

High Volume Air Sampler Calibration Worksheet

Project Title: Design and Construction of Tsuen Wan Drainage Tunnel
Monitoring Location: Ho Fung College (ASR 1)
Calibration Date: 27-May-10
Calibration Due Date: 27-Jul-10
Time: 10:12

Sampler Model:	BM2000HX
Serial No.:	4994
Calibrator Orifice no.:	1785
Slope (m):	1.97702
Intercept (b):	-0.00070
Correction coeff. (r)	0.99992

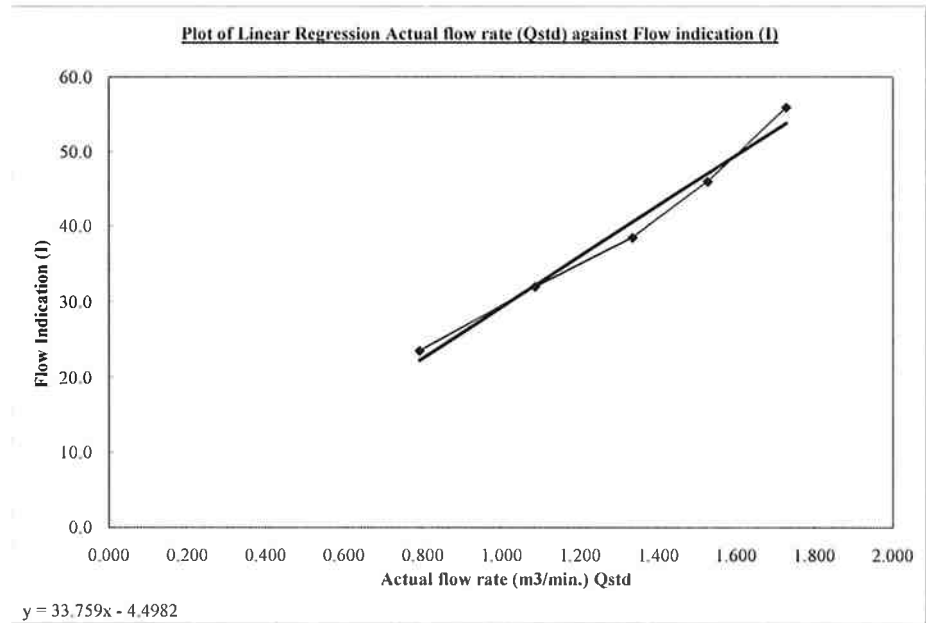
$$\text{Flow (corrected)} = \sqrt{H \times \frac{Pa}{Pstd} \times \frac{Tstd}{Ta}}$$

Standard pressure (mmHg) Pstd:	763.9
Standard temp. (K) Tstd:	290.8
Calibration pressure (mmHg) Pa:	755.2
Calibration temp. (K) Ta:	300.2


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

Sample no.	Pressure Drop (H), inch	Flow (corrected), m ³ /min	Actual flow rate (Qstd), m ³ /min	Flow indication (I), arbitrary
1	11.9	3.417	1.729	56.0
2	9.3	3.021	1.528	46.0
3	7.1	2.640	1.336	38.5
4	4.7	2.148	1.087	32.0
5	2.5	1.566	0.793	23.5

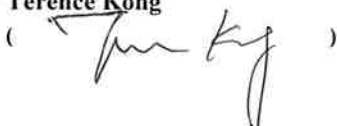
Correlation Coefficient : 0.9906



Remark
 1HPa = 0.750062 mmHg

Calibrated by: **Andrew Fong**
 ()

Date: 31.5.2010

Checked by: **Terence Kong**
 ()

Date: 31 May 2010

High Volume Air Sampler Calibration Worksheet

Project Title: Design and Construction of Tsuen Wan Drainage Tunnel
Monitoring Location: Heng Hoi Chi Hong Ship Temple (ASR 3)
Calibration Date: 27-May-10
Calibration Due Date: 27-Jul-10
Time: 11:00

Sampler Model:	BM2000HX
Serial No.:	5875
Calibrator Orifice no.:	1785
Slope (m):	1.97702
Intercept (b):	-0.00070
Correction coeff. (r):	0.99992

