

TISCH ENVIRONMENTAL, INC. 145 SOUTH MIAMI AVE VILLAGE OF CLEVES, OH 45002 513.467.9000 877.263.7610 TOLL FREE 513.467.9009 FAX

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Ma		7 Rootsmeter Orifice I.I		438320 0988	Ta (K) - Pa (mm) -	295 - 754.38
PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1 2 3 4 5	NA NA NA NA	NA NA NA NA	1.00 1.00 1.00 1.00	1.3910 0.9810 0.8750 0.8330 0.6890	3.2 6.4 7.9 8.8 12.7	2.00 4.00 5.00 5.50 8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	21	Va	(x axis) Qa	(y axis)
0.9984 0.9942 0.9921 0.9910 0.9858	0.7178 1.0135 1.1338 1.1897 1.4307	1.4161 2.0027 2.2391 2.3484 2.8322		0.9957 0.9915 0.9894 0.9883 0.9831	0.7158 1.0107 1.1308 1.1865 1.4269	0.8844 1.2507 1.3983 1.4666
Qstd slop intercept coefficie	(b) = ent (r) =	1.98425 -0.00930 0.99998		Qa slope intercept coefficie	t (b) =	1.24250 -0.00581 0.99998

CALCULATIONS

Vstd = Diff. Vol[(Pa-Diff. Hg)/760](298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa] Qa = Va/Time

For subsequent flow rate calculations:

Qstd = $1/m\{ [SQRT (H2O (Pa/760) (298/Ta))] - b\}$ Qa = $1/m\{ [SQRT H2O (Ta/Pa)] - b\}$

Total Suspended Particulates (TSP) Sampler Field Calibration Report

Station Fanling Government Secondary School (AM2)				Operator: Shum Kam Yuen			
Date:	15-Jan-18				Next Due Date:		-18
Model No:	TE-5170			Verified Against:			988
Equipment No.: A-001-74T			Expiration Date:	22-May-2	2018		
			Ambient C	Condition			
Temperat	ure, Ta	285.0	Kelvin	Pressu	re, Pa	763.3	mmHg
			ic r c c	1 17 6	•		
Equipmo	nt No.	988	ifice Transfer Sta			Intercent he	0.0002
Equipmen			Slope, mc 1.98425 Intercept, bc			-0.0093	
Last Calibra		22-May-17	1	mc x Qstd + bc =	= [H x (Pa/760)	$x (298/Ta)]^{1/2}$	
Next Calibra	ation Date:	22-May-18			20 NOW NO		
			Calibration of	TSP Sampler			
Calibration Point	H in. of water	[H x (Pa/760) x (298/Ta)] ^{1/2}		Qstd (m³/min) X - axis	W in. of oil	[ΔW x (Pa/760) x Y-ax i	
1	7.1		2.73		5.3	2.36	
2	5.9		2.49		4.3	2.13	
3	4.3		2.13		3.2	1.83	
4	3.4		1.89		2.3	1.55	
5	5 2.5 1.62		1.62	0.82	1.6	1.30	
By Linear Regro		X					
Slope, mw =		-		Intercept, bw =		-0.253	30
Correlation Co	oefficient* =	0	.9989	et .			
					(41)		
			Set Point C	alculation			
From the TSP Fig	eld Calibration	Curve, take Qs	$atd = 1.21 \text{ m}^3/\text{min}$ (43 CFM)			
From the Regress	sion Equation, t	the "Y" value a	ccording to				
		m v	Qstd + b = [W x (Pa/760) v <i>(2</i> 09/7	(a)1 ^{1/2}		
		m x	Qstu · b · [W x (1 a. 700) x (250/1	(u)]		
Therefore, S	Set Point $W = ($	m x Qstd + b)	² x (760 / Pa) x (Ta / 298) =	3	.97	
*If Correlation C	Coefficient < 0.9	990, check and	recalibrate again.				
Remarks:							
nomanto.							
11-	,					1-15-16	0
QC Reviewer:	ley		Signature:			Date: 22 - 1 - 17	V

