

High Volume Air Sampler Calibration Worksheet

Project Title: Design and Construction of Tsuen Wan Drainage Tunnel
 Monitoring Location: Ho Fung College
 Calibration Date: 29-Mar-10
 Calibration Due Date: 29-May-10
 Time: 11:50

Sampler Model:	BM2000HX
Serial No.:	4994
Calibrator Orifice no.:	1559
Slope (m):	1.97702
Intercept (b):	-0.00070
Correction coeff. (r)	0.99992

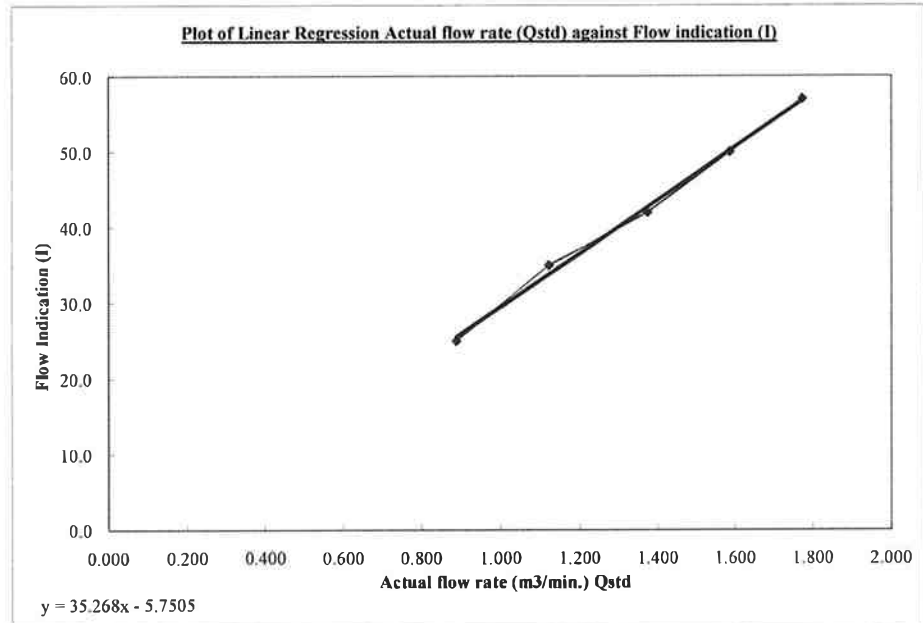
$$\text{Flow (corrected)} = \sqrt{H \times \frac{Pa}{Pstd} \times \frac{Tstd}{Ta}}$$

Standard pressure (mmHg) Pstd:	763.9
Standard temp. (K) Tstd:	290.8
Calibration pressure (mmHg) Pa:	765.0
Calibration temp. (K) Ta:	291.5

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

Sample no.	Pressure Drop (H), inch	Flow (corrected), m ³ /min	Actual flow rate (Qstd), m ³ /min	Flow indication (I), arbitrary
1	12.0	3.505	1.773	57.0
2	9.6	3.135	1.586	50.0
3	7.2	2.715	1.374	42.0
4	4.8	2.217	1.122	35.0
5	3.0	1.753	0.887	25.0

Correlation Coefficient : 0.9982



Remark
 1HPa = 0.750062 mmHg

Calibrated by: Tsang Yu Man
 (*Ts*)

Date: 29/3/2010

Checked by: Terence Kong
 (*Terence Kong*)

Date: 29/3/2010

High Volume Air Sampler Calibration Worksheet

Project Title: Design and Construction of Tsuen Wan Drainage Tunnel
Monitoring Location: Heng Hoi Chi Hong Ship Temple
Calibration Date: 29-Mar-10
Calibration Due Date: 29-May-10
Time: 11:15

Sampler Model:	BM2000HX
Serial No.:	5875
Calibrator Orifice no.:	1559
Slope (m):	1.97702
Intercept (b):	-0.00070
Correction coeff. (r)	0.99992