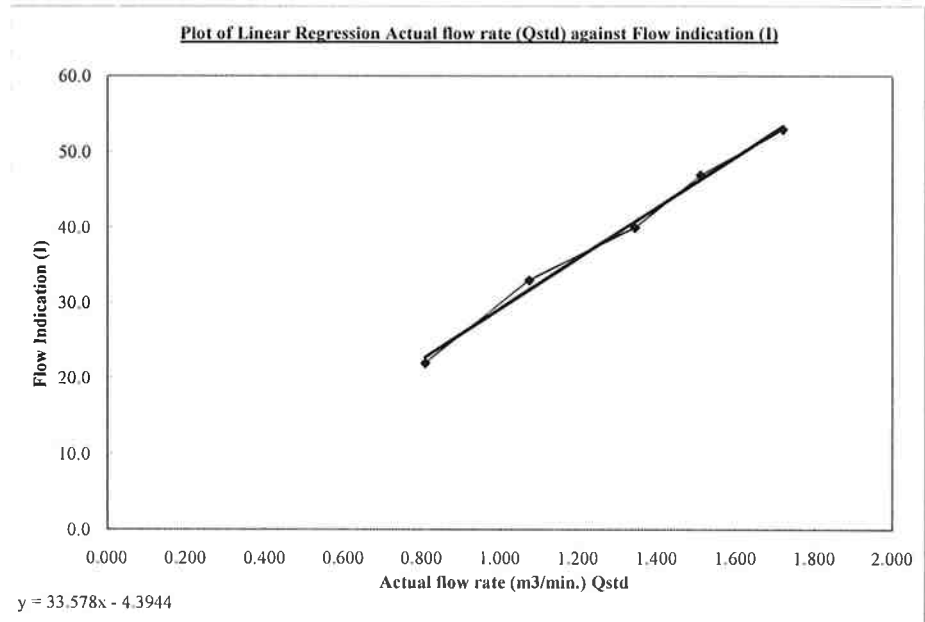
Standard pressure (mmHg) Pstd:	763.9
Standard temp. (K) Tstd:	290.8
Calibration pressure (mmHg) Pa:	755.2
Calibration temp. (K) Ta:	300.2

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

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

Sample no.	Pressure Drop (H), inch	Flow (corrected), m ³ /min	Actual flow rate (Qstd), m ³ /min	Flow indication (I), arbitrary
1	11.8	3.403	1.722	53.0
2	9.1	2.988	1.512	47.0
3	7.2	2.658	1.345	40.0
4	4.6	2.125	1.075	33.0
5	2.6	1.597	0.808	22.0

Correlation Coefficient : 0.9971



Remark
 1HPa = 0.750062 mmHg

Calibrated by: Andrew Fong)

Date: 31.5.2010

Checked by: Terence Kong)

Date: 31 May 2010

High Volume Air Sampler Calibration Worksheet

Project Title: Design and Construction of Tsuen Wan Drainage Tunnel
Monitoring Location: Long Beach Gardan (ASR 8)
Calibration Date: 01-Jun-10
Calibration Due Date: 01-Aug-10
Time: 11:40

Sampler Model:	TE5005X
Serial No.:	1559
Calibrator Orifice no.:	1785
Slope (m):	1.97702
Intercept (b):	-0.00070
Correction coeff. (r)	0.99992

