

Annex 2 High Volume Air Sampler Calibration Worksheet

Project Title: Expansion of Shek Wu Hui Sewage Treatment Works
Monitoring Location: Sewage Pumping Station at j/o San Po Street and Po Wan Road (CAM1a)
Date: 04-Jan-08
Time: 09:30

Sampler Model:	GBM2000H1
Calibrator Orifice no.:	517N
Slope (m):	2.02842
Intercept (b):	-0.01789
Correction coeff. (r)	0.9998
Serial No.:	1062

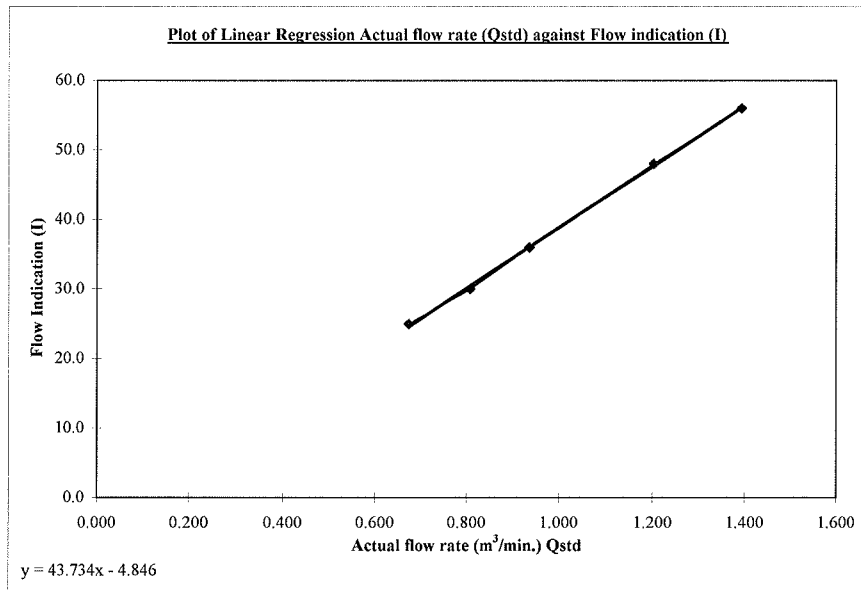
$$\text{Flow (corrected)} = \sqrt{H \times \frac{Pa}{Pstd} \times \frac{Tstd}{Ta}}$$

Standard pressure (mmHg) Pstd:	760.0
Standard temp. (K) Tstd:	297.18
Calibration pressure (mmHg) Pa:	755.1
Calibration temp. (K) Ta:	293.0


$$Qstd = \frac{1}{m} \times \left(\sqrt{H \times \frac{Pa}{Pstd} \times \frac{Tstd}{Ta}} - b \right)$$

Sample no.	Pressure Drop (H), inch	Flow (corrected), m ³ /min	Actual flow rate (Qstd), m ³ /min	Flow indication (I), arbitrary
1	7.8	2.807	1.393	56.0
2	5.8	2.421	1.202	48.0
3	3.5	1.881	0.936	36.0
4	2.6	1.621	0.808	30.0
5	1.8	1.349	0.674	25.0


Correlation Coefficient : 0.9996



Remark
 Qstd Range 0.6 - 1.7
 IHPa = 0.750062 mmHg

Calibrated by: Choi Hung Cho
 ()

Date: 4/1/08

Checked by: Hiu Yeung Tang
 ()

Date: 6/1/08

Annex 2 High Volume Air Sampler Calibration Worksheet

Project Title: Expansion of Shek Wu Hui Sewage Treatment Works
Monitoring Location: Flood Balancing Pumping Station at Po Wan Road near Wai Loi Tsuen (CAM2a)
Date: 04-Jan-08
Time: 14:30

Sampler Model:	GBM2000H1
Calibrator Orifice no.:	517N
Slope (m):	2.02842
Intercept (b):	-0.01789
Correction coeff. (r)	0.9998
Serial No.:	1097

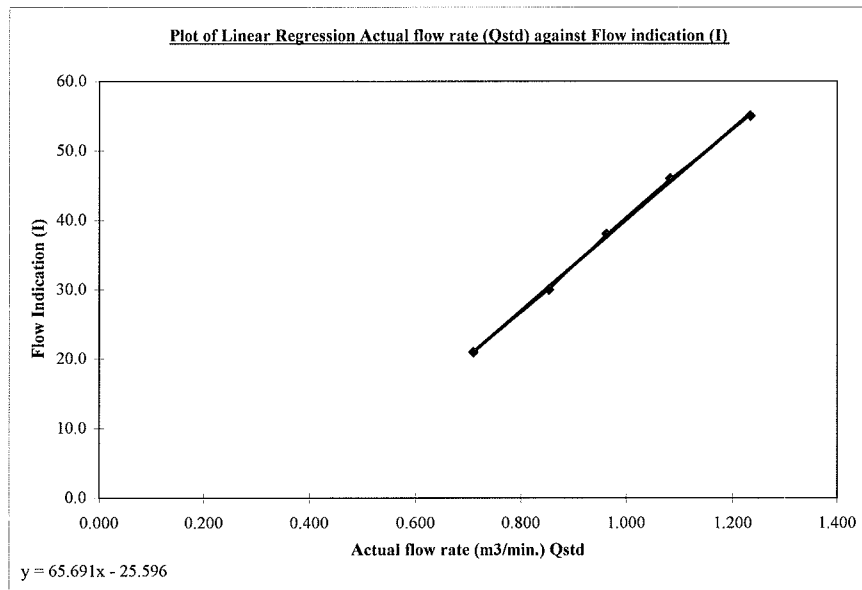
$$\text{Flow (corrected)} = \sqrt{H \times \frac{Pa}{Pstd} \times \frac{Tstd}{Ta}}$$

Standard pressure (mmHg) Pstd:	760.0
Standard temp. (K) Tstd:	297.18
Calibration pressure (mmHg) Pa:	755.1
Calibration temp. (K) Ta:	293.0


$$Qstd = \frac{1}{m} \times \left(\sqrt{H \times \frac{Pa}{Pstd} \times \frac{Tstd}{Ta}} - b \right)$$

Sample no.	Pressure Drop (H), inch	Flow (corrected), m ³ /min	Actual flow rate (Qstd), m ³ /min	Flow indication (I), arbitrary
1	6.1	2.483	1.233	55.0
2	4.7	2.179	1.083	46.0
3	3.7	1.934	0.962	38.0
4	2.9	1.712	0.853	30.0
5	2.0	1.422	0.710	21.0


Correlation Coefficient : 0.9995



Remark
 Qstd Range 0.6 - 1.7
 1HPa = 0.750062 mmHg

Calibrated by: Choi Hung Cho
 ()

Date: 4/1/08

Checked by: Hiu Yeung Tang
 ()

Date: 6/1/08



TISCH ENVIRONMENTAL, INC.
 145 SOUTH MIAMI AVE.
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AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Apr 23, 2007 Roots-meter S/N 9833620 Ta (K) - 295
 Operator Tisch Orifice I.D. - 517N Pa (mm) - 751.84

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORIFICE DIFF H2O (in.)
1	NA	NA	1.00	1.4100	3.2	2.00
2	NA	NA	1.00	0.9950	6.3	4.00
3	NA	NA	1.00	0.8910	7.9	5.00
4	NA	NA	1.00	0.8490	8.7	5.50
5	NA	NA	1.00	0.7000	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9951	0.7057	1.4137	0.9957	0.7062	0.8859
0.9910	0.9959	1.9993	0.9916	0.9966	1.2528
0.9887	1.1097	2.2353	0.9894	1.1104	1.4007
0.9877	1.1634	2.3444	0.9884	1.1642	1.4690
0.9824	1.4034	2.8275	0.9831	1.4044	1.7717
Qstd slope (m) = 2.02842			Qa slope (m) = 1.27016		
intercept (b) = -0.01789			intercept (b) = -0.01121		
coefficient (r) = 0.99998			coefficient (r) = 0.99998		
y axis = SQRT[H2O(Pa/760) (298/Ta)]			y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

$$Vstd = \text{Diff. Vol} [(Pa - \text{Diff. Hg}) / 760] (298 / Ta)$$

$$Qstd = Vstd / \text{Time}$$

$$Va = \text{Diff Vol} [(Pa - \text{Diff Hg}) / Pa]$$

$$Qa = Va / \text{Time}$$

For subsequent flow rate calculations:

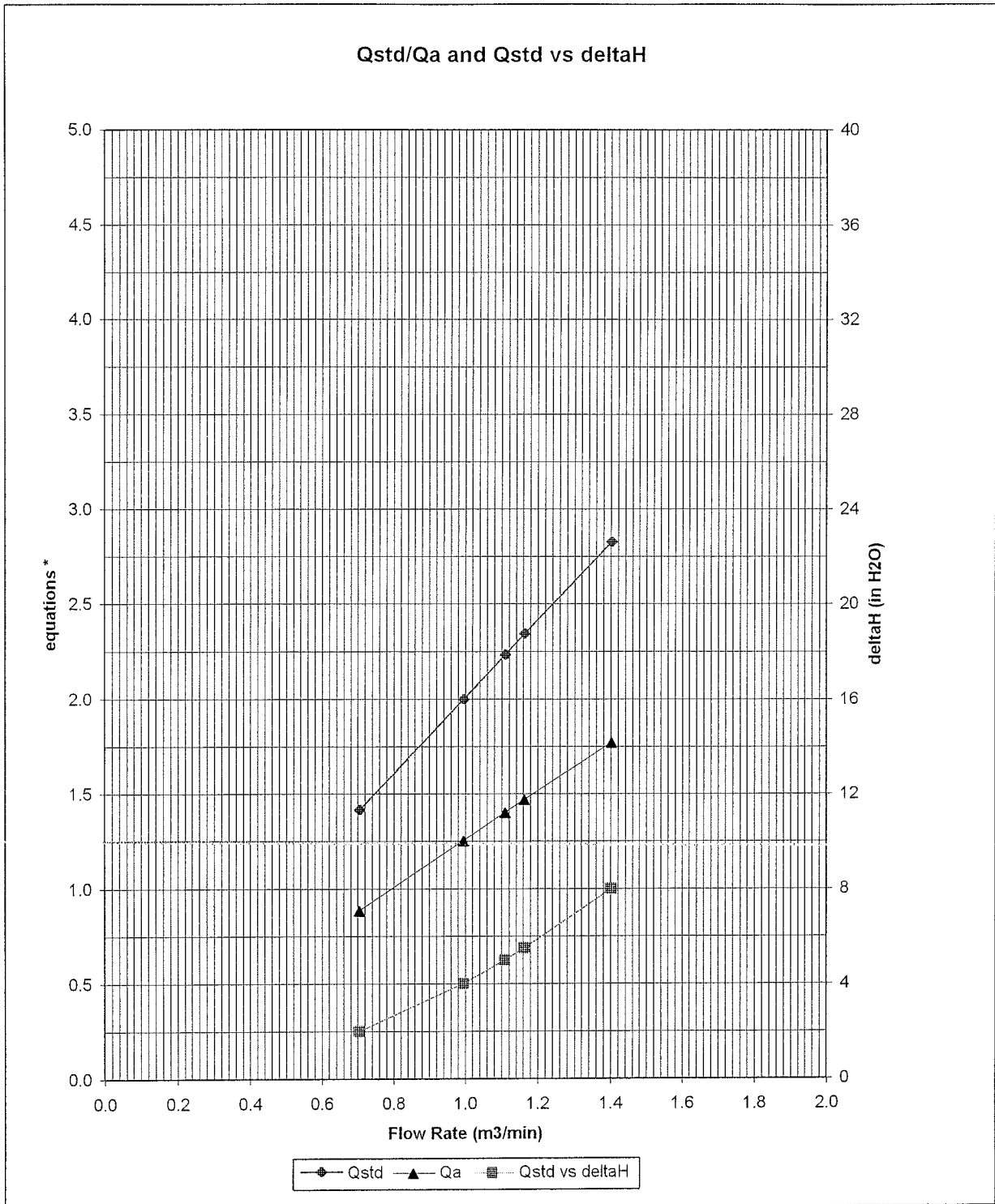
$$Qstd = 1/m \{ [\text{SQRT}(\text{H2O}(\text{Pa}/760) (298/\text{Ta}))] - b \}$$

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



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AIR POLLUTION MONITORING EQUIPMENT



* y-axis equations:

Qstd series:
$$\sqrt{\Delta H \left(\frac{P_a}{P_{std}} \right) \left(\frac{T_{std}}{T_a} \right)}$$

Qa series:
$$\sqrt{(\Delta H (T_a / P_a))}$$

#517N



Calibration Certificate

Certificate No. 70180

Page 1 of 2 Pages

Customer : Hyder Consulting Limited

Address : Room 3801., Hopewell Centre, 183 Queen's Road East, Wan Chai, Hong Kong

Order No. : Q70049

Date of receipt : 11-Jan-07

Item Tested

Description : Sound Level Calibrator

Manufacturer : B&K

Model : Type 4231

Serial No. : 1770806

Test Conditions

Date of Test : 12-Jan-07

Supply Voltage : --

Ambient Temperature : (23 ± 3)°C

Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.

Calibration procedure : F21, Z02.

Test Results

All results were within the IEC 942 Class 1 specification.

The results are shown in the attached page(s).

Test equipment used:

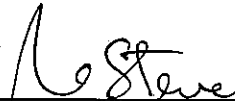
<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceable to</u>
S014	Spectrum Analyzer	62914	7-Jul-07	NIM-PRC & SCL-HKSAR
S024	Sound Level Calibrator	62691	22-Apr-07	NIM-PRC & SCL-HKSAR
S041	Universal Counter	63839	22-Aug-07	SCL-HKSAR

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 : 
P.F. Wong

Approved by : 
Steve Kwan

Date: 12-Jan-07



Calibration Certificate

Certificate No. **80027**

Page 1 of 2 Pages

Customer : Hyder Consulting Limited

Address : Room 3801., Hopewell Centre, 183 Queen's Road East, Wan Chai, Hong Kong

Order No. : Q72325

Date of receipt : 3-Jan-08

Item Tested

Description : Sound Level Calibrator

Manufacturer : B&K

Model : Type 4231

Serial No. : 1770806

Test Conditions

Date of Test : 17-Jan-08

Ambient Temperature : $(23 \pm 3)^{\circ}\text{C}$

Supply Voltage : --

Relative Humidity : $(50 \pm 25) \%$

Test Specifications

Calibration check.

Calibration procedure : F21, Z02.

Test Results

All results were within the IEC 942 Class 1 specification.

The results are shown in the attached page(s).

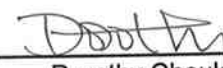
Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceable to</u>
S014	Spectrum Analyzer	73602	7-Jul-08	NIM-PRC & SCL-HKSAR
S024	Sound Level Calibrator	71791	16-Jul-08	NIM-PRC & SCL-HKSAR
S041	Universal Counter	73453	22-Aug-08	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 : 
P.F. Wong

Approved by : 
Dorothy Cheuk

Date: 17-Jan-08



Calibration Certificate

Certificate No. **72989**

Page 1 of 4 Pages

Customer : Hyder Consulting Limited

Address : Room 3801., Hopewell Centre, 183 Queen's Road East, Wan Chai, Hong Kong

Order No. : Q71060

Date of receipt : 3-Jul-07

Item Tested

Description : Digital Sound Level Meter

Manufacturer : B&K

Model : Type 2236

Serial No. : 1774423

Test Conditions

Date of Test : 5-Jul-07

Supply Voltage : --

Ambient Temperature : (23 ± 3)°C

Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.

Calibration procedure : Z01.

Test Results

All results were within the IEC 651 Type 1, IEC 804 Type 1 & IEC 1260 Class 1 specification.

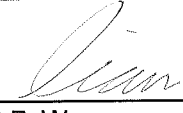
The results are shown in the attached page(s).

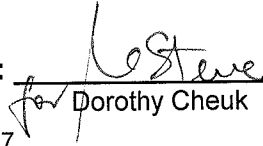
Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceable to</u>
S017	Multi-Function Generator	C071115	14-Mar-08	SCL-HKSAR
S024	Sound Level Calibrator	62691	19-Jul-07	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 : 
P.F. Wong

Approved by : 
Dorothy Cheuk

Date: 5-Jul-07