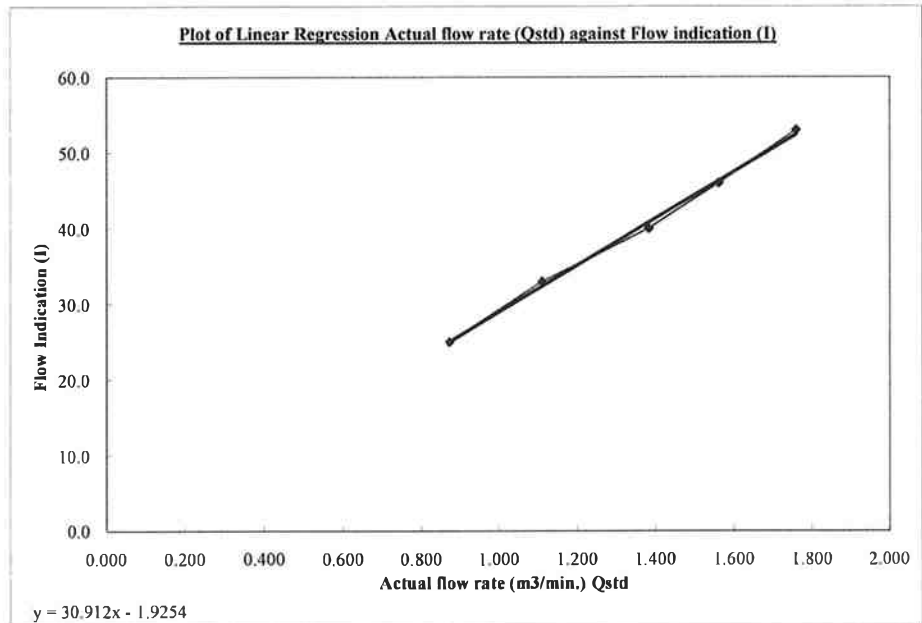
$$\text{Flow (corrected)} = \sqrt{H \times \frac{Pa}{Pstd} \times \frac{Tstd}{Ta}}$$

Standard pressure (mmHg) Pstd:	763.9
Standard temp. (K) Tstd:	290.8
Calibration pressure (mmHg) Pa:	765.0
Calibration temp. (K) Ta:	291.5

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

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	3.476	1.758	53.0
2	9.3	3.086	1.561	46.0
3	7.3	2.734	1.383	40.0
4	4.7	2.194	1.110	33.0
5	2.9	1.723	0.872	25.0

Correlation Coefficient : 0.9984



Remark
 1HPa = 0.750062 mmHg

Calibrated by: Tsang Yu Man
 (*Tsang Yu Man*)

Date: 29/3/2010

Checked by: Terence Kong
 (*Terence Kong*)

Date: 29/3/2010

High Volume Air Sampler Calibration Worksheet

Project Title: Design and Construction of Tsuen Wan Drainage Tunnel
Monitoring Location: Long Beach Gardan
Calibration Date: 29-Mar-10
Calibration Due Date: 29-May-10
Time: 10:00

Sampler Model:	TE5005X
Serial No.:	0390
Calibrator Orifice no.:	1559
Slope (m):	1.97702
Intercept (b):	-0.00070
Correction coeff. (r):	0.99992

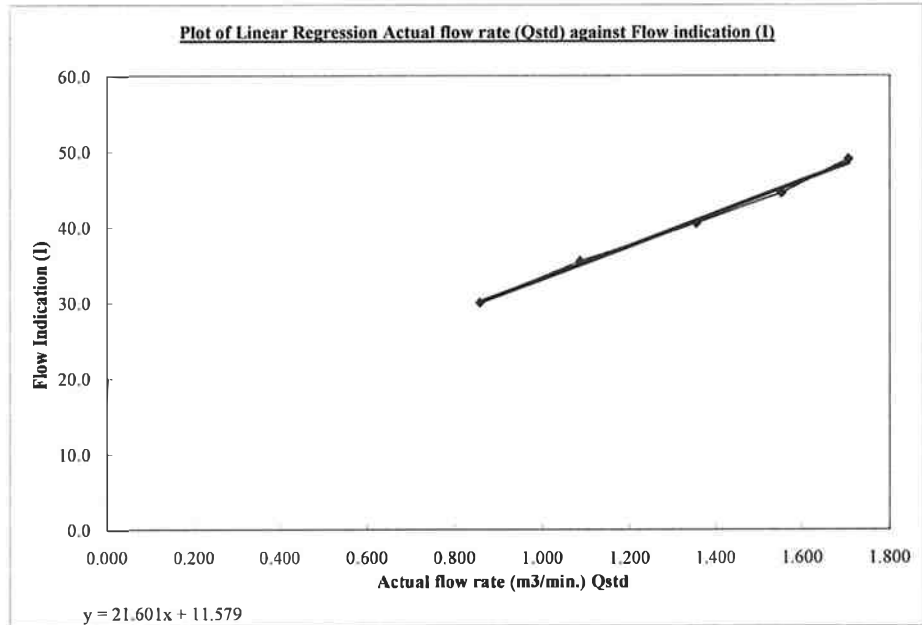
$$Flow (corrected) = \sqrt{H \times \frac{Pa}{Pstd} \times \frac{Tstd}{Ta}}$$