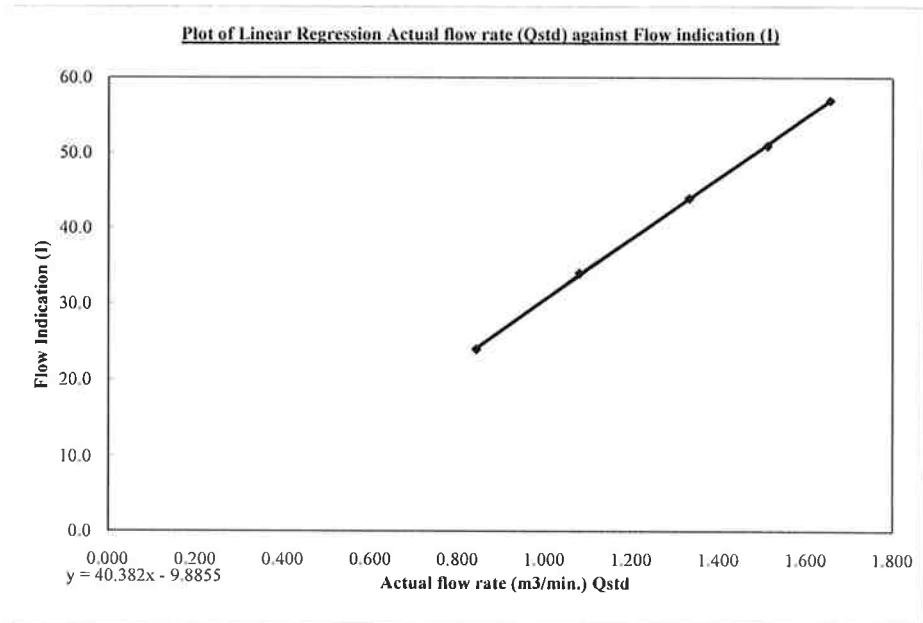
Standard pressure (mmHg) Pstd:	763.9
Standard temp. (K) Tstd:	290.8
Calibration pressure (mmHg) Pa:	756.1
Calibration temp. (K) Ta:	297.4

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

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

Sample no.	Pressure Drop (H), inch	Flow (corrected), m ³ /min	Actual flow rate (Qstd), m ³ /min	Flow indication (I), arbitrary
1	10.8	3.273	1.656	57.0
2	9.0	2.988	1.512	51.0
3	7.0	2.635	1.333	44.0
4	4.6	2.136	1.081	34.0
5	2.8	1.666	0.843	24.0

Correlation Coefficient : 0.9999



Remark
 1HPa = 0.750062 mmHg

Calibrated by: Andrew Fong)

Date: 1.6.2010

Checked by: Terence Kong)

Date: 1 Jun 2010

High Volume Air Sampler Calibration Worksheet

Project Title: Design and Construction of Tsuen Wan Drainage Tunnel
Monitoring Location: Greenview Terrace (ASR 9)
Calibration Date: 27-May-10
Calibration Due Date: 27-Jul-10
Time: 12:15

Sampler Model:	TE5005X
Serial No.:	0646
Calibrator Orifice no.:	1785
Slope (m):	1.97702
Intercept (b):	-0.00070
Correction coeff. (r):	0.99992

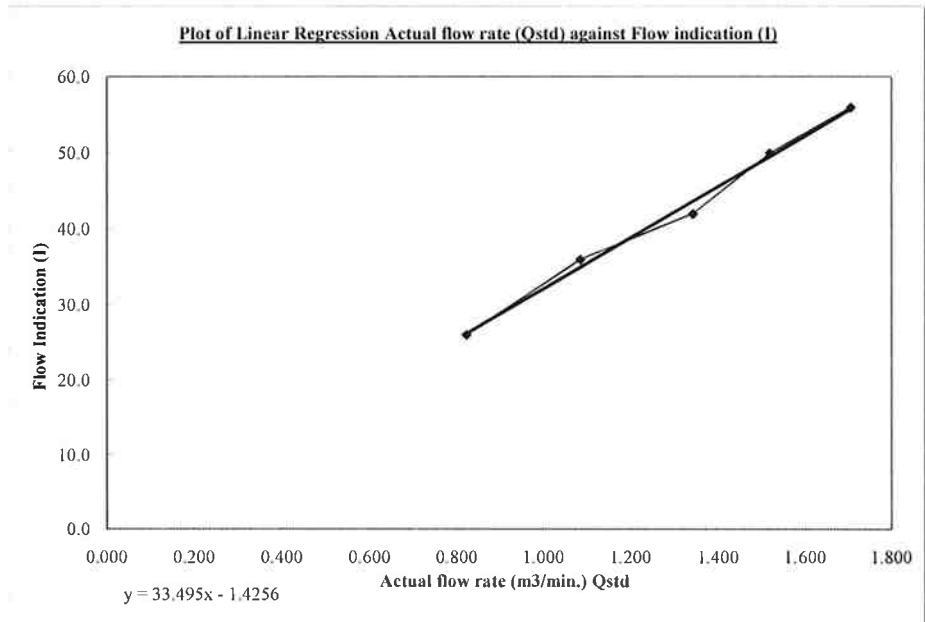
Standard pressure (mmHg) Pstd:	763.9
Standard temp. (K) Tstd:	290.8
Calibration pressure (mmHg) Pa:	755.2
Calibration temp. (K) Ta:	300.2

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


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

Sample no.	Pressure Drop (H), inch	Flow (corrected), m ³ /min	Actual flow rate (Qstd), m ³ /min	Flow indication (I), arbitrary
1	11.6	3.374	1.707	56.0
2	9.2	3.005	1.520	50.0
3	7.2	2.658	1.345	42.0
4	4.7	2.148	1.087	36.0
5	2.7	1.628	0.824	26.0

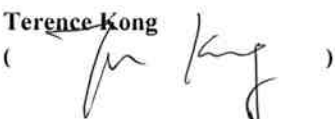
Correlation Coefficient : 0.9963



Remark
 1HPa = 0.750062 mmHg

Calibrated by: **Andrew Fong** ()

Date: 31.5.2010

Checked by: **Terence Kong** ()

Date: 31 May 2010



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

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - May 10, 2010 Rootsmeter S/N 9833620 Ta (K) - 296
 Operator Tisch Orifice I.D. - 1785 Pa (mm) - 750.57

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER	ORFICE
					DIFF Hg (mm)	DIFF H2O (in.)
1	NA	NA	1.00	1.3960	3.2	2.00
2	NA	NA	1.00	0.9840	6.4	4.00
3	NA	NA	1.00	0.8790	7.9	5.00
4	NA	NA	1.00	0.8390	8.7	5.50
5	NA	NA	1.00	0.6940	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9900	0.7092	1.4102	0.9957	0.7133	0.8881
0.9858	1.0018	1.9943	0.9915	1.0076	1.2560
0.9837	1.1191	2.2296	0.9894	1.1256	1.4042
0.9827	1.1713	2.3385	0.9884	1.1781	1.4728
0.9774	1.4084	2.8203	0.9830	1.4165	1.7762
Qstd slope (m) = 2.01637			Qa slope (m) = 1.26262		
intercept (b) = -0.02316			intercept (b) = -0.01458		
coefficient (r) = 0.99996			coefficient (r) = 0.99996		
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

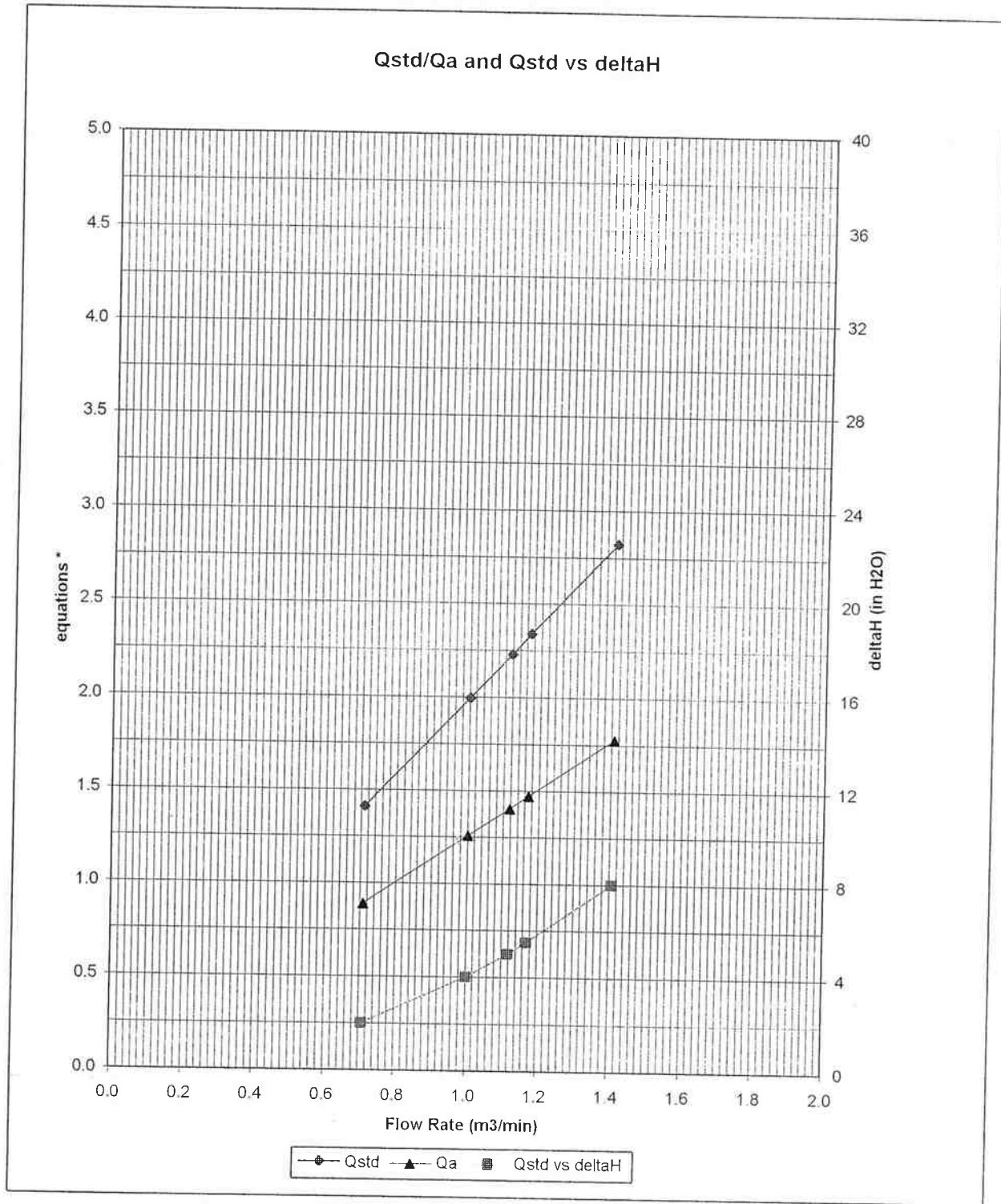
For subsequent flow rate calculations:

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



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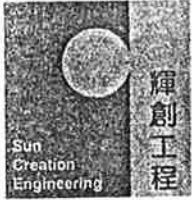


* y-axis equations:

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

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

#1785



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C093599

Certificate of Calibration

This is to certify that the equipment

Description : Precision Sound Level Meter

Manufacturer : Rion

Model No. : NA-27

Serial No. : 00201194

*has been calibrated for the specific items and ranges.
The results are shown in the Calibration Report No. C093599.*

The equipment is supplied by

Co. Name : Envirotech Services Co.

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong*

Date of Issue : 10 July 2009

Certified by :


H C Chan

The test equipment used for calibration are traceable to the National Standards as specified in this report.
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Calibration and Testing Laboratory of Sun Creation Engineering Limited

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
Tel: 2927 2606 Fax: 2744 8986 E-mail: callaba@suncreation.com Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C093598

Certificate of Calibration

This is to certify that the equipment

Description : Sound Level Calibrator

Manufacturer : Rion

Model No. : NC-73

Serial No. : 10786708

*has been calibrated for the specific items and ranges.
The results are shown in the Calibration Report No. C093598.*

The equipment is supplied by

Co. Name : Envirotech Services Co.

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong*

Date of Issue : 10 July 2009

Certified by : 
H C Chan

The test equipment used for calibration are traceable to the National Standards as specified in this report.
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輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C093473

Certificate of Calibration

This is to certify that the equipment

Description : Precision Integrating Sound Level Meter

Manufacturer : Rion

Model No. : NL-18

Serial No. : 00360030

*has been calibrated for the specific items and ranges.
The results are shown in the Calibration Report No. C093473.*

The equipment is supplied by

Co. Name : Envirotech Services Co.

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
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Date of Issue : 6 July 2009

Certified by :


H C Chan

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Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C093472

Certificate of Calibration

This is to certify that the equipment

Description : Sound Level Calibrator

Manufacturer : Rion

Model No. : NC-73

Serial No. : 10997142

*has been calibrated for the specific items and ranges.
The results are shown in the Calibration Report No. C093472.*

The equipment is supplied by

Co. Name : Envirotech Services Co.

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong*

Date of Issue : 6 July 2009

Certified by : 
H C Chan

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Calibration and Testing Laboratory of Sun Creation Engineering Limited

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Website: www.suncreation.com

CERTIFICATE OF ANALYSIS



Batch: HK1006361
Date of Issue: 29/03/2010
Client: HYDER CONSULTING LIMITED
Client Reference:

Calibration of Turbidity System

Item : Turbidimeter
ALS Lab ID: HK1006361 -001
Date of Calibration: 26 March, 2010

Model No.: Eutech Instruments TN-100
Equipment No.: --
Serial No.: 215619

Testing Results :

Turbidity	Expected Reading	Recording Reading
	0.00 NTU	0.10 NTU
	4.00 NTU	3.75 NTU
	16.0 NTU	15.1 NTU
	40.0 NTU	42.9 NTU
	160 NTU	150 NTU
	Allowing Deviation	± 10%

Testing Method:

APHA (19th edition), 2130B


Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

CERTIFICATE OF ANALYSIS



Batch: HK1013850
Date of Issue: 02/07/2010
Client: HYDER CONSULTING LTD
Client Reference: TWDT (Tsuen Wan Drainage Tunnel)

Calibration of Turbidity System

Item : Turbidimeter
ALS Lab ID: HK1013850 -001
Date of Calibration: 25 June, 2010

Model No.: Eutech Instruments TN-100
Equipment No.: N/A
Serial No.: 215619

Testing Results :

Turbidity

Expected Reading	Recording Reading
0 NTU	0.09 NTU
4 NTU	3.97 NTU
40 NTU	40.7 NTU
80 NTU	77.5 NTU
400 NTU	435 NTU
Allowing Deviation	± 10%

Testing Method:

APHA (19th edition), 2130B

CERTIFICATE OF ANALYSIS



Batch: HK1011634
Date of Issue: 11/06/2010
Client: HYDER CONSULTING LIMITED
Client Reference: TWDT (Tsuen Wan Drainage Tunnel)

Calibration of Multimeter

Item : Multi-parameter Instrument/ Model No.: WTW pH/Oxi 340i
Mehrparameter-MeBgerat Equipment No.: N/A
ALS Lab ID: HK1011634 -001 Serial No.: 08101283
Date of Calibration: 01 June, 2010

1

Testing Results :

pH

Expected Reading	Recording Reading
4.00	4.17
7.00	7.18
10.00	9.95
Allowing Deviation	± 0.2 unit

Testing Method:

APHA (20th edition), 4500-H⁺B

Temperature

Expected Reading	Recording Reading
24.0 °C	23.9 °C
31.0 °C	30.8 °C
Allowing Deviation	±2.0°C

Testing Method:

In-House Method


Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

CERTIFICATE OF ANALYSIS



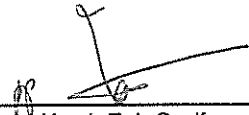
Date of Issue: 28/06/2010
Client: HYDER CONSULTING LTD

Calibration of DO System

Item : DO meter
Model No. : YSI 58
Serial No. : --
Calibration Method : This meter was calibrated in accordance with standard method APHA (21st Ed.) 4500-OC & G
Date of Calibration : 06 May, 2010

Testing Results :

Expected Reading	Recording Reading
5.27 mg/L	5.30 mg/L
6.64 mg/L	6.63 mg/L
7.43 mg/L	7.44 mg/L
8.27 mg/L	8.31 mg/L
Allowing Deviation	±0.2 mg/L



 Mr Chan Kwok Fai, Godfrey
 Laboratory Manager - Hong Kong

CERTIFICATE OF ANALYSIS



Batch: HK1013019
Date of Issue: 22/06/2010
Client: HYDER CONSULTING LIMITED
Client Reference: TWDT (Tsuen Wan Drainage Tunnel)

Calibration of Multimeter

Item : Multi-parameter Instrument/Mehrparameter-Mebgerat Model No.: WTW pH/Oxi 340i
ALS Lab ID: HK1013019 -001 Serial No.: 08101283
Date of Calibration: 17 June,2010

Testing Results :

DO

Expected Reading	Recording Reading
7.75 mg/L	7.84 mg/L
5.53 mg/L	5.66 mg/L
4.12 mg/L	4.28 mg/L
Allowing Deviation	± 0.2 mg/L

Testing Method:

APHA (20th edition), 4500-OC & G


Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong