



RECALIBRATION **DUE DATE:**

January 16, 2024

ertificate d

Calibration Certification Information

Cal. Date: January 16, 2023 Rootsmeter S/N: 438320

Ta: 293 Pa: 748.8 °K

Operator: Jim Tisch

Calibration Model #:

TE-5025A

Calibrator S/N: 0843

mm Hg

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3860	3.2	2.00
2	3	4	1	0.9840	6.4	4.00
3	5	6	1	0.8780	8.0	5.00
4	7	8	1	0.8430	8.8	5.50
5	9	10	1	0.6950	12.7	8.00

	Data Tabulation						
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)		
0.9978	0.7199	1.4157	0.9957	0.7184	0.8846		
0.9935	1.0097	2.0021	0.9915	1.0076	1.2511		
0.9914	1.1291	2.2384	0.9893	1.1268	1.3987		
0.9903	1.1747	2.3476	0.9882	1.1723	1.4670		
0.9851	1.4174	2.8313	0.9830	1.4144	1.7693		
	m=	2.03196		m=	1.27238		
QSTD[b=	-0.04813	QA	b=	-0.03007		
_	r=	0.99993		r=	0.99993		

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

	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

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

Station	Block B, Merit In	dustrial Centre (E-A14a)	Operator:	Choi W	/ing Ho	
Cal. Date:	3/11/2023			Next Due Date:	3/1/2	2024	•
Model No.:	TE-5170			Serial No.	103	380	-
Equipment No.:	A-001-15T	_		•			•
			Ambient	Condition			
Temperatur	re, Ta (K)	301.0	Pressure, I	Pa (mmHg)		770.6	
			Orifice Transfer Sta	andard Information			
Serial		843	Slope, mc	2.00	3196	Intercept, bc	-0.04813
Last Calibra		16-Jan-23		mc x Qstd + bo	c = [H x (Pa/760) x ((298/Ta)] ^{1/2}	
Next Calibra	tion Date:	16-Jan-24			(,		
			Calibration of	TCD Campler			
		(Orfice	13F Sampler	HV	S Flow Recorder	
Resistance Plate No.	DH (orifice), in. of water		[DH x (Pa/760) x (298/Ta)] ^{1/2}		Flow Recorder Reading (CFM)	Continuous Flov Reading IC (CFI	
18	7.0		2.65	1.33	44.0	44.08	
13	6.0		2.45	1.23	40.0	40.08	
10	5.1		2.26	1.14	36.0	36.07	
7	4.1		2.03	1.02	30.0	30.06	
5	3.1		1.76	0.89	24.0	24.05	
By Linear Regress Slope , mw = Correlation Coeffi *If Correlation Coef	46.3915 cient* =		. 9991 ate.	Intercept, bw =	-17.	1928	-
			Set Point (Calculation			
From the TSP Field From the Regression		Y" value accordi	ng to				
Therefore, Set Poir	nt; IC = (mw x Qs			[(Pa/760) x (298/Ta	a)] ^{1/2}	43.03	-
Remarks:							
QC Reviewer:	WS CHAN		Signature:	2	Date:	3/11/2023	

Station	Plack P. Marit Industrial Contro	\ E A14a\
Station	Block B, Merit Industrial Centre) (E-A 14a)

Cal. Date: 3-Nov-23

3-Jan-24 Next Due Date:

Set Point (IC) 43.03

IC (CFM)	Qstd (m³/min)
24	0.888
25	0.909
26	0.931
27	0.953
28	0.974
29	0.996
30	1.017
31	1.039
32	1.060
33	1.082
34	1.103
35	1.125
36	1.147
37	1.168
38	1.190
39	1.211
40	1.233
41	1.254
40	1 076
42	1.276 1.297
44	1.319
44 45	1.341
46	1.362
47	1.384
48	
40	1.405
49	1.427
50	1.448
51	1.470
52	1.491
53	1.513
54	1.535
55	1.556
56	1.578
57	1.599
58	1.621
59	1.642
60	1.664
61 62	1.685 1.707
63	1.707
64	1.729
65	1.772

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

Operator:

Choi Wing Ho

Block B, Merit Industrial Centre (E-A14a)

Station

Cal. Date:	3/1/2024	<u>-</u>	· · · · · · · · · · · · · · · · · · ·	Next Due Date:	3/3/2024		
Model No.:	TE-5170			Serial No.	10380		
Equipment No.:	A-001-15T			•			-
			Ambient	Condition			
Temperatur	e, Ta (K)	294.0	Pressure,	Pa (mmHg)		775.2	
				andard Information			
Serial		843	Slope, mc	2.03	3196	Intercept, bc	-0.04813
Last Calibra		16-Jan-23		mc x Qstd + bc	: = [H x (Pa/760) x ([298/Ta)] ^{1/2}	
Next Calibra	tion Date:	16-Jan-24					
			Onlib wati awara	TOD Committee			
	<u> </u>		Orfice	TSP Sampler	LIV	S Flow Recorder	
		 	Jilice	1	П	5 Flow Recorder	
Resistance Plate No.	DH (orifice), in. of water	[DH x (Pa/7	[DH x (Pa/760) x (298/Ta)] ^{1/2}		Flow Recorder Reading (CFM)	Continuous Flow Reading IC (CF	
18	6.9		2.67	1.34	45.0	45.76	 }
13	5.9		2.47	1.24	40.0	40.67	
10	5.0		2.27	1.14	36.0	36.60)
7	4.0		2.03	1.02	30.0	30.50)
5	2.9		1.73	0.88	25.0	25.42	
By Linear Regress	sion of V on Y						
Slope , mw =	44.3755			Intercept, bw =	-14.0	1800	
Siope , iliw – Correlation Coeffi				intercept, bw -	-14.	0090	-
*If Correlation Coef	_			_			
ii Correlation Coel	11016111 × 0.330, G1	ieck and recailbr	ate.				
			Set Point (Calculation			
From the TSP Field	I Calibration Curve	e, take Qstd = 1.					
From the Regression							
3	4,		3				
		mw :	x Qstd + bw = IC x	[(Pa/760) x (298/Ta	a)] ^{1/2}		
				410			
Therefore, Set Poir	nt; IC = (mw x Qsf	td + bw) x [(760	/ Pa) x (Ta / 298)]¹/2=		42.88	-
Remarks:							
rveillains.							
00 Davis	MO OLIANI		Ciamat	2	5.1	2/4/0004	
QC Reviewer:	WS CHAN		Signature:		Date:	3/1/2024	

Station	Plack P. Marit Industrial Contro	\ E A14a\
Station	Block B, Merit Industrial Centre) (E-A 14a)

Cal. Date: <u>3-Jan-24</u>

Next Due Date: 3-Mar-24

Set Point (IC) <u>42.88</u>

IC (CFM)	Qstd (m³/min)
24	0.858
25	0.881
26	0.903
27	0.926
28	0.948
29	0.971
30	0.994
31	1.016
32	1.039
33	1.061
34	1.084
35	1.106
36	1.129
37	1.151
38	1.174
39	1.196
40	1.219
41	1.241
40	1 064
42	1.264
43	1.286
44	1.309
45	1.332
46	1.354
47	1.377
48	1.399
49	1.422
50	1.444
51	1.467
52	1.489
53	1.512
54	1.534
55	1.557
56	1.579
57	1.602
58	1.625
59	1.647
60	1.670
61	1.692
62	1.715
63	1.737
64	1.760
65	1.782

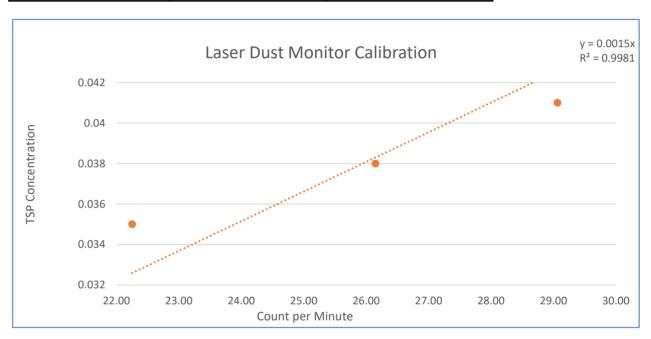
Type:			Laser Dus		_		
Manufactu	ırer/Brand:		SIBATA				
Model No.	:		LD-3B	•			
Equipment	t No.:		A.005.16a		·		
	Adjustment Sca	le Setting:	521 CPM				
,	•	J					
Operator: WS CHAN						-	
Standard Equimment							
Equipment: High Volume Sampler							
Venue:				Chung Villa			
Model No.			TE-5170	Chung ville	age		
							-
Serial No.:			3383				-
Last Calibr	ation Date:		4-Aug-23				-
<u> </u>							
Calibration	n Result						
Sensitivity	Adjustment Sca	le Setting (Befor	e Calibrati	on):		521	CPM
Sensitivity	Adjustment Sca	le 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)
					Y-axis		X-axis
1	15/08/23	9:00-10:00	32.0	80	0.038	1569	26.15
2	15/08/23	11:30-12:30	32.0	80	0.035	1335	22.25
3	15/08/23	13:50-14:50	32.0	80	0.041	1744	29.07
Note:	_ · ·	data was measu					
	~	was logged by L			oumpie.		
	\tilde{z}	ite was calculate			1)		
	(3) County Illinu	ite was calculate	u by (Tota	i Count/oc	')		
Bv Linear F	Regression of Y o	on X					
,	Slope (K-factor)		0.0015				
	Correlation coef		0.9981		•		
	Correlation coe	illicient.	0.5561		•		
Validity of Calibration Booms.			15-Aug-24				
Validity of Calibration Record:				ug-24	•		
Domorka							
Remarks:							
					1.1		
					0/		
QC I	Reviewer:	Y.W. Fung	_	Signature:		Date:	15-Aug-23

Laser Dust Monitor Calibration

Type: Laser Dust Monitor Manufacturer/Brand: SIBATA LD-3B Model No.: Equipment No.: A.005.16a Sensitivity Adjustment

521 CPM Scale Setting:

Hour	Count/Minute	Concentration (mg/m3)
	X-axis	Y-axis
1	26.15	0.038
2	22.25	0.035
3	29.07	0.041



Prepare by: WS CHAN 15-Aug-23 Date

Type: Laser Dust Monitor					_		
Manufacti	urer/Brand:		SIBATA	•			
Model No	.:		LD-3		•		
Equipmen			A.005.07a	n			
	Adjustment Sca	la Satting:	557CPM	4			•
Sensitivity	Aujustinent sca	ie setting.	337CFIVI				
Operator:			WS CHAN				
Standard E	Equimment						
Equipmen	τ:		High Volu				
Venue:			Ma Wan	Chung Villa	age		
Model No			TE-5170				-
Serial No.:	:		3383				_
Last Calibr	ration Date:		4-Aug-23				<u>-</u>
Calibration	n Result						
Sensitivity	Adjustment Sca	le Setting (Befor	e Calibrati	on):		557	СРМ
Sensitivity	Adjustment Sca	le Setting (After	Calibratio	n):		557	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	15/08/23	9:00-10:00	32.0	80	0.038	1542	25.70
2	15/08/23	11:30-12:30	32.0	80	0.035	1355	22.58
3	15/08/23	13:50-14:50	32.0	80	0.041	1792	29.87
Note:		data was measu				1 2732	23.07
Note.	_	was logged by L			Jumpier		
	_				1		
	③ Count/minu	ite was calculate	ed by (Tota	Count/60))		
By Linear I	Regression of Y o	on X					
,	Slope (K-factor)		0.0015				
	Correlation coe		0.9975				
					•		
Validity of	Calibration Reco	ord:	15-Aug-24				
Remarks:							
Kemarks.							
					M		
OC	Reviewer:	Y.W. Fung	c	ignature:		Date:	15-Aug-23
ųι	INCAICAACI.	i.vv. i ulig	_	ignature.	*	- Date.	10-408-52

Laser Dust Monitor Calibration

Type: Laser Dust Monitor

Manufacturer/Brand: SIBATA

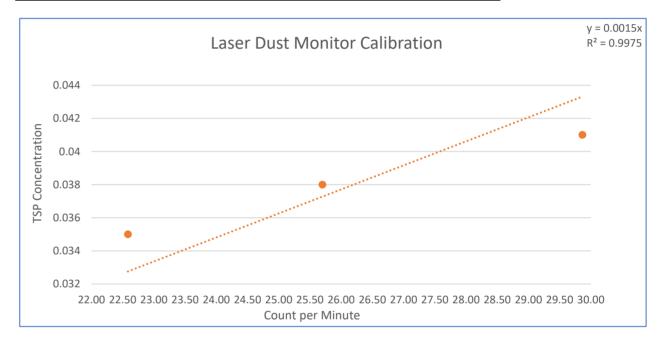
Model No.: LD-3

Equipment No.: A.005.07a

Sensitivity Adjustment

Scale Setting: 557 CPM

Hour	Count/Minute	Concentration (mg/m3)
	X-axis	Y-axis
1	25.70	0.0380
2	22.58	0.0350
3	29.87	0.0410



Type:			Laser Dust Monitor				_	
Manufacturer/Brand:			SIBATA		-			
Model No.	.:		LD-3		_			
Equipmen	t No.:		A.005.09a	3			-	
Sensitivity	Adjustment Sca	le Setting:	797 CPM				- -	
Operator:			WS CHAN				_	
Standard E	Equimment							
Equipmon	+•		High Volu	ma Campl	or			
Equipment Venue:	ι.		High Volu Ma Wan (-	
Model No.	•		TE-5170	chung vin	age		-	
Serial No.:			3383				-	
	ation Date:		4-Aug-23				-	
Last Callor	ation bate.		+ Aug 23				-	
Calibration	n Result							
Sancitivity	Adjustment Sca	la Satting (Rafar	o Calibrati	on):		797	CPM	
•	Adjustment Sca			-		797	- CPM	
Schisterity	Aujustinent sea	ic setting (Arter	Canbration	1).		737		
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	15/08/23	9:00-10:00	32.0	80	0.038	1580	26.33	
2	15/08/23	11:30-12:30	32.0	80	0.035	1360	22.67	
3	15/08/23	13:50-14:50	32.0	80	0.041	1752	29.20	
Note:	1 Monitoring	data was measu	red by Hig	h Volume	Sampler	•	•	
	2 Total Count	was logged by L	aser Dust I	Monitor				
	3 Count/minu	te was calculate	d by (Total	Count/60	0)			
Dulingari	Dograssian of V a	un V						
Бу Шеаг г	Regression of Y o Slope (K-factor)		0.0015					
	Correlation coef		0.9985					
	Correlation coe	incient.	0.9965					
Validity of Calibration Record:			15-Aug-24					
Remarks:								
	Nemarks.							
					11			
		=						
QC I	Reviewer:	Y.W. Fung	- S	ignature:	<i>V</i>	Date:	15-Aug-23	

Laser Dust Monitor Calibration

Type: Laser Dust Monitor

Manufacturer/Brand: SIBATA

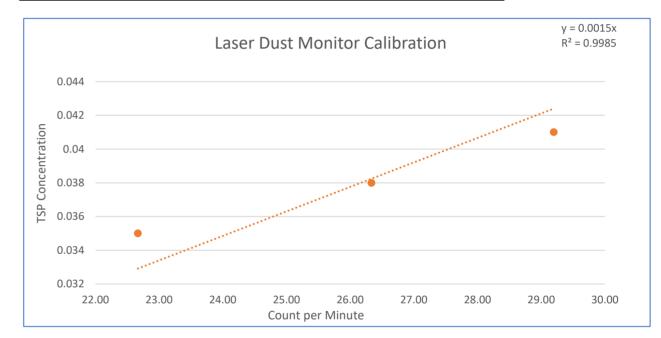
Model No.: LD-3

Equipment No.: A.005.09a

Sensitivity Adjustment

Scale Setting: 797 CPM

Hour	Count/Minute	Concentration (mg/m3)
	X-axis	Y-axis
1	26.33	0.0380
2	22.67	0.0350
3	29.20	0.0410



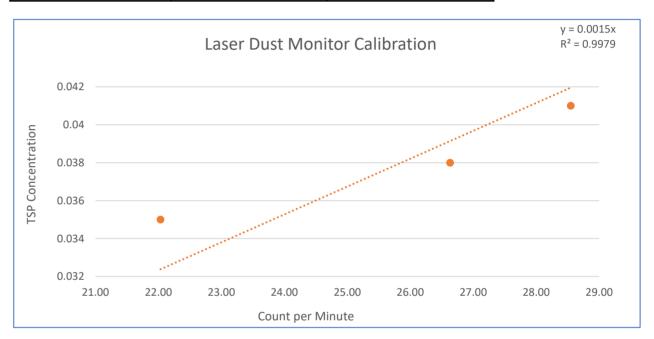
Type:			Laser Dus				
Manufacturer/Brand:			SIBATA				•
Model No.:			LD-3				•
Equipmen	t No.:		A.005.10a	ì			-
Sensitivity Adjustment Scale Setting:			753 CPM				•
Operator:			WS CHAN				-
Standard Equimment							
F	L .		High Male	C	la		
Equipment Venue:	Li.		High Volu Ma Wan (-
Model No.			TE-5170	chung vin	age		
Serial No.:			3383				-
	ation Date:		4-Aug-23				-
Last campi	anon bater		17108 20				•
Calibration	n Result						
			6 111	,		750	0014
•	Adjustment Scal			-		753	CPM
Sensitivity	Adjustment Scal	ie Setting (After	Calibration	1):		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	15/08/23	9:00-10:00	32.0	80	0.0380	1598	26.63
2	15/08/23	11:30-12:30	32.0	80	0.0350	1322	22.03
3	15/08/23	13:50-14:50	32.0	80	0.0410	1713	28.55
Note:	(1) Monitoring				Sampler		
	(2) Total Count						
	③ Count/minu	te was calculate	ed by (Total	Count/60	0)		
Dy Linoar (Regression of Y o	un V					
by Lilleal I	Slope (K-factor):		0.0015				
	Correlation coef		0.9979				
	correlation coci	meiene.	0.5575		•		
Validity of	Calibration Reco	ord:	15-Au	ıg-24			
Remarks:							
					9/		
QC I	QC Reviewer: Y.W. Fung Signature: Date: 15-Aug-23						

Laser Dust Monitor Calibration

Type: Laser Dust Monitor Manufacturer/Brand: SIBATA LD-3 Model No.: A.005.10a Equipment No.: Sensitivity Adjustment

753 CPM Scale Setting:

Hour	Count/Minute	Concentration (mg/m3)
	X-axis	Y-axis
1	26.63	0.0380
2	22.03	0.0350
3	28.55	0.0410



Prepare by: WS CHAN 15-Aug-23 Date

Type:			Laser Dust Monitor				
Manufacturer/Brand:			SIBATA				•
Model No.:			LD-3	-			
Equipment No.:			A.005.11a	1			
Sensitivity	Adjustment Sca	le Setting:	799 CPM				•
Operator:			WS CHAN				
Standard E	Standard Equimment						
	1,						
Equipmen	t:		High Volu				<u>-</u>
Venue:			Ma Wan (Chung Vill	age		-
Model No			TE-5170				-
Serial No.:			3383				-
Last Calibr	ration Date:		4-Aug-23				•
Calibration	n Result						
Sensitivity	Adjustment Sca	le Setting (Befor	re Calibrati	on):		799	СРМ
Sensitivity	Adjustment Sca	le Setting (After	Calibration	า):		799	CPM
	,		ı				<u> </u>
Hour	Date	Time	Ambient (Concentration 1	Total Count 2	Count/
	(dd/mm/yy)		Temp (°C)	R.H.(%)	(mg/m3)		Minute ③
1	45/00/22	0.00 10.00	22.0	00	Y-axis	4526	X-axis
2	15/08/23	9:00-10:00 11:30-12:30	32.0 32.0	80 80	0.038 0.035	1536 1321	25.60 22.02
3	15/08/23 15/08/23	13:50-12:50	32.0	80	0.033	1721	28.68
Note:	1 Monitoring					1721	20.00
Note.	_	was logged by L			Sampler		
	$\underline{\underline{}}$	te was calculate			0)		
	,		, .	,	•		
By Linear I	Regression of Y o	n X					
	Slope (K-factor)	:	0.0015				
	Correlation coef	fficient:	0.9982				
Validity of Calibration Record: 1				ıg-24			
Domarks							
Remarks:							
					4/		
QC	Reviewer:	Y.W. Fung	_ S	ignature:	//	Date:	15-Aug-23

Laser Dust Monitor Calibration

Type: Laser Dust Monitor

Manufacturer/Brand: SIBATA

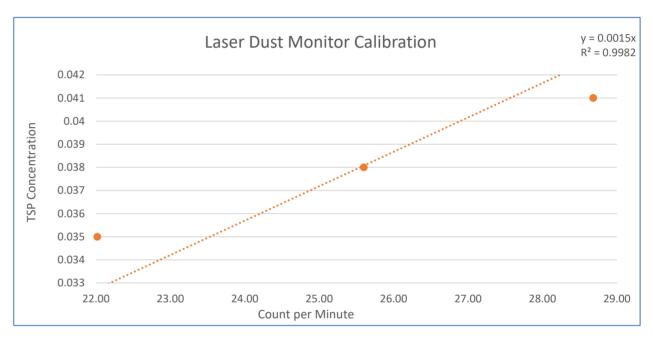
Model No.: LD-3

Equipment No.: A.005.11a

Sensitivity Adjustment

Scale Setting: 799 CPM

Hour	Count/Minute	Concentration (mg/m3)	
	X-axis	Y-axis	
1	25.60	0.0380	
2	22.02	0.0350	
3	28.68	0.0410	



Type:			Laser Dust Monitor				
Manufacturer/Brand:			SIBATA		1		
Model No	.:		LD-3B				1
Equipmen	t No.:		A.005.13a	a			1
Sensitivity	Adjustment Sca	le Setting:	643 CPM				-
			-				
Operator:			WS CHAN				
Standard Equimment							
Equipmen	t:		High Volu	me Sampl	er		
Venue:	••		Ma Wan (
Model No			TE-5170		-60		
Serial No.:			3383				ı
	ation Date:		4-Aug-23				i
			- 10 -				ı
Calibration	n Result						
Sensitivity	Adjustment Sca	le Setting (Befor	e Calibratio	on):		643	СРМ
Sensitivity	Adjustment Sca	le Setting (After	Calibration	n):		643	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	15/08/23	9:00-10:00	32.0	80	0.038	1512	25.20
2	15/08/23	11:30-12:30	32.0	80	0.035	1338	22.30
3	15/08/23	13:50-14:50	32.0	80	0.041	1703	28.38
Note:	1 Monitoring	data was measu	red by High	n Volume :	Sampler		
	2 Total Count	was logged by La	aser Dust N	Monitor			
	③ Count/minu	te was calculate	d by (Total	Count/60)		
	_						
By Linear I	Regression of Y o						
	Slope (K-factor)		0.0015				
	Correlation coef	fficient:	0.9989				
V 1: 1: 6	C 121 12 D		45.4	24			
validity of	Calibration Reco	ora:	15-Aug-24				
Remarks:							
nemarks.							
					4/		
QC	Reviewer:	Y.W. Fung	S	Signature:		Date:	15-Aug-23
						'	

Laser Dust Monitor Calibration

Type: Laser Dust Monitor

Manufacturer/Brand: SIBATA

Model No.: LD-3B

Equipment No.: A.005.13a

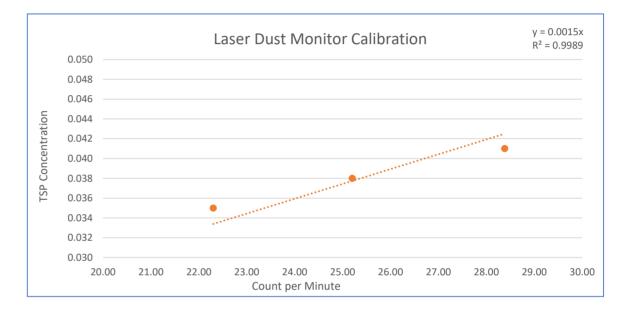
Sensitivity Adjustment

Scale Setting: 643 CPM

3

Hour	Count/Minute	Concentration (mg/m3)
	X-axis	Y-axis
	0.00	0.0000
1	25.20	0.0380
2	22.30	0.0350

28.38



0.0410



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CERTIFICATE OF CALIBRATION

Certificate No.:

23CA0427 01-03

Page:

1

of

2

Item tested

Description:

Acoustical Calibrator (Class 1)

Manufacturer: Type/Model No.: 4231

Serial/Equipment No.: 3006428 Adaptors used:

Item submitted by

Curstomer

AECOM

Address of Customer: Request No:

Date of receipt: 27-Apr-2023

Date of test:

29-Apr-2023

Reference equipment used in the calibration

Description: Model: Serial No. **Expiry Date:** Traceable to: Lab standard microphone B&K 4180 2412857 23-May-2023 SCL Preamplifier B&K 2673 2743150 CEPREI 28-Jun-2023 Measuring amplifier B&K 2610 2346941 30-Jun-2023 CEPREI Signal generator DS 360 61227 08-Jun-2023 CEPREL Digital multi-meter 34401A US36087050 30-May-2023 CEPREI Audio analyzer 8903B GB41300350 06-Jul-2023 CEPREI Universal counter 53132A MY40003662 CEPREI 13-Jun-2023

Ambient conditions

Temperature:

22 ± 1 °C 55 ± 10 %

Relative humidity: 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 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.
- 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: 02-May-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.

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Form No CARP156-1/Issue 1/Pay D/01/03/2003

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

23CA0427 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 uPa) Frequency Output Sound Pressure Measured Output Estimated Expanded Shown Level Setting Sound Pressure Level Uncertainty Hz dB dB 1000 94.00 94.22 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 = 0.016 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 = 0.7 %

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:

Checked by

29-Apr-2023

Date:

02-May-2023

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.

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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:

Date:

Fung Chi Yip 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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CERTIFICATE OF CALIBRATION

Certificate No.: 23CA1030 01-02 of Item tested Description: Sound Level Meter (Type 1) Microphone Pream Manufacturer: B&K B & K B & K Type/Model No.: 2270 4189 ZC0032 Serial/Equipment No.: 3007965 2846461 17965 Adaptors used: Item submitted by Customer Name: AECOM ASIA CO. LTD. Address of Customer: Request No.: Date of receipt: 30-Oct-2023 Date of test: 31-Oct-2023 Reference equipment used in the calibration

Description: Model: Serial No. **Expiry Date:** Traceable to: Multi function sound calibrator B&K 4226 2288444 28-Aug-2024 CIGISMEC Signal generator DS 360 33873 31-Jan-2024 CEPREI

Ambient conditions

21 ± 1 °C Temperature: Relative humidity: 60 ± 10 % Air pressure: 1005 ± 5 hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- 2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of +20%.
- 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:

01-Nov-2023

Company Chop:

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

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 23CA1030 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	A	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 1/10 ³ at 4kHz	Pass	0.3
	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4
Overload indication	SPL	Pass	0.3
	Leg	Pass	0.4

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	Uncertanity (dB) / Coverage Factor
Weighting A at 125 Hz Weighting A at 8000 Hz	Pass Pass	0.3 0.5
	Weighting A at 125 Hz	Weighting A at 125 Hz Pass

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.

End Calibrated by: Funa Chi Yin Date: 31-Oct-2023 Date: 01-Nov-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.

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CERTIFICATE OF CALIBRATION

Certificate No.: 23CA1030 01-01 of 2 Item tested Description: Sound Level Meter (Type 1) Microphone Pream Manufacturer: B&K B&K B&K Type/Model No.: 2270 4950 ZC0032 Serial/Equipment No.: 2644597 2879980 29398 Adaptors used: Item submitted by Customer Name: AECOM ASIA CO. LTD. Address of Customer Request No.: 30-Oct-2023 Date of receipt:

Reference equipment used in the calibration

31-Oct-2023

Ambient conditions

Date of test:

21 ± 1 °C
60 ± 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%.
- 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

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

Actual Measurement data are documented on worksheets.

Approved Signatory: 01-Nov-2023 Company Chop: Fena Juna

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 : 23CA1030 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 Factor
Self-generated noise	A	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: ung Chi Yip Date: 31-Oct-2023 01-Nov-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.

C Soils & Materials Engineering Co., Ltd.

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

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