Standard pressure (mmHg) Pstd:	763.9
Standard temp. (K) Tstd:	290.8
Calibration pressure (mmHg) Pa:	765.0
Calibration temp. (K) Ta:	291.5

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

Sample no.	Pressure Drop (H), inch	Flow (corrected), m ³ /min	Actual flow rate (Qstd), m ³ /min	Flow indication (I), arbitrary
1	11.1	3.371	1.705	49.0
2	9.2	3.069	1.553	44.5
3	7.0	2.677	1.354	40.5
4	4.5	2.146	1.086	35.5
5	2.8	1.693	0.857	30.0

Correlation Coefficient : 0.9976



Remark
 1HPa = 0.750062 mmHg

Calibrated by: Tsang Yu Man
 (*Tsang*)

Date: 29/3/2010

Checked by: Terence Kong
 (*Terence Kong*)

Date: 29/3/2010

High Volume Air Sampler Calibration Worksheet

Project Title: Design and Construction of Tsuen Wan Drainage Tunnel
Monitoring Location: Greenview Terrace
Calibration Date: 29-Mar-10
Calibration Due Date: 29-May-10
Time: 10:40

Sampler Model:	TE5005X
Serial No.:	0646
Calibrator Orifice no.:	1559
Slope (m):	1.97702
Intercept (b):	-0.00070
Correction coeff. (r):	0.99992

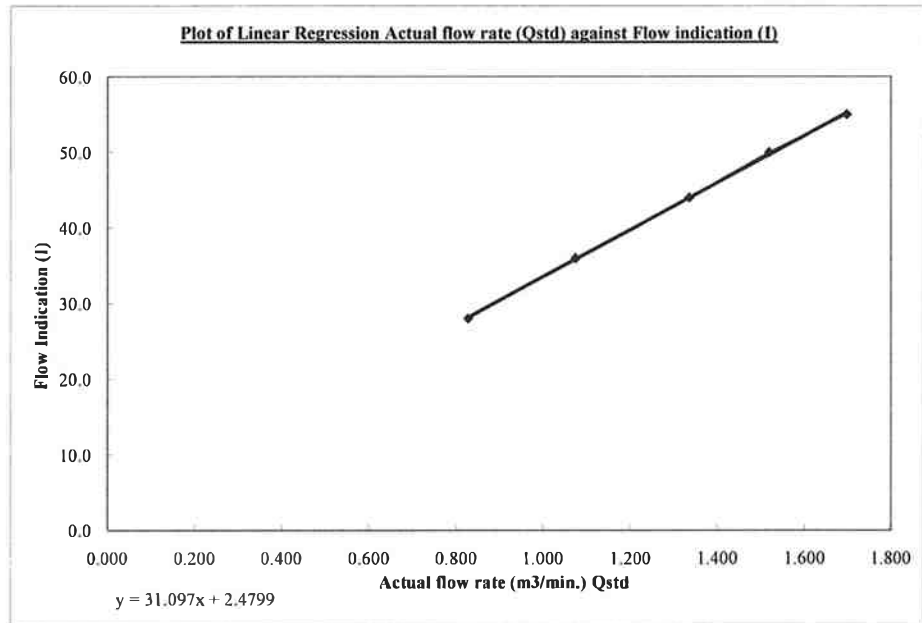
$$Flow\ (corrected) = \sqrt{H \times \frac{Pa}{Pstd} \times \frac{Tstd}{Ta}}$$

Standard pressure (mmHg) Pstd:	763.9
Standard temp. (K) Tstd:	290.8
Calibration pressure (mmHg) Pa:	765.0
Calibration temp. (K) Ta:	291.5

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

Sample no.	Pressure Drop (H), inch	Flow (corrected), m ³ /min	Actual flow rate (Qstd), m ³ /min	Flow indication (I), arbitrary
1	11.0	3.356	1.698	55.0
2	8.8	3.002	1.519	50.0
3	6.8	2.638	1.335	44.0
4	4.4	2.122	1.074	36.0
5	2.6	1.632	0.826	28.0

Correlation Coefficient : 0.9998



Remark
 1HPa = 0.750062 mmHg

Calibrated by: Tsang Yu Man
 (*[Signature]*)

Date: 29/3/2010

Checked by: Terence Kong
 (*[Signature]*)

