Appendix C
Calibration Certificates of Monitoring Equipment

TISCH Environmental

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ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Mar 24, 2015 Rootsmeter S/N 0438320 Ta (K) - 292
Operator Tisch Orifice I.D. - 1941 Pa (mm) - 756.92

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.4880	3.2	2.00
2	NA	NA	1.00	1.0510	6.4	4.00
3	NA	NA	1.00	0.9360	7.9	5.00
4	NA	NA	1.00	0.8920	8.8	5.50
5	NA	NA	1.00	0.7360	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
1.0121	0.6802	1.4258		0.9958	0.6692	0.8784
1.0078	0.9589	2.0163		0.9916	0.9434	1.2422
1.0057	1.0745	2.2543		0.9895	1.0571	1.3888
1.0046	1.1262	2.3644		0.9884	1.1080	1.4566
0.9993	1.3578	2.8515		0.9832	1.3358	1.7568
Qstd slope (m) =		2.10265		Qa slope (m) =		1.31664
intercept (b) =		-0.00335		intercept (b) =		-0.00206
coefficient (r) =		0.99999		coefficient (r) =		0.99999
y axis = SQRT[H2O(Pa/760)(298/Ta)]				y axis = SQRT[H2O(Ta/Pa)]		

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}

TSP Sampler Calibration

SITE

Location: Lian Tang 3 — Date: March 5, 2016
Sampler: TE-5170 MFC (Serial # : 2359) — Tech: Sam Wong

CONDITIONS

Barometric Pressure (in Hg):	40.00	Corrected Pressure (mm Hg):	1016
Temperature (deg F):	70	Temperature (deg K):	294
Average Press. (in Hg):	40.00	Corrected Average (mm Hg):	1016
Average Temp. (deg F):	70	Average Temp. (deg K):	294

CALIBRATION ORIFICE

Make:	Tisch	Qstd Slope:	2.10265
Model:	TE-5025A	Qstd Intercept:	-0.00335
Serial#:	1941	Date Certified:	March 24, 2015

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)
1	12.00	1.919	58.0	67.50
2	10.00	1.752	54.0	62.85
3	8.20	1.587	48.0	55.86
4	5.20	1.264	38.0	44.23
5	3.20	0.992	30.0	34.92

LINEAR REGRESSION

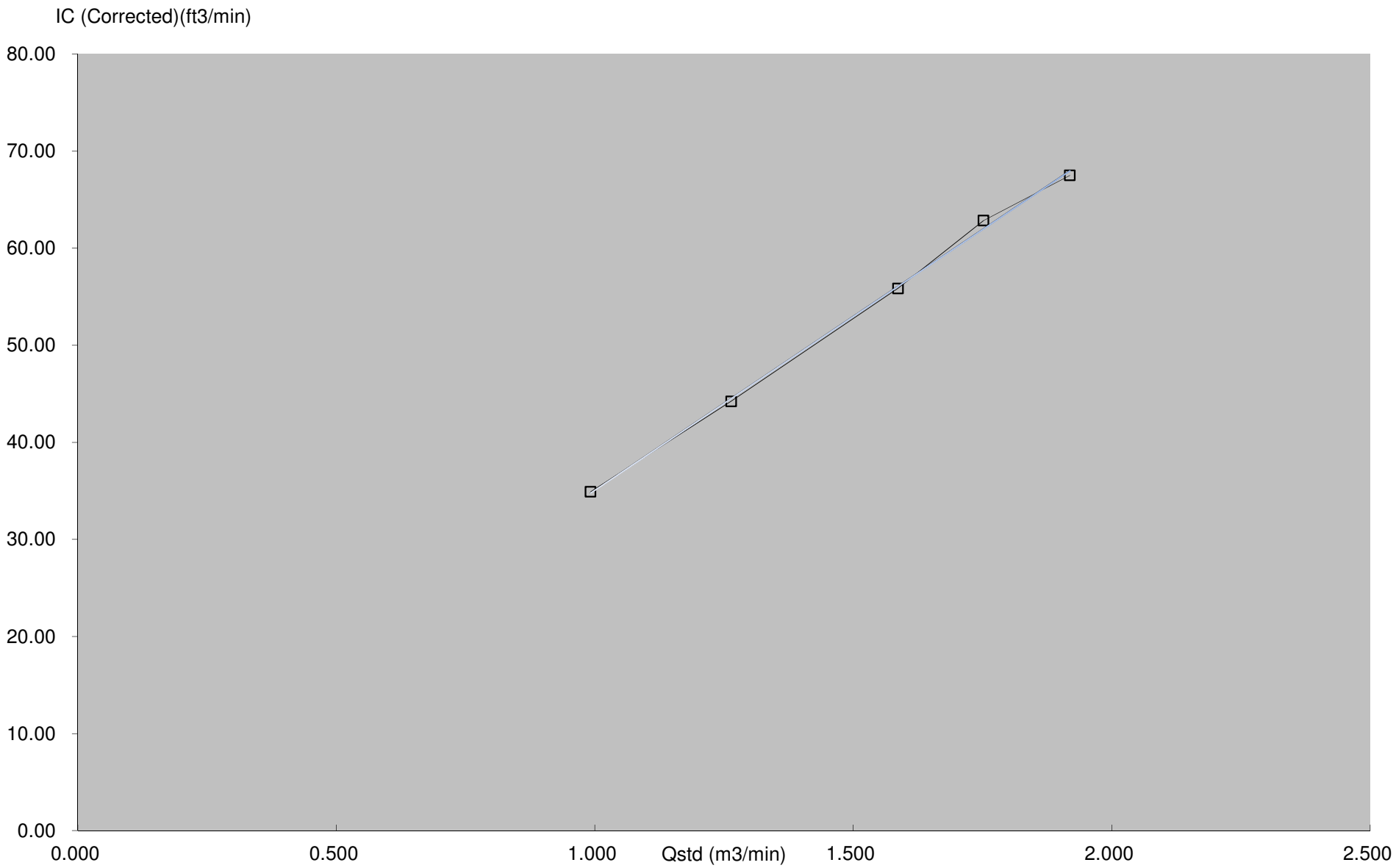
Slope =	35.7973
Intercept =	-0.7187
Corr. coeff.=	0.9992
# of Observations:	5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg
For subsequent calculation of sampler flow:
1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure


IC (Corrected)(ft3/min)
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0.000
0.500
1.000
Qstd (m3/min)
1.500
2.000
2.500

TEST REPORT

for

SOUND CALIBRATOR

Model : NC－74

Serial No. : 34857296

Condition : Temperature 25 ℃

Humidity 64 %RH

Date : September, 8, 2015

Signature : Y. kitajima

RION CO., LTD.

NC-74
34857296

1. Sound Pressure Level	94.0 ± 0.25 dB	94.00 dB
2. Frequency	1000 ± 7 Hz	1002.0 Hz
3. Distortion	3 % or less	Pass
4. Alarm Function		Pass
5. Appearance		Pass

Applicable standards

JIS C 1515:2004 class1
IEC 60942:2003 class1

RION

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. 508784 Page 1 of 3 Pages

Customer : Enovative Environmental Service Limited

Address : Flat 6, 3/F, Block E, Wah Lok Industrial Centre, 31-35 Shan Mei Street, Shatin, N.T., Hong Kong.

Order No. : Q53442 **Date of receipt :** 8-Oct-15

Item Tested

Description : Sound Level Meter
Manufacturer : B&K
Model : 2238 **Serial No. :** 2694908

Test Conditions

Date of Test : 15-Oct-15 **Supply Voltage :** --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure: Z01, IEC 651 and IEC 804.

Test Results

All results were within the IEC 651 Type1 and IEC 804 Type1 specification after adjustment.
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C147450	SCL-HKSAR
S240	Sound Level Calibrator	500563	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI).
The test results apply to the above Unit-Under-Test only

Calibrated by : Alan Chu

Approved by : Steve Kwan

Date: 15-Oct-15

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

EO

Calibration Certificate

Results :

1. SPL Accuracy

UUT Setting				Applied Value (dB)	UUT Reading (dB)	
Range	Freq. Wgt.	Bandwith	Center Freq.		Before adjust	After adjust
20 ~ 100	A	BB/F	--	94.0	*91.6	93.8
	A	BB/S	--		--	93.8
	C	BB/F	--		--	93.8
40 ~ 120	A	BB/F	--	94.0	--	93.9
	A	BB/F	--	114.0	--	113.8

IEC 651 Type 1 Spec. : ± 0.7 dB
Uncertainty : ± 0.1 dB

2. Level Stability : 0.0 dB

IEC 651 Type 1 Spec. : ± 0.3 dB
Uncertainty : ± 0.1 dB

3. Linearity

3.1 Level Linearity

UUT Range (dB)	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec. (Primary Indicator Range)
140	114.0	113.9	0.0	± 0.7 dB
130	104.0	103.9	0.0	
120	94.0	93.9 (Ref.)	- -	
110	84.0	83.9	0.0	
100	74.0	73.9	0.0	
90	64.0	63.9	0.0	
80	54.0	53.8	-0.1	

Uncertainty : ± 0.1 dB

3.2 Differential level linearity

UUT Range (dB)	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec.
120	84.0	84.0	+ 0.1	± 0.4 dB
	94.0	93.9 (Ref.)	- -	
	95.0	94.9	0.0	± 0.2 dB

Uncertainty : ± 0.1 dB

Calibration Certificate

4. Frequency Weighting

A weighting

Frequency	Attenuation (dB)	IEC 651 Type 1 Spec.
31.5 Hz	- 39.3	- 39.4 dB, ± 1.5 dB
63 Hz	- 26.2	- 26.2 dB, ± 1.5 dB
125 Hz	- 16.2	- 16.1 dB, ± 1 dB
250 Hz	- 8.7	- 8.6 dB, ± 1 dB
500 Hz	- 3.2	- 3.2 dB, ± 1 dB
1 kHz	0.0 (Ref)	0 dB, ± 1 dB
2 kHz	+ 1.2	+ 1.2 dB, ± 1 dB
4 kHz	+ 1.0	+ 1.0 dB, ± 1 dB
8 kHz	- 1.2	- 1.1 dB, + 1.5 dB ~ -3 dB
16 kHz	- 6.7	- 6.6 dB, + 3 dB ~ - ∞

Uncertainty : ± 0.1 dB

5. Time Averaging

Applied Burst duty Factor	Applied Leq Value (dB)	UUT Reading (dB)	IEC 804 Type 1 Spec.
continuous	40.0	40.0	--
1/10	40.0	39.9	± 0.5 dB
$1/10^2$	40.0	39.9	
$1/10^3$	40.0	39.9	± 1.0 dB
$1/10^4$	40.0	39.8	

Uncertainty : ± 0.1 dB

Remarks:
1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1008 hPa
4. The UUT was adjusted with the laboratory's sound calibrator at the reference sound pressure level before the calibration.
5. * Out of specification.

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