EQUIPMENT CALIBRATION RECORD

	: ufacturer/Brand: el No.:			Laser D SIBATA LD-3	Oust Mon	itor		
	oment No.:			A.005.0	7a			
Sens	itivity Adjustment	t Scale Se	etting:	557 CF	PM			
Opera	ator:		-	Mike Sh	ek (MSK	M)		
Standa	ard Equipment							
	ment:		pprecht & Pa					
Venue Mode			berport (Pui	Ying Sec	ondary S	chool)		
Serial			ries 1400AB ntrol: 14	0AB2198	00803			
				00C1436		K _o : 1250	0	
Last C	Calibration Date*		1ay 2017	0001100	00000	10. 1200	<i>J</i>	
*Remar	rks: Recommend	led interva	al for hardwa	re calibra	ition is 1	year		
Calibra	tion Result							
Sensit	tivity Adjustment tivity Adjustment	Scale Se	tting (Before tting (After C	Calibration	on):):		PM PM	
Hour	Date (dd-mm-yy)	7	Time		dition R.H. (%)	Concentration¹ (mg/m³) Y-axis	Total Count ²	Count/ Minute ³ X-axis
1	06-05-17	12:30	- 13:30	27.5	78	0.04741	1894	31.57
2	06-05-17	13:30	- 14:30	27.6	78	0.04823	1933	32.22
3	06-05-17	14:30	- 15:30	27.6	79	0.04968	1987	33.12
Note:	06-05-17	15:30	- 16:30	27.6	79	0.04785	1915	31.92
By Linea	2. Total Count 3. Count/minute ar Regression of (K-factor): ation coefficient:	was logge e was cal	ed by Laser [Dust Mon	itor	shnick TEOM®		
Validity	of Calibration R	ecord:	6 May 201	18				
Remarks	3.							
QC Rev	viewer: YW Fu	ung	Signatu	ure:		Date	: _08 May	2017

EQUIPMENT CALIBRATION RECORD

Туре				Laser D	ust Mon	itor		
	ufacturer/Brand:			SIBATA				
	el No.:		03-	LD-3				
	ment No.:		-	A.005.0				
Sens	itivity Adjustmen	t Scale Setting	j :	797 CP	M			
Operator:				Mike Sh	ek (MSKI	M)		
Standa	ard Equipment						7 - 10 - 10 - 10 - 10 - 10 - 10 - 10 - 1	
Fauta		_		952 ON 11296 DE	The state of the s			
	ment:			tashnick				2004000 MMCF
Venue	m.c)	Cyberp	ort (Pui	Ying Seco	ondary S	chool)		
Mode			1400AB					
Serial	NO:	Control	1000 000	0AB2198				
l ast C	Calibration Date*	Sensor		00C1436	59803	K _o : _12500)	
Last	Dalibration Date	: _ 6 May 2	2017					
*Remar	rks: Recommend	led interval for	hardwa	re calibra	tion is 1	year		
Calibra	tion Result							
C:	Ct. A.I.	0 1 0						
Sensit	tivity Adjustment	Scale Setting	(Before	Calibratio	n):		PM	
Sensit	tivity Adjustment	Scale Setting	(After C	alibration):	_797 CF	M	
Hour	Date	Time		Amh	pient	Concentration ¹	Total	C
	(dd-mm-yy)	"""		Cond		(mg/m ³)	Total Count ²	Count/
	(, , , , , , , , , , , , , , , , , , ,			Temp	R.H.	Y-axis	Count	Minute ³
				(°C)	(%)	I-axis		X-axis
1	06-05-17	12:00 -	13:00	27.5	78	0.04715	1881	31.35
2	06-05-17	13:00 -	14:00	27.6	78	0.04843	1939	32.32
3	06-05-17	14:00 -	15:00	27.6	79	0.04987	1992	33.20
4	06-05-17	15:00 -	16:00	27.6	79	0.04794	1916	31.93
Note:	 Monitoring d 	ata was meas	ured by	Rupprech	nt & Pata	shnick TEOM®		01.00
	2. Total Count	was logged by	/ Laser [Dust Moni	tor			
	Count/minut	e was calculat	ed by (T	otal Cour	nt/60)			
Dulines	n Donnessian of	V V						
	Regression of		0045					
	(K-factor): ation coefficient:		0015					
Correia	ation coefficient:	_0.	9961					
Validity	of Calibration R	decord: 6	May 201	8				
Remarks	s·							
Tomanc	J							
QC Rev	viewer: YW Fo	ung	Signatu	ıre:	4/	Date	. 08 May	2017



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



CERTIFICATE OF CALIBRATION

11.009.04

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Certificate No.:

17CA0407 01

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Item tested

Description: Manufacturer: Sound Level Meter (Type 1)

Microphone

B&K

B&K

2238

4188

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

2285692

2250455

Adaptors used:

Item submitted by

Customer Name:

AECOM ASIA CO., LTD.

Address of Customer:

Request No.:

07-Apr-2017

Date of receipt:

Date of test:

10-Apr-2017

Reference equipment used in the calibration

Description:

Model:

Serial No.

Expiry Date:

Traceable to:

Multi function sound calibrator Signal generator

B&K 4226

2288444

18-Jun-2017 18-Apr-2017 CIGISMEC CEPREL

Signal generator

DS 360 DS 360

33873 61227

18-Apr-2017

CEPREI

Ambient conditions

Temperature:

22 ± 1 °C

Relative humidity:

50 ± 10 %

Air pressure:

1010 ± 5 hPa

Test specifications

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

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

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

Test results

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

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

Actual Measurement data are documented on worksheets.

Approved Signatory:

Date:

11-Apr-2017

Company Chop:

Huang Jian Min/Feng Jun Qi

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



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CERTIFICATE OF CALIBRATION

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1. Electrical Tests

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

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	Α	Pass	0.3	
Sell-gellerated floise	Ĉ	Pass		2.4
	Lin	Pass	1.0	2.1
Linearity range for Leq			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	
Lisa saite assault (S. O.D.)	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	С	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/103 at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

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

st	Status	Uncertanity (dB)	Factor
ing A at 125 Hz	Pass	0.3	
ing A at 8000 Hz	Pass	0.5	
	ting A at 125 Hz ting A at 8000 Hz		

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:

Lai Sheng Jie 10-Apr-2017 Checked by:

u by.

Date:

Lam Tze Wai 11-Apr-2017

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

End

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CERTIFICATE OF CALIBRATION

Certificate No.:

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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:

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Item submitted by

Curstomer:

AECOM ASIA CO LIMITED

Address of Customer: Request No.:

-

Date of receipt:

22-Sep-2017

Date of test:

28-Sep-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to
Lab standard microphone	B&K 4180	2341427	11-Apr-2018	SCL
Preamplifier	B&K 2673	2743150	05-May-2018	CEPREI
Measuring amplifier	B&K 2610	2346941	03-May-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI
Digital multi-meter	34401A	US36087050	25-Apr-2018	CEPREI
Audio analyzer	8903B	GB41300350	21-Apr-2018	CEPREI
Universal counter	53132A	MY40003662	22-Apr-2018	CEPREI

Ambient conditions

Temperature:

21 ± 1 °C

Relative humidity:

55 ± 10 %

Air pressure:

1000 ± 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.
- 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.

in/Feng Jun Qi

Approved Signatory:

Date:

28-Sep-2017

Company Chop:

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

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



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1, Measured Sound Pressure Level

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

Frequency	Output Sound Pressure	Measured Output	Estimated Expanded Uncertainty dB
Shown	Level Setting	Sound Pressure Level	
Hz	dB	dB	
1000	94.00	94.07	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 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 = 2.8 %

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:

Lai Sheng Jie
Date: 28-Sep-2017

Date:

Fung Chi Yip 28-Sep-2017

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

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