Date: 29/3/2010



TISCH ENVIRONMENTAL, INC.
 145 SOUTH MIAMI AVE.
 VILLAGE OF CLEVELAND, OH 45002
 513.467.9000
 877.263.7610 TOLL FREE
 513.467.9009 FAX
 WWW.TISCH-ENV.COM

AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - May 18, 2009 Rootsometer S/N 9833620 Ta (K) - 293
 Operator Tisch Orifice I.D. - 1559 Pa (mm) - 765.81

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	1.4130	3.2	2.00
2	NA	NA	1.00	0.9900	6.4	4.00
3	NA	NA	1.00	0.8850	7.9	5.00
4	NA	NA	1.00	0.8420	8.7	5.50
5	NA	NA	1.00	0.6970	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
1.0205	0.7222	1.4317	0.9958	0.7047	0.8748
1.0163	1.0266	2.0247	0.9917	1.0017	1.2371
1.0142	1.1460	2.2637	0.9896	1.1182	1.3831
1.0132	1.2033	2.3742	0.9886	1.1741	1.4506
1.0078	1.4459	2.8633	0.9834	1.4109	1.7495
Qstd slope (m)	=	1.97702	Qa slope (m)	=	1.23797
intercept (b)	=	-0.00070	intercept (b)	=	-0.00043
coefficient (r)	=	0.99992	coefficient (r)	=	0.99992
y axis = SQRT[H2O(Pa/760) (298/Ta)]			y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

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

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

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

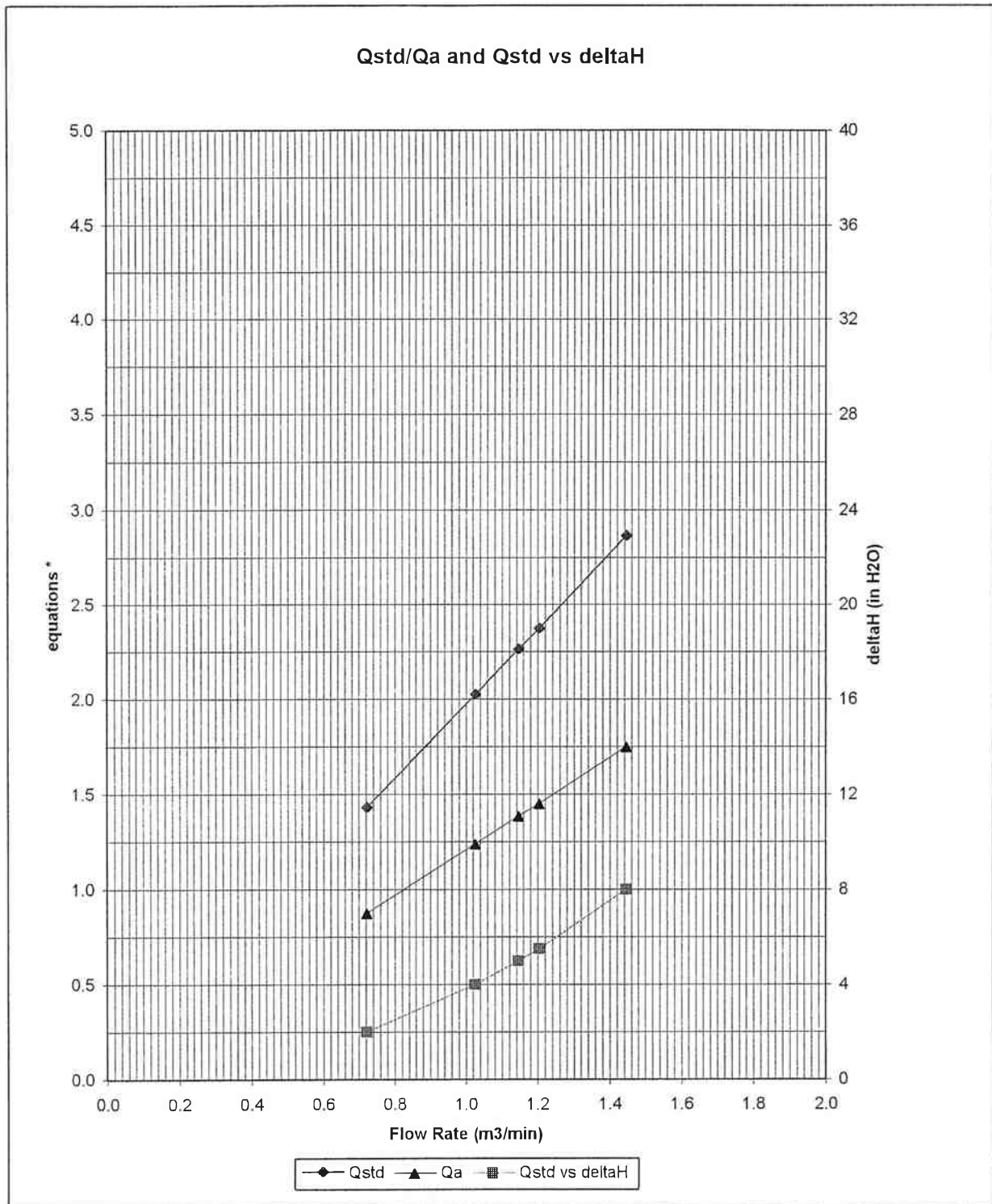
$$Qa = Va / \text{Time}$$

For subsequent flow rate calculations:

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

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

AIR POLLUTION MONITORING EQUIPMENT

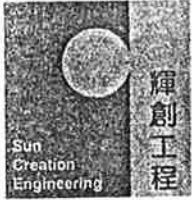


* y-axis equations:

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

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

1559



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,
Hong Kong*

Date of Issue : 6 July 2009

Certified by :

Chan H C Chan
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

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

Tei: 2927 2606

Fax: 2744 8986

E-mail: callab@suncreation.com

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

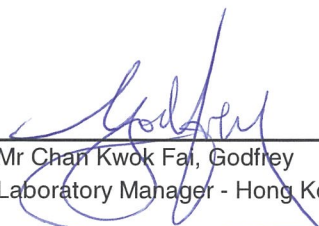
Item : Turbidimeter
ALS Lab ID: HK1006361 -001
Date of Calibration: 26 March, 2010
Model No.: Eutech Instruments TN-100
Equipment No.: --
Serial No.: 215619

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



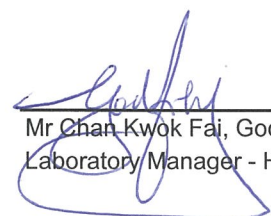
Batch: HK1004131
Date of Issue: 02/03/2010
Client: HYDER CONSULTING LTD
Client Reference:

Calibration of pH System

Item : Multi-parameter Instrument / Mehrparameter-MeBgerat
Model No. : WTW pH / Oxi 340i
Serial No. : 08101283
Equipment No. : --
Calibration Method : This meter was calibrated in accordance with standard method APHA (19th Ed.) 4500-H⁺B
Date of Calibration : 01 March, 2010

Testing Results :

Expected Reading	Recording Reading
4.00	4.14
7.00	7.10
10.0	9.95
Allowing Deviation	± 0.2


Mr Chan Kwok Faj, Godfrey
Laboratory Manager - Hong Kong

CERTIFICATE OF ANALYSIS



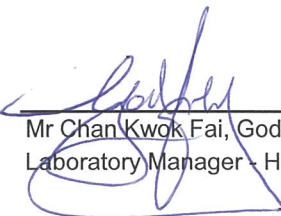
Batch: HK1004131
Date of Issue: 02/03/2010
Client: HYDER CONSULTING LTD
Client Reference:

Calibration of Thermometer

Item : Multi-parameter Instrument / Mehrparameter-Meßgerät
Model No. : WTW pH / Oxi 340i
Serial No. : 08101283
Equipment No. : --
Calibration Method : In-house Method
Date of Calibration : 01 March, 2010

Testing Results :

Reference Temperature (°C)	Recorded Temperature (°C)
22.0 °C	21.8 °C
35.0 °C	34.2 °C
Allowing Deviation	±2.0°C


Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

CERTIFICATE OF ANALYSIS



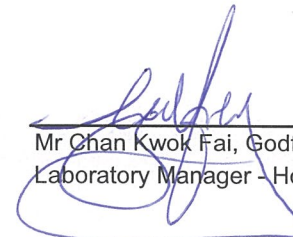
Batch: HK1004131
Date of Issue: 02/03/2010
Client: HYDER CONSULTING LTD
Client Reference:

Calibration of DO System

Item : Multi-parameter Instrument / Mehrparameter-MeBgerat
Model No. : WTW pH / Oxi 340i
Serial No. : 08101283
Equipment No. : --
Calibration Method : This meter was calibrated in accordance with standard method APHA (18th Ed.) 4500-O C & G
Date of Calibration : 01 March, 2010

Testing Results :

Expected Reading	Recording Reading
3.37 mg/L	3.38 mg/L
5.31 mg/L	5.50 mg/L
8.39 mg/L	8.47 mg/L
Allowing Deviation	±0.2 mg/L


Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong