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.:

20CA0914 02

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Item tested

Description: Manufacturer: Sound Level Meter (Type 1)

Microphone B&K

B & K

Type/Model No .:

2238

4188

Serial/Equipment No.: Adaptors used:

2800927

2250455

Item submitted by

Customer Name:

AECOM ASIA CO., LTD.

Address of Customer:

Request No.: Date of receipt:

14-Sep-2020

Date of test:

19-Sep-2020

Reference equipment used in the calibration

Description:

Model:

Serial No.

Expiry Date:

Traceable to:

Multi function sound calibrator

B&K 4226

2288444

23-Aug-2021

CIGISMEC

Signal generator

DS 360

61227

24-Dec-2020

CEPREI

Ambient conditions

Temperature:

22 ± 1 °C 55 ± 10 %

Relative humidity: Air pressure:

1000 ± 5 hPa

Test specifications

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

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

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

Test results

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

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

Feng Junqi

Actual Measurement data are documented on worksheets.

Approved Signatory:

Date:

20-Sep-2020

Company Chop:

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

Soils & Materials Engineering Co., Ltd.

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



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



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CERTIFICATE OF CALIBRATION

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1, Electrical Tests

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

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
3	C	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	

2, Acoustic tests

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

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

3, Response to associated sound calibrator

N/A

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

Calibrated by:

Date:

~

Fung Chi Yip 19-Sep-2020 End

Checked by

Date:

20-Sep-2020

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.CARP152-2/Issue 1/Rev.C/01/02/2007



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

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CERTIFICATE OF CALIBRATION

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Item tested

Description:

Acoustical Calibrator (Class 1)

Manufacturer:

Rion Co., Ltd.

Type/Model No.:

NC-74

Serial/Equipment No.:

34246490 / N.004.10

Adaptors used:

Item submitted by

Curstomer:

AECOM ASIA CO LIMITED

Address of Customer:

Request No.:

Date of receipt:

06-Oct-2020

Date of test:

12-Oct-2020

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	11-May-2021	SCL
Preamplifier	B&K 2673	2743150	03-Jun-2021	CEPREI
Measuring amplifier	B&K 2610	2346941	03-Jun-2021	CEPREI
Signal generator	DS 360	33873	19-May-2021	CEPREI
Digital multi-meter	34401A	US36087050	19-May-2021	CEPREI
Audio analyzer	8903B	GB41300350	18-May-2021	CEPREI
Universal counter	53132A	MY40003662	18-May-2021	CEPREI

Ambient conditions

Temperature:

22 ± 1 °C 55 ± 10 %

Relative humidity: Air pressure:

1005 ± 5 hPa

Test specifications

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

Test results

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

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

Feng Junqi

Approved Signatory:

Date:

12-Oct-2020

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

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1. Measured Sound Pressure Level

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

Frequency Shown	Output Sound Pressure Level Setting	Measured Output Sound Pressure Level	Estimated Expanded Uncertainty
Hz	dB	dB	dB
1000	94.00	94.10	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 = 0.017 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 Hz

Estimated expanded uncertainty

0.1 Hz

Coverage factor k = 2.2

Total Noise and Distortion 4.

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

At 1000 Hz

TND = 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:

Date:

Fung Chi Yip 12-Oct-2020 Checked by:

Date:

12-Oct-2020

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.:

20CA1019 02-02

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Item tested

Description:

Acoustical Calibrator (Class 1)

Manufacturer:

B&K 4231

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

3014024 / N004.04

Adaptors used:

Item submitted by

Curstomer:

AECOM ASIA CO LIMITED

Address of Customer:

Request No.:

Date of receipt:

19-Oct-2020

Date of test:

22-Oct-2020

Reference equipment used in the calibration

Description: Lab standard microphone Preamplifier Measuring amplifier Signal generator	Model: B&K 4180 B&K 2673 B&K 2610 DS 360	Serial No. 2341427 2743150 2346941 33873	Expiry Date: 11-May-2021 03-Jun-2021 03-Jun-2021	Traceable to: SCL CEPREI CEPREI
Digital multi-meter Audio analyzer Universal counter	34401A 8903B 53132A	US36087050 GB41300350 MY40003662	19-May-2021 19-May-2021 18-May-2021 18-May-2021	CEPREI CEPREI CEPREI

Ambient conditions

Temperature:

22 ± 1 °C

Relative humidity:

55 ± 10 %

Air pressure:

1005 ± 5 hPa

Test specifications

- The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B 1, 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,
- 3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

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

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

Approved Signatory:

Date:

23-Oct-2020

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

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Certificate No.:

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1. Measured Sound Pressure Level

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

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

2. Sound Pressure Level Stability - Short Term Fluctuations

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

At 1000 Hz

STF = 0.014 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 Hz

Coverage factor k = 2.2

4, **Total Noise and Distortion**

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

At 1000 Hz

TND = 0.5 %

Estimated expanded uncertainty

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:

End

Checked by:

Fung Chi Yip 22-Oct-2020 Date:

Date:

Feng 23-Oct-2020

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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